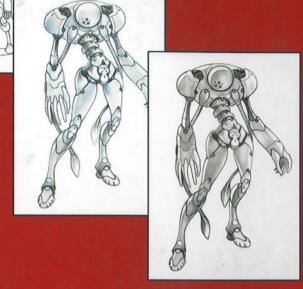


ABOUT THE AUTHOR

Keith Thompson is a renowned illustrator and conceptual designer who specialises in fantasy and science fiction art. His surreal and innovative work has featured in numerous books and magazines around the world, and is also available to buy as fine-art prints on his web site www.keiththompsonart.com. He lives in Ottawa, Canada.



RAH

ĎIZT

KEITH

Learn how to draw awe-inspiring robots for comic books, graphic novels and computer games with this practical, essential guide. From terrifying Victorian clockwork creations to the dark future's most lethal war machines, bring cold life to your robot art.

- Master the core skills for rendering robots: where to find inspiration; how to draw and colour your work using a range of media; crucial techniques for adding detail like electrical circuits, machinery and weapons
- Experiment with a wide range of robot styles, from basic tin men to sophisticated tank destroyers; fourteen supersimple designs will get you started
- Choose from the directory of 50 fantastical robot designs, each featuring step-by-step constructional drawings and instructions for shading and colouring

0 ROBOTS TO DRAW & PAINT CREATE FANTASTIC ROBOT CHARACTERS FOR COMICS, COMPUTER GAMES AND GRAPHIC NOVELS







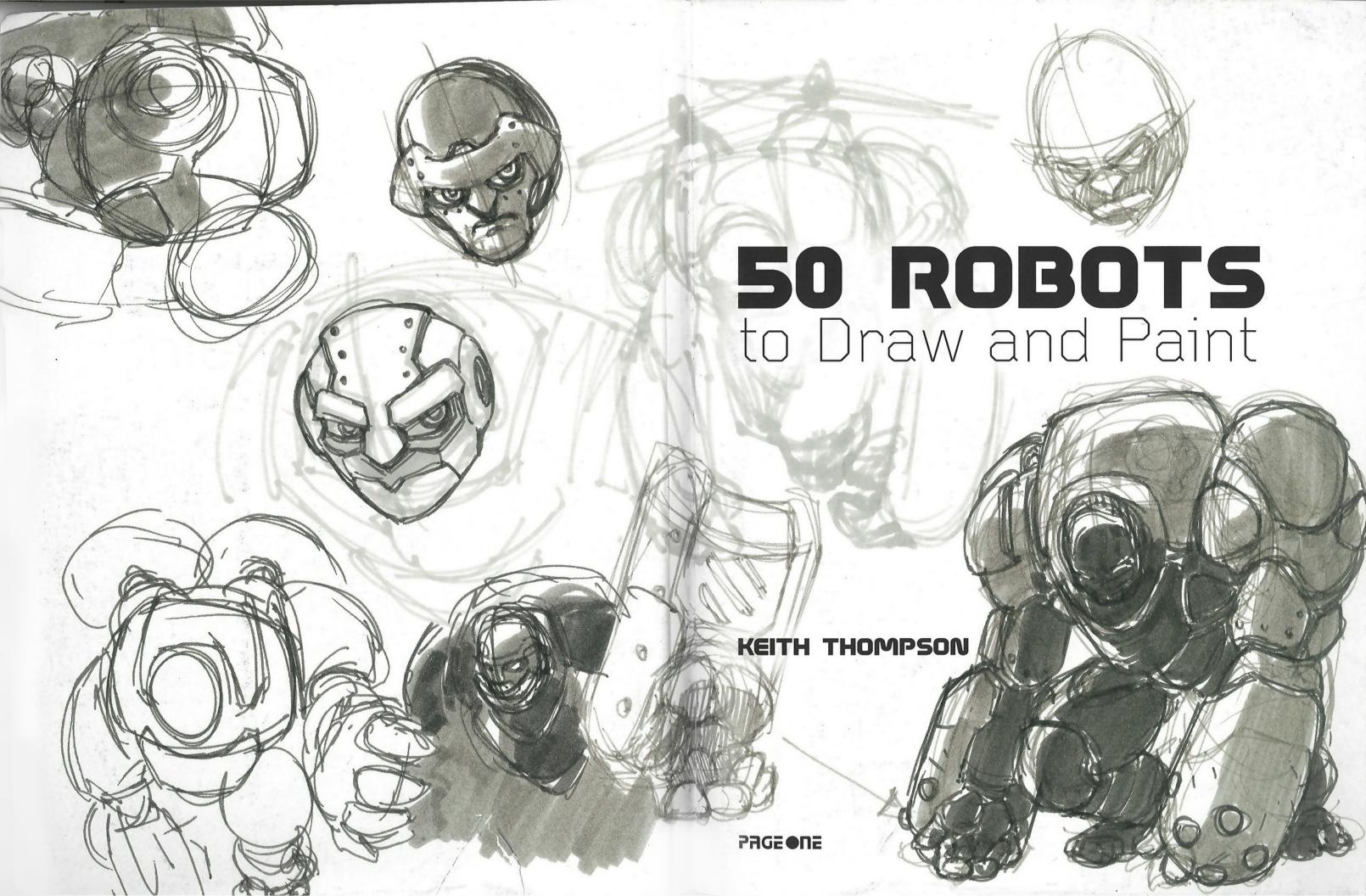


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50 ROBOTS

to Draw and Paint





A QUARTO BOOK

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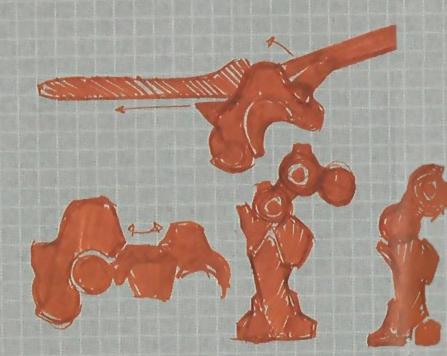
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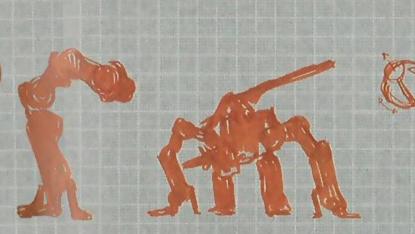
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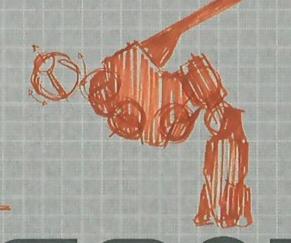
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SINTRODUCTION

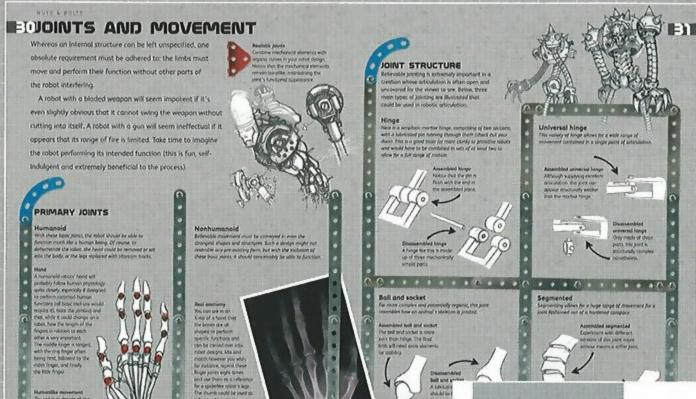
In 1921 Karel Capek wrote the play R.U.R. in which he took the Czech word 'robota', meaning 'enslaved labour', and adapted it, creating the term 'robot'. We live in a time in which robots are becoming pervasive, and yet the robot is still primarily regarded as existing in the domain of science fiction. Robots are unique in this respect, straddling the realms of fantasy and reality. Although they exist in our world, the word 'robot' tends to immediately conjure up impressions of futuristic technology or fantastical alchemical achievements.

This book is an expansive reference for both beginner and experienced artists interested in creating their own robot art. To start, the book details robot-art basics, giving you a familiarity with general techniques and approaches that can be readily applied to most types of art.

other than me, with their own opinions and methods. Some of these artists work traditionally, others digitally, and some, as I do, use a combination of the two. While the terms and tools may differ, the artistic advice is applicable to any robot artwork. Don't be afraid to simply copy what you find here: *

P.S. You may want to destroy all your art when the robot uprising occurs, as these insensitive "mechanist" caricatures will be greatly fromned upon.

Many of the robots have been created by artists - Leich flows



◀Nuts & Bolts

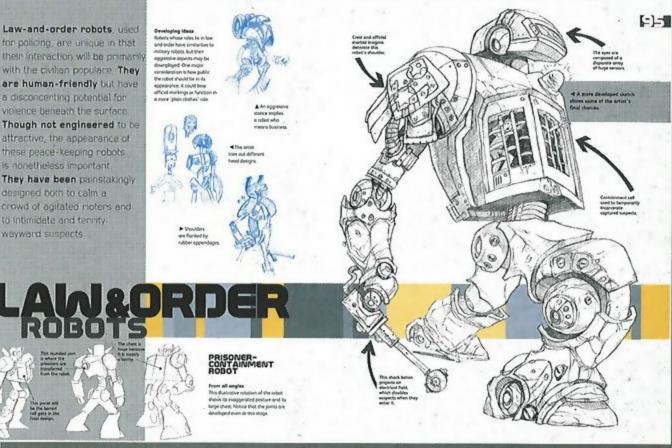
This section explains construction and how to conceptualize and render generic robot parts.

It offers an overview of elements you may wish to develop specifically for your own robots, and it discusses everything from joint and limb construction to props and tools.

Sketchpads ►

Sketchpad pages introduce subsections in the 'Robot Foundry' (see below). See how illustrators develop ideas and get them onto paper.

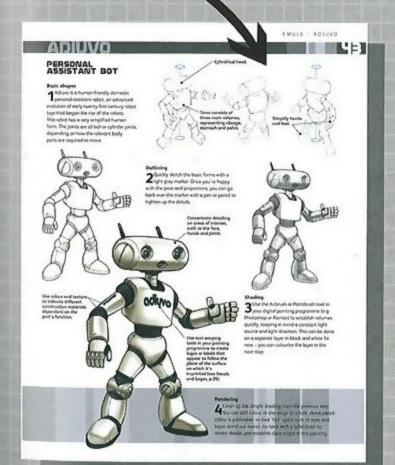
Alternate views and rotations let you see the pared-down elements of each robot design.



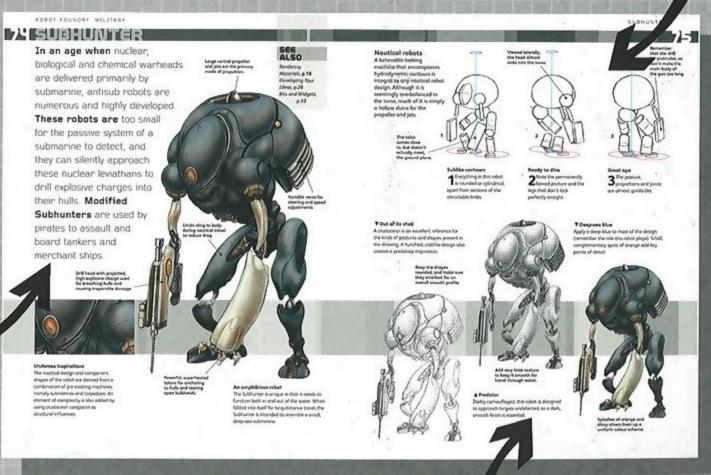
▼ The Robot Foundry

The core of the book, this part describes and demonstrates how to draw and paint 50 robots. The text and visuals guide you through the robot's artistic construction, explaining different points along the way. You'll be told what the robot is, where and when it exists, and what it does.

Each robot is broken down into primitive shapes, so you can easily see the basic construction and recreate it yourself.



Discover the conceptual process that went into imagining the robot and developing its appearance.



Step-by-step description of the drawing and painting process.

EINSPIRATION

Robots have always captured peoples' imaginations. The alchemists of old were obsessed with the idea of the homunculus: an artificial being created by humans; a robot. The popularity of robots has grown as we approach the age where they are actually coming into being.

In any subject, there is a wealth of artwork and creativity available to those willing to look for it, and collecting a body of inspirational material is an absolute necessity for the practising artist. Simply looking through much-admired art can open up the creative process, allowing your ideas to develop in all sorts of fantastical directions.

Novels and short stories also offer creative inspiration.

Reading provides an excellent opportunity to begin visualizing and creating illustrations to go with the amazing stories you've just read.

USEFUL WEBSITES

There's so much useful information for artists on the Internet that anyone can do a search on their own to find a wealth of inspiring material and information.

www.artlex.com

thousands of art term definitions and examples

www.artrenewal.org

the Internet's largest on-line museum

en.wikipedia.org

a great place for researching your subject matter

www.spectrumfantasticart.com

the best in contemporary fantastic art

www.eatpoo.com

an art site with an active and skilled forum of artists

www.cgtalk.com

on-line forum for the computer graphics industry

www.cgchannel.com

online magazine of computer graphics and effects

www.sijun.com

an inspiring forum of artists discussing their work

www.conceptart.org

some of the Internet's most imaginative artists

www.gfxartist.com

a great collection of artist-managed on-line galleries

www.epilogue.net

high-quality site of fantasy and science fiction art

9

Zoology

Take inspiration from scientists: adapt the efficient and complex evolutionary structures found in nature for use in your robots.

Documentaries

Want to develop a tank robot? You should probably have a look at some documentaries featuring existing tanks before you try to create your own version from scratch.



Books

One of the the best sources for conceptual inspiration, reading books is a fantastic way to exercise your mentalvisualization muscles.



Cinema

With the potential to be the most inspiring and engrossing of all media, cinema should not be overlooked.

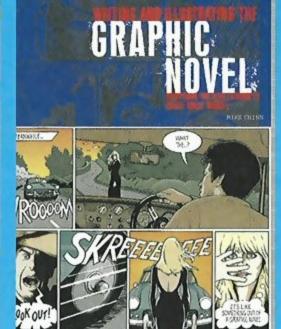


about b.



Internet

As long as you are prepared to do some thorough searching, the Internet can be a great source for robots.



Graphic novels

A gold mine of extremely original robot reference and inspiration, graphic novels, as well as Manga, tend to be exceptionally well-versed in robotic art.

IDRAWING AND RESEARCH

Classical art schools once stressed to pupils that one of the best ways to learn to make art is to study pre-existing art. It's also true that simple, repetitive practice can reap great results.

Life drawing is one of the prime staples of art education.

Although the drawing of nude figures may seem to be somewhat disconnected from the production of robotic art, it is a necessity. You will need to understand the three-dimensional form and its interaction with the environment in order to gain a mastery of rendering structure in all kinds of art.

Maintain a consistent portfolio of current artwork at all times. Aim to replace your least favourite pieces and 'clean house' occasionally to continually improve your portfolio.

Research and explore new areas; constantly bombard yourself with inspiration from unlikely places. You never know when inspiration will strike.

RESEARCH

The most outlandish designs always require a believable grounding in reality. This basic believability adds support to the weird and wonderful, and research is a necessity in science fiction. Proper research methods help an artist to form a more well-developed visual vocabulary and to create an image library from which he or she can draw in the future.

The Internet

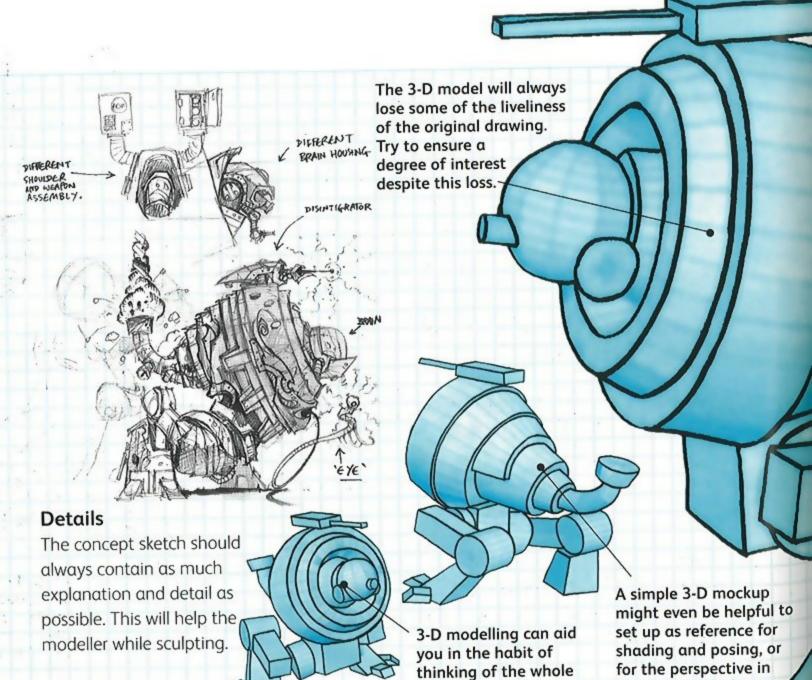
Easily the most streamlined and efficient resource, often one can find almost immediately more than one needs. An organized collection of bookmarks that grows over time can become a personalized library that the artist revisits with familiarity. Applications available for download or purchase can allow the artist to save whole galleries and webpages and then to customize them as a unique data bank for reference.

 One of the best tools for visual research is the image search engine.
 Always make sure to go through the

the final artwork.

CREATING CHARACTER SHEETS

If the robot you're designing is intended for repeated use, then it's probably a good idea to lay down some basic rotations to better understand its structure. These rotations will give you a reference to look back to when working on the robot, ensuring that visual consistency is maintained. They'll also get you accustomed to the robot from several angles and leave you with a solid mental impression and understanding of the robot for future work. Rotations are helpful for animation and group project work: they effectively explain to the animator, or to others working on the project, how the robot moves and which parts of the robot can shift or transform.



form of your designs.

advanced image search option. Set the image size to 'medium' or 'large'. This will ensure that the results are usable as visual reference.

- •It's usually a good idea to be overly specific in the search field at first and then to generalize if more results are needed. Try many different variants if results are poor.
- •Using +, and "" modifiers can help narrow down the search (see the search engine FAQ or tips section). Scan through the thumbnails presented until something catches your eye.
- •Chances are that when you find a great image, the page it's from will contain more of what you're looking for, so don't forget to look around if there's more to see. It's great to find images using the search engine, but finding a whole website that addresses your research goals is what you really want. The site might also have a section of links to other, similar sites.

Libraries/bookstores

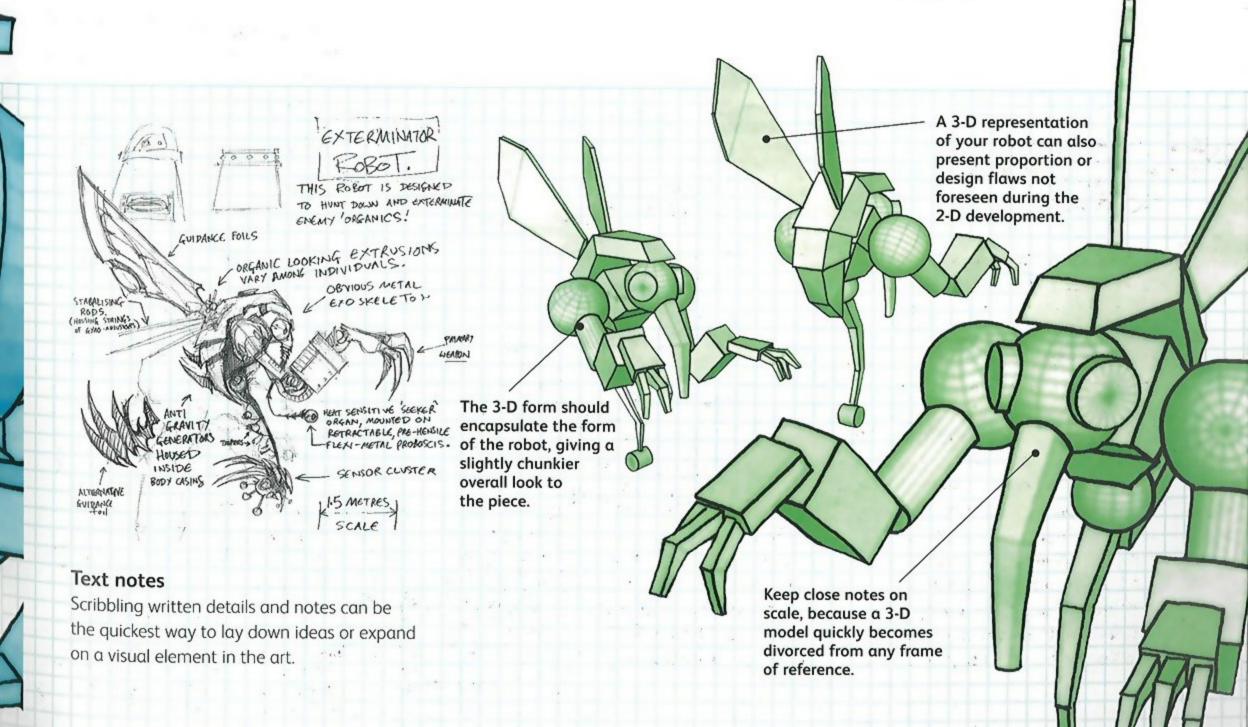
A good, image-heavy book can give an artist immediate access to a number of high-resolution images. A few good books, as applicable reference, are truly invaluable to an artist's work. Although the task of finding exactly what one needs can be both tedious and expensive, the payoff is always worth the hunt. When a good reference book is found, the artist has acquired a resource that can be consistently returned to.

Life observation

Technically, this method of research will always bring the best results. The problemis the artist's ability to acquire first-hand access to the place or situation needed. Time is also a constraint when using real-life as reference. People and still lifes tend to be the best subjects for personal observation as a method of reference and research.

Practise drawing

Simply producing frequent representative drawings is a perfect way to practise. Keep a notebook and draw your robot from a variety of different angles and ever-changing perspectives.



HWORKING TRADITIONALLY

Traditional mediums possess an inherent advantage over their digital counterparts: visual complexity. The algorithms involved in imitating a pencil's line on a computer cannot yet come close to representing the complexity that a pencil on paper can produce (eventually this will be overcome). By simply scanning the image, a slight choke point is introduced and some of its complexity may be lost. Certain tasks (masking, for example) present no material advantages in traditional procedures and should be relegated solely to digital process. Traditional and digital mediums should be recognized as noncompetitive elements serving differing roles, appropriately matching the desires and needs of the artist. The digital line may be far more valuable to some artists as it concerns smooth workflow and spontaneity, more so than the immediate aesthetic advantage derived from traditional linework.

▼ All shapes and sizes

Find your personal preference among the many types of erasers available.

- 2 Bevelled eraser in holder
- 3 Standard eraser

Trade tools

Blue Col-Erase can be used in a traditional, or a mechanical version.

TOOLS Blue Col-Erase pencils

Commonly used by animators, blue Col-Erase pencils are available from several different pencil manufacturers. They're distinct from graphite in that they are far less disposed to smudging and smearing. When scanned, their colour can be desaturated and resaturated in whatever hues the artist desires. A wide range of colours are available in Col-Erase, but differing binders and pigments can result in a noticeably varying softness and feel to the pencil (experiment, keeping in mind that the actual colour of the pencil is unimportant).

Pencil extenders

Simple pragmatism: with extenders you can run your pencils down much farther. Avoid using them for sweeping, gestural drawing as their balance and ergonomics leave something to be desired.

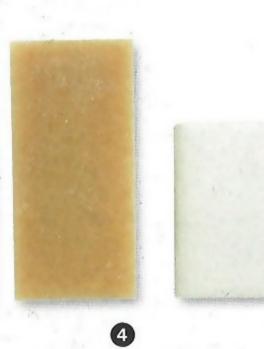
◀ Imbalance

Don't use an extender on a long pencil. It will add too much weight.

5

Relatively standard white eraser refills are made both for normal holders, and for electric erasers. Ensure the quality of the eraser before buying because it can vary widely. Good quality eraser sticks tend to be whiter and softer than their extremely poor, harder and yellower counterparts. The regular holder can be useful for immediate and precise erasing, but be sure that the tip is clean to avoid smudging. The electric eraser spins the tip of the eraser and is an extremely fast and efficient way of erasing heavy pencil work, while still being quite gentle on quality paper.





▲ Tint and texture

1 Textured, handmade paper

0

- 2 Smooth white paper
- 3 Watercolour paper
- 4 Tinted paper



▲ Extra sharp

If you find the electric sharpener insufficient, use some emery board to touch up the end of your pencil.

Paper

2

Pictured here is a variety of 250gsm paper, all of it good quality, with a slight texture. Again, experiment with different papers to see if you prefer a smoother or rougher texture. Paper should be heavy and tough enough to handle repeated erasure and drawing.

Electric sharpener

Ensure that it's the helical variety and not simply a rotating blade. While certain pencil tips (soft-edged, etc.) are better achieved with a craft knife, a good quality electric sharpener is extremely useful for general sharpening (especially in batches).

Hardboard

Experiment with different types of board to find the drawing surface that suits you best, one that's resilient enough not to bend.

▼ Base of operations

Choose a base that suits the weight of pressure you use with your pencil.



HELPFUL TIPS

Little tips like this can, cumulatively, save huge amounts of time, time that can be spent on actual artwork and not the frustrating minutiae of the craft.

- It's a good idea (beforehand) to have a series of pencils already sharpened and sharpened for differing roles (while it only takes a moment to sharpen a pencil, it still can break artistic momentum).
- Mount artwork on a series of hardboards. This keeps the artwork backed with a surface to draw on, in case you want to shift locations, and can avoid damage being done to the paper.
- Some artists tend to hate categorizing things and cleaning up areas of high activity. However, a simple well-designed system can help manage a balance between structure and spontaneity. Without one you're eventually going to lose something or need to hunt for something while working on your art. This effort can either be expended beforehand, or you can leave it until you're on a roll and have to break it to find a replacement eraser.

HOW TO SET **UP YOUR** WORKSTATION

Light source positioning is important when you're working traditionally. You'll want a bright light source coming through your windows from about a 10 o'clock position (if you are left handed, from 2 o'clock). This will minimize cast shadows falling over your work.

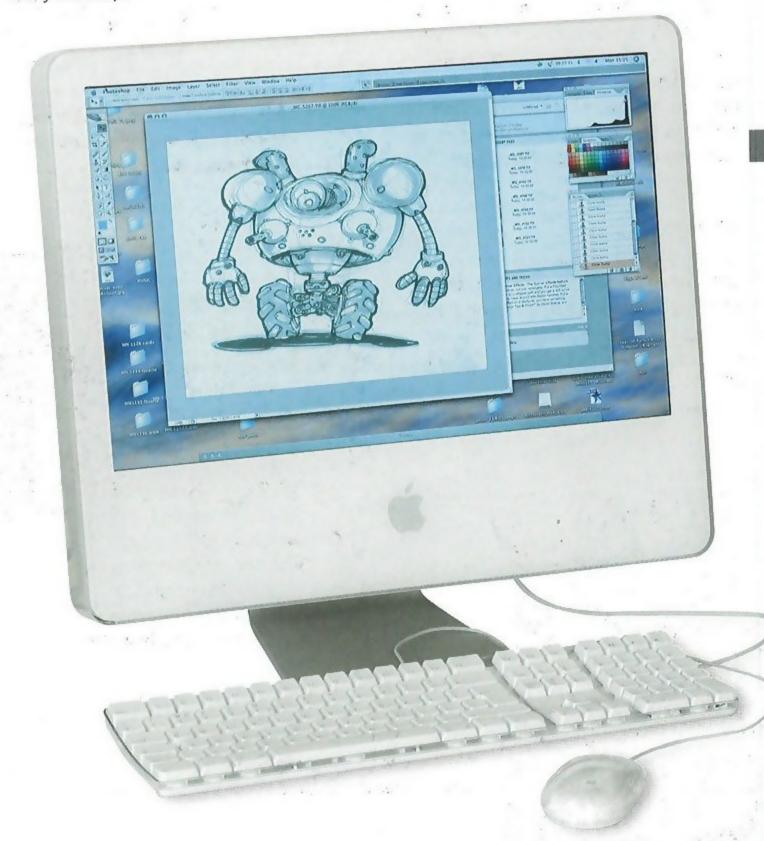
The larger and cleaner the working surface, the better off you are. Have everything prepared and within immediate reach without cluttering the work space. If using paints, or anything that gives off fumes, ensure you're working in an extremely well-ventilated area.

LIWORKING DIGITALLY

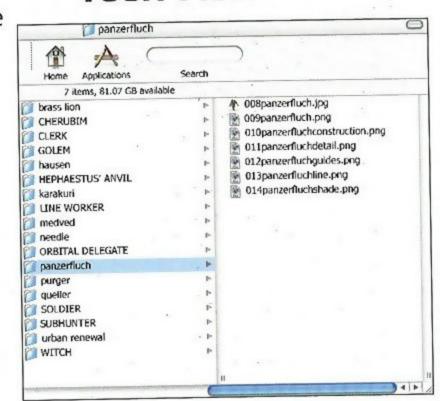
When working digitally, it is a good idea to proceed in batches. If you are working on several projects at once, leave tasks to be done collectively. Scanning a series of drawings all at once saves time compared to setting up individually for each piece of art. Even for more manual tasks, such as digitally cleaning up the scans, it can save time if the work is done serially (one tends to gain momentum in laborious tasks, and it's a good idea to use this built-up momentum efficiently).

Monitors

Your computer will depreciate rapidly over time but a good monitor will be just as valuable as the first day you bought it. A multi-monitor setup is an excellent way to expand your working space, and is suprisingly easy to set up.



HOW TO ORGANIZE



Keep computer files alphabetically ordered. Remember, with numbers, to keep a zero as a placeholder for numbering systems in series that reach at least double digits (11.jpg will be listed higher than 1.jpg, but not 01.jpg).

HOW TO SET UP YOUR DIGITAL WORKSTATION

When working digitally, you'll want no light source but that coming from your monitor. Glare and reflections dramatically reduce your ability to see subtleties on the screen. If working for an extended period, take breaks and go outside to view objects at varying distances, otherwise your eyes may become extremely strained, resulting in problems focusing and headaches. Choosing the right chair can be extremely important. It ensures that your posture isn't too bowed when working: back problems or even compaction of the lower organs can develop. Repetitive strain injuries can be avoided by regularly switching from the tablet to the mouse while working. Intermittently switch projects if rote processes are required.



TOOLS

Scanner

Avoid scanners that are thin, or tout speed as a prime feature.

Apparently, the heavier the scanner the thicker its glass plate, which can improve the quality of the scan. Be sure the light is off when not in use; this can save wear on the bulb and preserve scan quality. (There are usually bulb-saving features that automatically turn off the scanner, but they can be unreliable. It's a good idea

just to unplug the power from the scanner when not in use; this means the scanner has to warm up when it's turned on, but the increase in longevity is worth it.)

Although you may want to scan strange materials for use in art (wood, roughly painted textures, etc.), be careful you don't scratch or mark the glass surface in the scanner.

Tablet

Although there's still a lot to be improved upon in terms of technology, the tablet is a necessary tool for working digitally. Experiment with tablet sizes, but because a degree of visual disconnection will always be present, a larger tablet might not be worth its ungainly size or the impediment of having to use the keyboard and mouse in conjunction with the tablet. On multi-monitor setups, ensure that the tablet is designated to work only on the primary monitor. Use a mouse to access secondary displays.

Tablet PC

These may be seen as an alternative to desktop PCs, or as an accompaniment to your main workstation. Although this model has no pressure sensitivity, being able to draw directly on the screen has its advantages (especially for tedious labour, such as masking an image). With a wireless network, all art files can be kept in a shared file on a main computer and accessed from the laptop with ease. This avoids constant file transfers and the attention paid to which computer holds the most recently modified file.

Digital camera

Nothing fancy is necessary here: a cheap digital camera is excellent for setting up reference shots. Examples could be how light falls in from a window, references for foreshortening, and perspective references.

◀GatewayThe scanner i

The scanner is your gateway from traditional to digital. Ensure that the quality of your traditional sketches is not being lost in translation.



▲ Digital sketchpad

A tablet PC might be exceptionally helpful to the artist who works in a completely digital medium.



▲ Picture quality

For taking photos to use in your art, it's best to invest in a top-of-the-line camera, but for reference snaps, a handy digital will be your best friend.



Although there's a lot of room for technological improvement, a basic tablet is still a necessary tool for most digital artists.



IT-JARTISTIC RENDERING

You will develop your own way of executing specific techniques, and the culmination of your differing approaches will give your art a distinctive thumbprint and style. However, before you can use them to your benefit, first you must grasp the fundamental functions of these basic techniques.

Contour lines

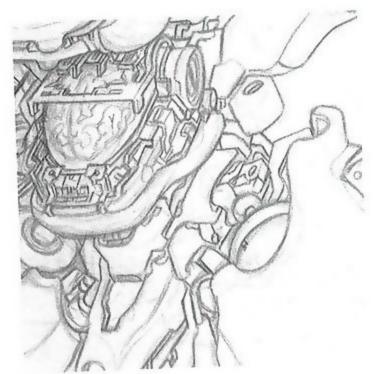
At first seeming formless, notice how closely these loose lines conform to the lines in the next step.

Remember that, although flat and two-dimensional, the curves of lines can convey a great deal about the form, which will become even more apparent later in the process. All other steps rely upon the quality of the contour line.



Loose line

Don't be afraid to draw forms overlapping each other: as long as the line is light it can be worked out later.



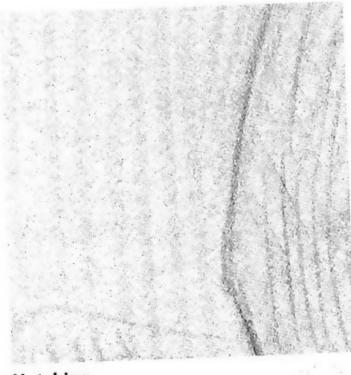
Tight line

2Go in with a precise eraser and remove any overlapping lines that remain too apparent.

Hatching

Line hatching should always seem to lie on top of the plane it's texturing or shading. If the plane has a bump, or shifts, the hatching should follow this shift identically.

Cross hatching is a secondary application of hatching that coincides with the initial application. While travelling at a different angle, the second set of hatching must conform to the surface of the plane just as much as the first.



Hatching

The trick is to allow your motor skills to keep the lines consistently spaced and relatively smooth.



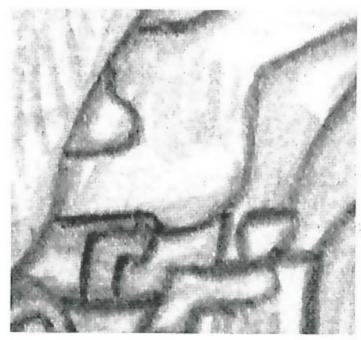
Cross hatching

2If you stiffen up and try to be too precise with the hatching, the lines will become wavy and stilted.

Shading

Mainly functioning to bring texture, this light hatching is also prevalent in areas of high shadow.

If a plane shares the same angle, it should probably also share the same shading. An exception to this may include reflected light, or a differing material composition.



Line shading

Loosen up, but don't become careless with this application of linework.



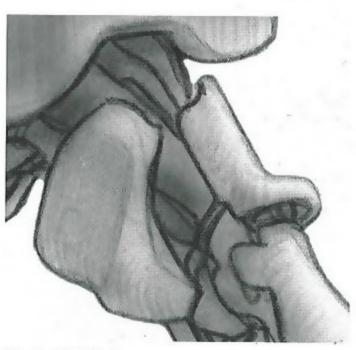
Digital shading

2 Avoid attempting an overly dynamic contrast that may end up obscuring important details.

Highlighting

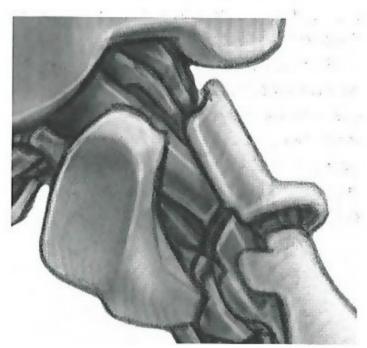
Although suitably shaded, this section can be given even more form by applying a layer of highlighting.

Additive tints of white run along raised sections of this robotic limb section. This highlighting adds more contrast and even seems to make the shading darker.



Basic highlights

Basic plane shades are achieved at this point, but you can punch them up a little bit more.



Sharp highlights

2 Your tight highlighting can end up developing even more complex forms in the robot's surfaces.

Glazing

Remember that the colour of the entire piece before glazing will show through and affect how the glazes appear. A warm base tends to give the colours an attractive richness.

Note how much colour variance results from a glaze; because it's additive, no colour in the process is lost, only compounded.



Coloured ground

Start off with a basic textural surface, including a slight degree of inconsistency and roughness.



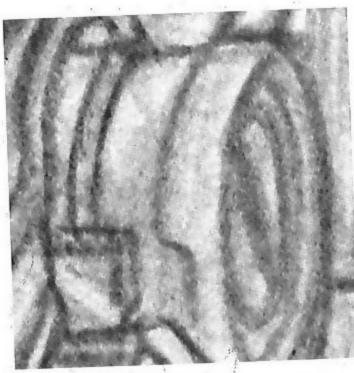
Glaze coat

2 Be moderate with the shading and highlighting here. The metal is covered in a layer of paint, so there will be no glinting or strong metallic contrasts. The paint covers the entire material, and the indication of its original composition is primarily textural.

ERENDERING MATERIALS

Being a manufactured entity, robots will usually be composed of several different materials that can often have widely varying appearances. Immediately one would default to simply assuming they're made of metal, but first take a look at a car and its materials: note the different types of metal, glass, rubber and plastic. An inclusive material complexity is key to creating a believable and interesting robot.

Polished/lubricated metals



Shapes and structure Not intended for heavy exposure, this material can be used for exposed internals and jointing.



Shade Extremely heavy contrast is applied here with bright, crisp highlights.

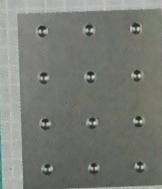


Hue Highly reflective, the material will include the colours of the surrounding materials. Highlights are extremely bright white.

Although a robot can be made of any material the artist desires, the classic form will probably have a mostly metallic composition. From the gleaming chrome publicservice robot, to his rusted and pitted street-sweeper contemporary, metallic robots can have a vastly varying appearance. Both aesthetic and conceptual concerns will dictate what types of metal you choose for your creation.



Oxidized copper Worn metal that's had a reaction take place on its surface will begin to show blotchy patching and a rough texture.



Punched

aluminum Some types of polished, clean metal surfaces will show a general gradient on its surface with highly reflective spots where the surface has changed (in this case, small studs).



Brushed stainless steel Begin a surface such as this with a general gradient that would suit an extremely polished surface, but then distress it slightly for a less reflective, brushed look.



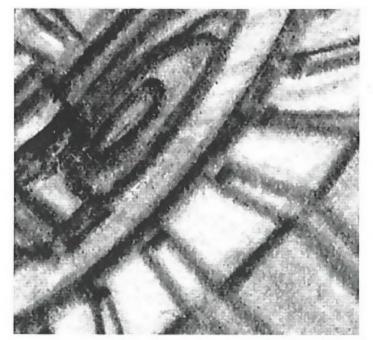
Copper Notice the colour shift on this metal: the distinct copper-orange isn't solely important. Offset it with a slightly desaturated purple as it moves into the shade.



Split, stretched steel If a part of your robot needs freedom of movement or the ability to deform, you'll want to think of a pattern that allows for stretching and bending in most any direction.

19

Brass



Line

Gun metal

Being a bare metal, start off with some heavy darks. Leave clear areas for the later application of highlights.



Shade

2When shading and highlighting, lay in basic planes and edging.



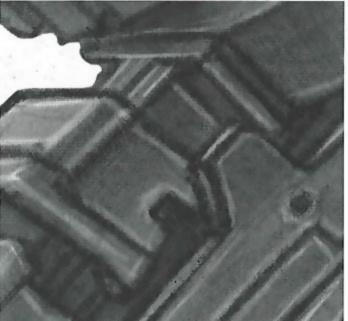
Hue

When coloured, the distinct nature of the metal comes through. Highlights tend to be white, and the majority of colour is grey. The transition from shade to highlight dictates the colour for the whole material.



Line

Very strong lines are initially important here to ensure a machined appearance and dark contrast for the later steps.



Shade

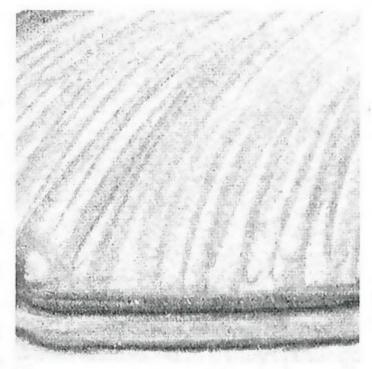
2 Shading should be overall dark, with stiff and stark highlights only.



Hue

3Remember that gun metal, though drab, will still reflect the hue of local colours.

Painted metal



Line

Start off with a basic textural surface, including a slight degree of inconsistency and roughness.



Shade

2Be sparing with shading and highlights. The metal is covered in a layer of paint, so there will be no glinting or strong contrast.



Hue

3 The paint covers the entire material, and the indication of its original composition is primarily textural.



Shiny laminates



Line

The linework is serving the form primarily. Little indication needs to be given of the material at this point.



Shade

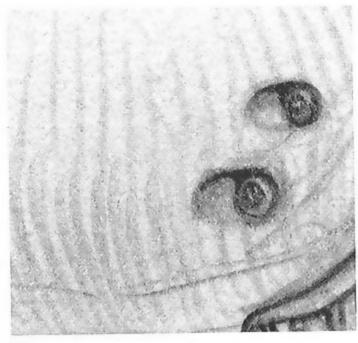
Notice that no distinct surface texture is used. The blurry quality and shine is simply the environment playing off the reflective surface.



Hue

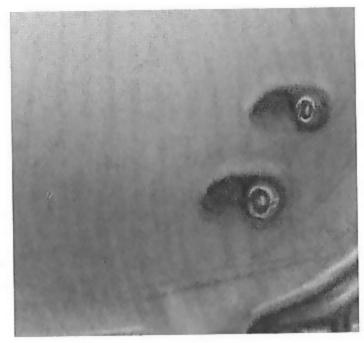
The hue is mostly reflecting the lighting of the environment. Stark highlights next to slightly darkened strips glint and show off the reflective material.

Plastic



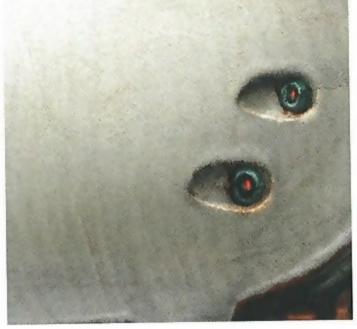
Line

Whereas initially textured much like painted metal, this is more for definition of form and will later be toned down heavily.



Shade

The shading and highlighting is gentle even for a slightly shiny plastic.



Hue

Here we can see how toned down the texture has become and how the glazed colour is much more subtle than on the metallic surfaces.

DECALS AND LOGOS

A decal, or label, is simply a two-dimensional image laid onto a three-dimensional surface. A simple way to understand this is to imagine the decal contained inside a corresponding box or grid. When this box is laid flat over the surface of the object, the decal will curve and deform in a consistent manner to that of the box. Note how the curve of the containment box also corresponds to the contour hatching applied earlier.



Convex

The decal bulges out over the robot's surface, its centre stretching.



Concave

The decal curves into the depression of the surface on which it's imprinted.



Perspective 1

Lettering will diminish in size if the robot is turning from the viewer.



Perspective 2

Decals will conform to the perspective from which you draw your robot.

LIFE IS YOUR PALETTE

You can use pretty much any material that comes to mind to construct your weirder robots. You may have a great visual picture in your mind of a robot made of sponge. Just make sure that your backstory serves this initial vision. Don't be afraid to try things that may initially seem ridiculous. Use your imagination and do some research to make your implausible idea usable.



Overlaid pattern

The actual material may be unimportant if the robot is decorated with a pattern for ceremonial reasons.



Amorphous material

Your robot might be made of a clear material, like water, that can form shapes, and even function as aquatic camoflauge.



If your robot is heavily armoured it may be plated in ceramics such as boron carbide, which offers incredible ballistic protection.

914141411141141414141414141



Wood

Some primitive robots may be constructed with wood, of which there are many variants. Choose an exact texture, colour and type.



Stone

A golem or magically created robot may be made of stone or some other earthy material that's animated by a sorcerer.

Organic shells or carapaces may

partially organic robot, giving it

the appearance of a crustacean.

be vat grown and used in a



Iridescent fibre

Materials such as iridescent

impression of extremely

sophisticated technology.

synthetic fibre weaves give the

Plastic

Plastics look deceptively easy to render, but their particular specularity and hues are often quite unnatural and difficult.

Foam

Ceramic

Soft foam materials can be used on robots that deal with people in a delicate fashion-a child's robotic nanny, for instance.

Transparent film

Lay a textured, plastic film over your robot's surface. Light and shadow will be the only things to indicate this near-invisible film.

Organic

Shells



Line

Loosen up and keep the shapes flowing. Line weight should vary greatly.



Shade

The shading handles more of the soft, smoothly textural surface, rather than using the line to achieve this.



Hue

A lot of warm colour variation is used for The organic material, and a slight shine is given to indicate moisture.

THE WHOLE PROCESS

On the following pages you will be guided in detail through every step involved in the process of creating a robot from scratch. This, of course, is only a single, specific way to go about things, and you should develop your own techniques, adding to or removing from the steps seen here. The following sequence combines drawing and painting. The main mechanics

LINEWORK

Some parts – such as the ammo drum – will undergo a slight change after

this step.

Don't be afraid if the thumbnail seems like nonsense to a regular viewer: what's important is that you understand it.

The thumbnail

The basic shapes and ideas of the robot are conceived in this step. Note the details that appear in this stage: the dual eyes are far more important to the design than the details of the arm mechanisms.

(see Joints and Movement, p.30).

and jointing is solidified

Although the drawing is coming together, don't get complacent.

Loose linework

Recognizable elements of the robot take Ishape at this point. Remember to keep

the linework light in this step. Details that have not yet been conceived need to be

developed at this point, so take your time.

Loose gesture

This step is basically Laying in the proportioning at full-size. These lines will be carried through to the finished piece, so be gentle with line weight. Although it should follow the thumbnail closely, remember that the curves and shapes should also result in an improvement over the thumbnail's.

Tightened contour line

The final lines are laid in at this step, and this contour will show in the final piece, so take care. All the major structures and details are rendered at this point, from the shape of the large leg plating to the internal sockets visible in the pelvic gap.

SHADING

Hatched, finished line

This step uses hatching and bolder line definition to add a degree of form to the flat drawing. Traditionally, this is the last step before scanning the image into the computer so make sure you're satisfied.

Highlighting will increase the readability of detailed parts.

Remember that it will be easier to remove linework in the computer rather than add it in after this step.

Highlighted

A new layer is set over the top and tints of white are added in places that require highlighting. Many of the applications of highlighting are as much drawing as painting and are resultantly quite linear.

The shading should serve as an indicator of visual importance, as well as realism.

Shaded

After scanning, a transparent layer is set over the top of the robot. Black is applied in degrees of opacity to fill in planes that will be darker and cast in shadow.





CHOOSING A GROUND

Your canvas ground will affect the whole impression and style of your art, and choosing the right one is an extremely important step. Anything can be used, and its attractiveness to you and the suitability to the art are your primary concerns. Ensure that there are no large contrasts between light and dark as this will conflict with the painting later on. If you can scan it, it can be used as a ground.

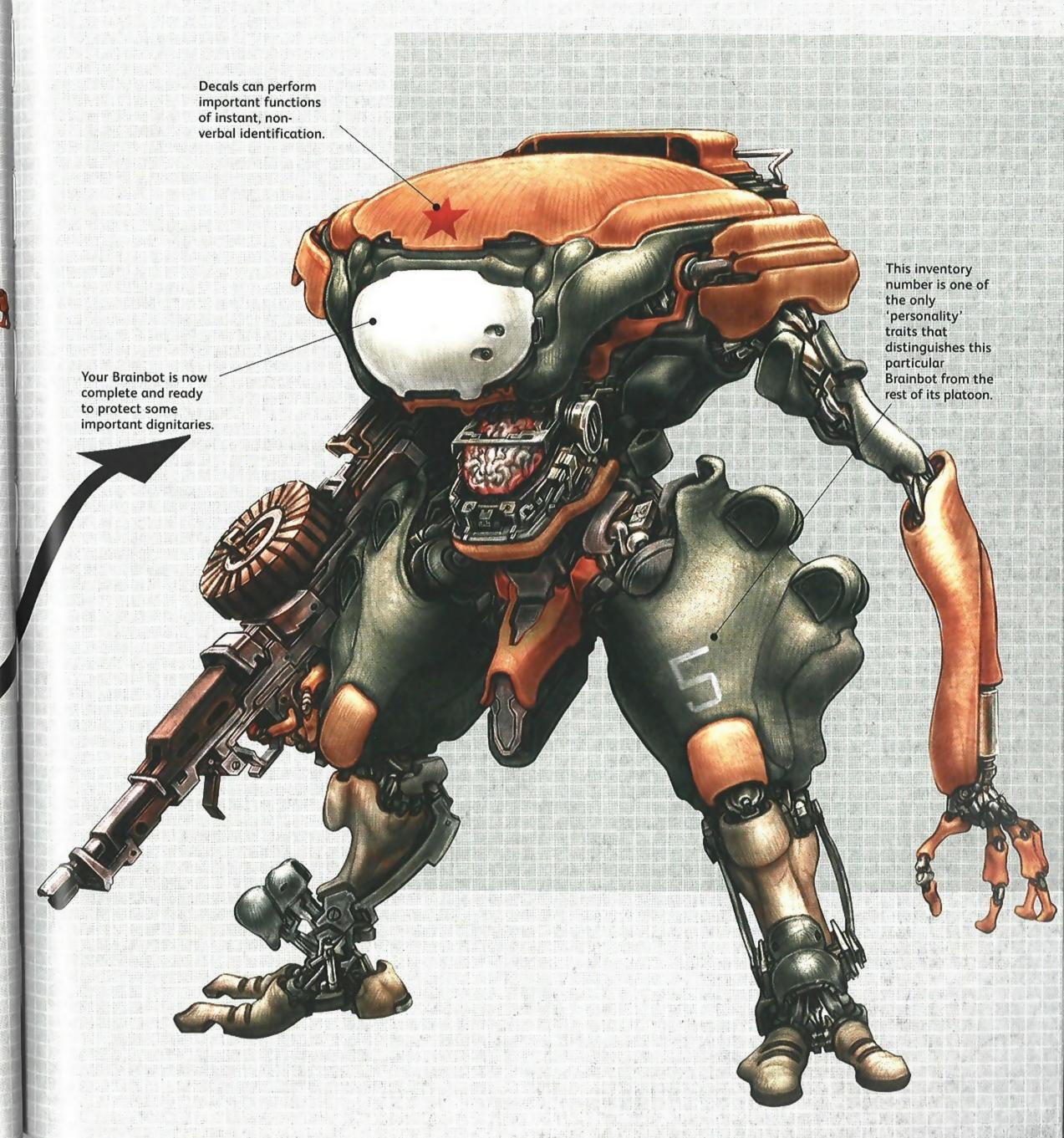
Second glaze coat

10 This second, independent layer of glazing will deal with reflected light and deliver an added spectral complexity.



Finishing steps

This step will wrap up the finished piece and involves adding little details. Decal application should probably occur at this step, as well as slight saturation tweaking and visual effects such as LEDs and rusting or staining.



E-DEVELOPING YOUR IDEAS

Work as small or as large as you prefer, but the function of this step is to lay down generalized designs as fast as possible while focusing on major elements and shapes. Often a thumbnail may be so minimalist that only the artist can make any sense of it; being able to construe the finished product from this step is an important skill. Of course, by no means should you limit yourself to the design produced at this stage, and if additive improvements are conceived, they should definitely be worked into the design as the art progresses.

Orbital Delegate: Evolution of function



▼ ▲ The Orbital Delegate (p.104)
was initially more of an Orbital
Paratrooper, seen here as a grounded
soldier incapable of flight.



Brass Lion: Dramatic progression



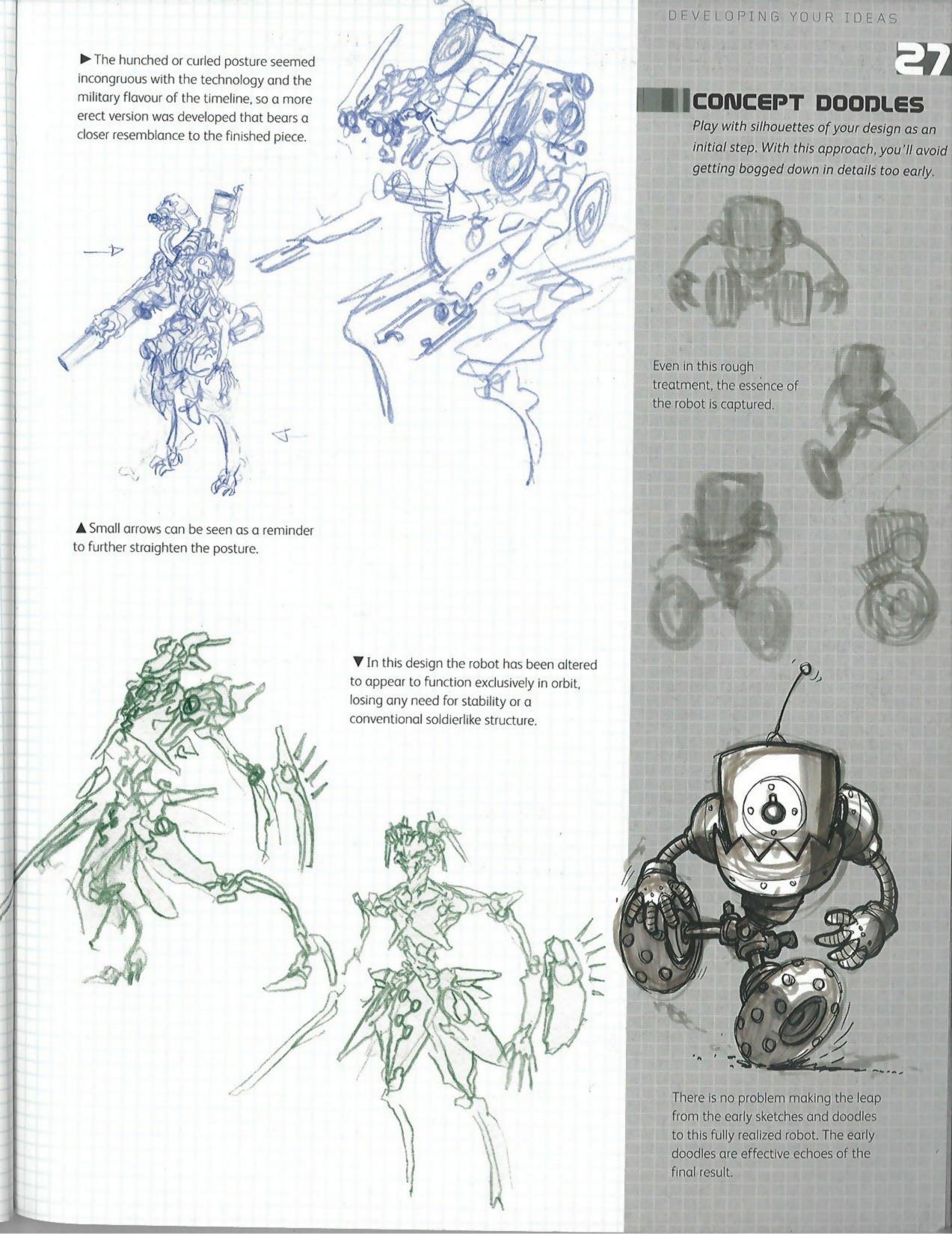
▲ Here we can see the dramatic progression occurring in the development of Her Majesty's Honourable Brass Lion (p.58). Initially starting as a more arachnid or bestial form, it was then modified to a humanoid shape.

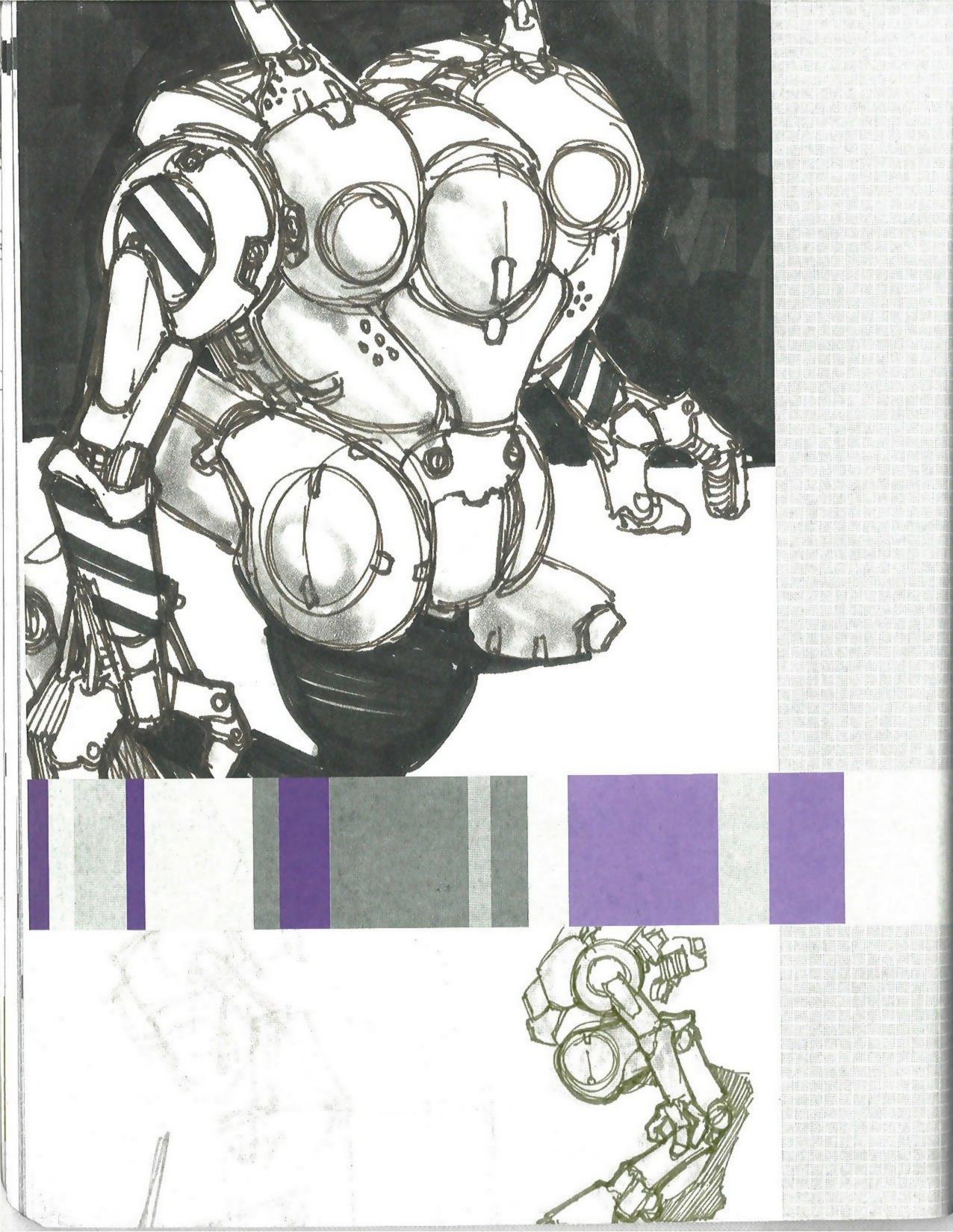
Encyclical Purger: Similar re-workings

► Here we see many versions of the Encyclical Purger (p.102), all of which bear a close resemblance to each other. No real thumbnail was used as a final, and the completed piece takes elements from differing thumbnails; it also utilizes aspects not yet appearing at this stage.



▲ The second step shows a rotated view of a similar soldier with extraneous gear for functioning in space.











A robot is a sum of its parts. The details you decide to include in your construction are important in and of themselves. This section will guide you through the construction of jointing and articulations, through to the devices and tools attached to, or held by, your robot. These details will indicate to your viewer that your robot is lithe or lumbering, constructive or merely destructive.

是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就 第一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就

FIJOINTS AND MOVEMENT

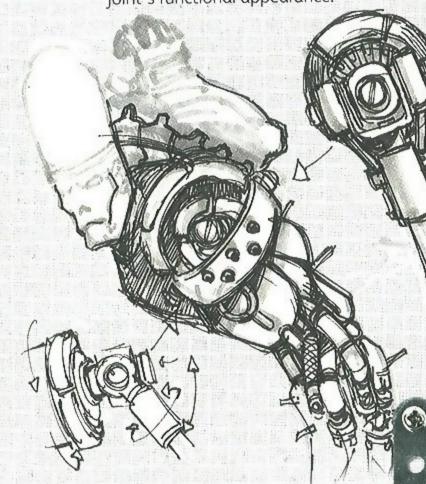
Whereas an internal structure can be left unspecified, one absolute requirement must be adhered to: the limbs must move and perform their function without other parts of the robot interfering.

A robot with a bladed weapon will seem impotent if it's even slightly obvious that it cannot swing the weapon without cutting into itself. A robot with a gun will seem ineffectual if it appears that its range of fire is limited. Take time to imagine the robot performing its intended function (this is fun, self-indulgent and extremely beneficial to the process).



Realistic joints

Combine mechanical elements with organic curves in your robot design. Notice that the mechanical elements remain bonelike, maintaining the joint's functional appearance.



PRIMARY JOINTS

Humanoid

With these basic joints, the robot should be able to function much like a human being. Of course, to dehumanize the robot, the head could be removed or set into the body, or the legs replaced with titanium tracks.

Hand

A humanoid robots' hand will probably follow human physiology quite closely, especially if designed to perform common human functions (all basic tool-use would require it). Note the jointing and that, while it could change on a robot, how the length of the fingers in relation to each other is very important.

The middle finger is longest, with the ring finger often being next, followed by the index finger, and finally the little finger.

Humanlike movement

The red dots denote all the main points of articulation needed for a robot to function in a believable manner.



Believable movement must be conveyed in even the strangest shapes and structures. Such a design might not resemble any pre-existing form, but with the inclusion of these basic joints, it should conceivably be able to function.

Real anatomy

You can see in an X-ray of a hand that the bones are all shaped to perform specific functions and can be carried over into robot designs. Mix and match however you wish: for instance, repeat these finger joints eight times and use them as a reference for a spiderlike robot's legs. The thumb could be used as reference for a single, articulated gunmount that can move freely on its attachment to the robot.

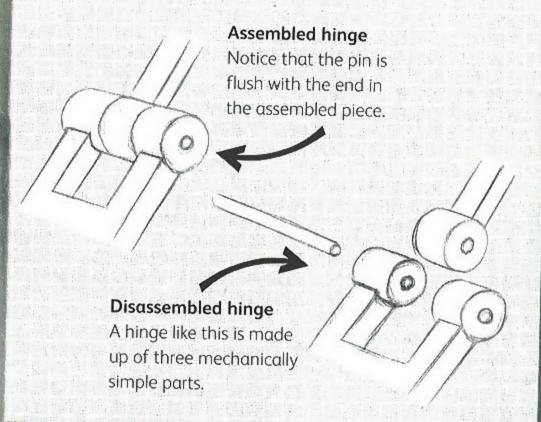


JOINT STRUCTURE

Believable jointing is extremely important in a creation whose articulation is often open and uncovered for the viewer to see. Below, three main types of jointing are illustrated that could be used in robotic articulation.

Hinge

Here is a simplistic mortise hinge, comprising of two sections, with a lubricated pin running through them (check out your door). This is a good basis for more clunky or primitive robots and would have to be combined in sets of at least two to allow for a full range of motion.

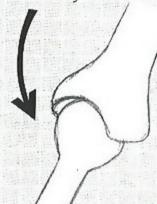


Ball and socket

Far more complex and potentially organic, this joint resembles how an animal's skeleton is jointed.

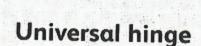
Assembled ball and socket

The ball and socket is more joint than hinge. The final limb will need extra elements for stability.



Disassembled ball and socket

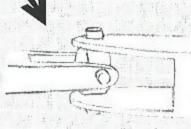
A lubricated pad should lie between the connections in the ball and socket joint.



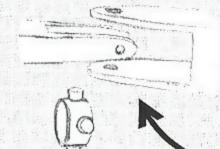
This variety of hinge allows for a wide range of movement contained in a single point of articulation.

Assembled universal hinge

Although supplying excellent articulation, this joint can appear structurally weaker that the mortise hinge.



()



Disassembled universal hinge

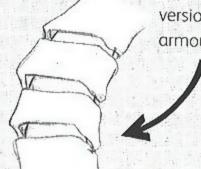
Only made of three parts, this joint is structurally complex nonetheless.

Segmented

Segmenting allows for a huge range of movement for a joint fashioned out of a hardened carapace.

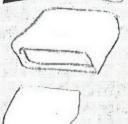
Assembled segmented

Experiment with different versions of this joint: more armour means a stiffer joint.



Disassembled segmented

Make your jointing as long as you want by simply repeating this section.



BITS AND WIDGETS

Choosing the proper type of screw head will be primarily up to your aesthetic tastes as the artist. Some screws may be covered with caps that have their own shapes, others may lie flush with the surface. However, these aesthetic choices should also match the storytelling associated with the robot a highly sophisticated robot set far in the future probably shouldn't have big lug nuts on it!

Building your robots with chunky screw heads and visible bolts, can result in a grotesquely interesting character. Concealed panels and sections A robot may have limbs or parts that retract into its

Nuthead

ASSEMBLY DETAILS

Screw heads

A robot, especially if mass assembled, may display extensive jointing using industrial couplings. In your designs, different screw heads can add variety and a touch of personality – for instance, a crosshead may give a more complex and ornate appearance than a regular slot head.



Cross head



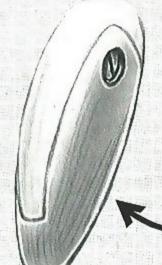
Slot head



Square head

Add variety

Cars are mass produced (by robots!) to be uniform. Bring variety to your designs by varying the details.



of concealment.

Curved and ratcheted

body when not in use. Remember that the covering

of the part. Also, the device contained within must

appear to correspond with the space inside the area

plate must match the hole it leaves in the main body

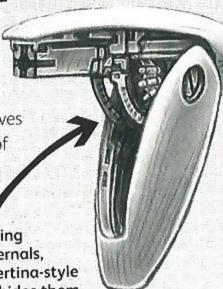
A workaday brace, such as this, would not look out of place on any type of robot.

When closed, this pod is a self-contained shape, useful for sleek, aerodynamic bots.

Open sesame

A visible rotating hinge gives the viewer an indication of how the nozzle slides out of the casing.

> Instead of showing complicated internals, consider a concertina-style dust cover that hides them.





Organic reference can be invaluable even for robots. This skeletal android leg structure follows human anatomy almost exactly, creating a believable basis for bipedal locomotion. Simply by replacing the organic tissue with an artificial counterpart, a perfectly human anatomical structure can appear strange and robotic.



Organic reference

Study human anatomy, look in text books and medical dictionaries, to get a sense of how human limbs function.



Mechanical skeleton

The differences depicted in the robotic bones are, visually speaking, only cosmetic. The materials are implicitly different, and the joints are posed as being mechanical.

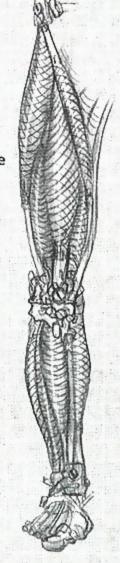
The distinctive curves of human bones have been maintained here.

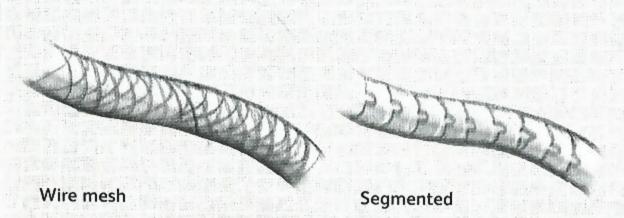


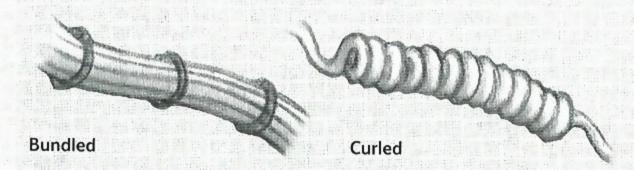
In principal, the muscles work identically to those of a human and wrap around the bone in the same configuration.

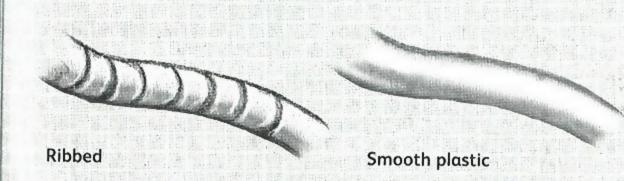
Artificial materials

The bundled fibres of the muscles have been replaced with tensile bundles of steel mesh cable (which would function quite similarly to muscles).









Piping and wiring

The piping or wiring in a robot can vary widely for aesthetic or storytelling reasons.

Wire mesh

This cable is protected by a strong steel-fibre mesh that still allows a degree of movement.

Segmented

Jointed plates surround this wire to protect it from harsh conditions or situations.

Bundled

This set of bundled cables is composed of several smaller wires bound with plastic rings.

Curled

This wire has been curled up in a spiral to minimize length while still allowing for a large degree of extension.

Ribbed

This piping has been strengthened with hardened rings, creating a more rigid and sturdy type of piping.

Smooth plastic

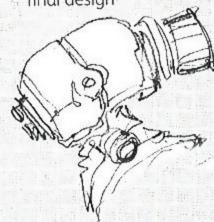
Simple and bland, this type of piping may be used to avoid visual confusion in areas with a high degree of structural complexity.

FLATTACHMENTS AND EMBELLISHMENTS

A basic humanoid robot can be interesting, but it may lack the storytelling element that a more functionally obvious design can provide. An artist should always think about what his or her creation would do in the world in which it exists. Added attachments and embellishments present narrative elements that dramatically enhance the appeal of the robot's design.

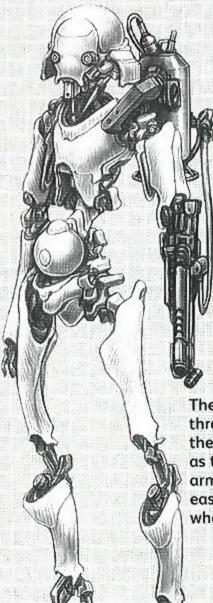


Modification sketches By making quick sketches of potential robot modifications, you may come up with something that will influence your final design



Antipersonnel functions

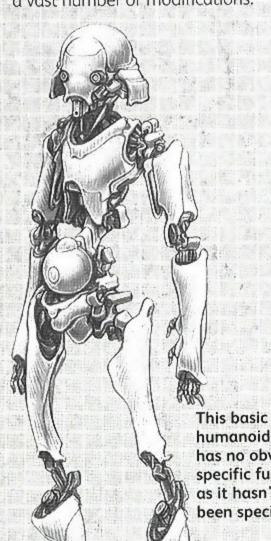
The left forearm of this robot has been replaced with a napalm thrower. The napalm supply leads from the expansion chamber in the body of the thrower up the piping to a large tank anchored to the robot's left shoulder and scapula. The separation of fuel and weapon adds a level of visual complexity to a simple modification.



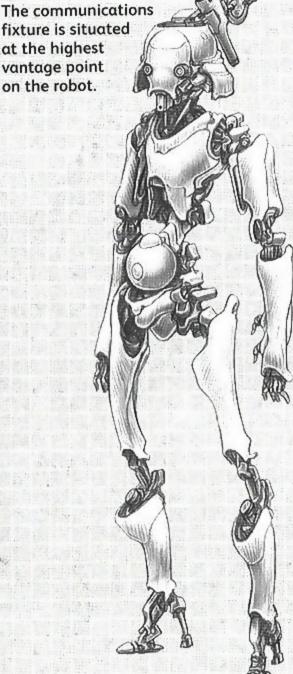
The napalm thrower is about the same length as the replaced arm, ensuring ease of clearance when in use.

BASIC FRAME

The basic frame of a modular robot. Humanoid for design and application reasons, this robot is presented with basic functionality and the potential for a vast number of modifications.

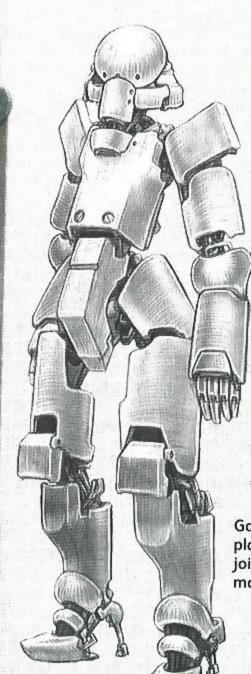


humanoid robot has no obvious specific function, as it hasn't yet been specialized.



Communications

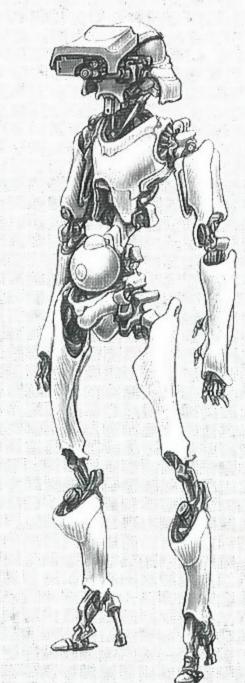
A communications array protrudes from the skull of this robot. Two primary antennae slide on a disk mounting, and a coil housed in the lower extension aids transmissions. Note that parts of the robot have been removed (part of the skull dome) which brings a further level of design unity to the additions.



Survival

Fully plated in heat resistant, magnetized ballistic plating, this robot has been outfitted to survive extremely hazardous situations. The armour lays on, and curls around the profile of the robot, and still maintains the necessary gaps in jointing for movement.

Gaps in the armour plating allow the joints to flex and move freely.



Reconnaissance

A large, extended visor gives this version of the robot extremely advanced visual functionality. A primary cluster of lenses on the visor's left side telescopes and rotates, enabling the robot to see in a variety of ways. In some cases, this capability is limited only by the curvature of the earth.

This fixture could potentially be removed by the robot itself in the field.

Supply

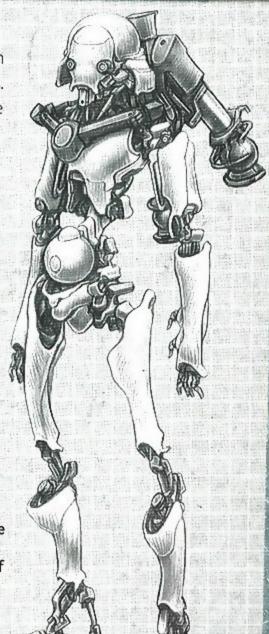
This version has attachable carrying cases. Several compartmentalized portions are detailed, and a relative front and rear balance has been maintained in the whole structure. This robot could simply be a pack mule, or the cases may contain a huge mainframe that vastly enhances the robot's cognitive and calculation capabilities.

> The cases are attached around the pelvic region to lower the centre of gravity and make the robot more stable.



This robot has been fitted with three back-mounted jump jets. A brace crosses the chest plate for extra anchorage, and the jet openings are socketed and spherical, pivoting in all directions. The jet openings should extend outwards from the body of the robot to allow for proper clearance.

> The jets need the appearance of having a high range of directionality, or the viewer will envision the robot simply careering into a wall from lack of control during flight.



FI-MILITARY ATTACHMENTS

To carry out its intended function, a robot will need tools that may or may not be integral. The weapons that an offensive robot will carry can speak volumes about the robot's intent, function and even personality (in a specific sense of the word). For the sake of functionality, a robot may be fitted to use interchangeable, modular weapons, allowing for a wider range of application. These two pages illustrate how a basic design can be adapted to fulfil whatever role the artist wants for the offensive robot. The following weapons are intended for use by a humanoid, mass-produced robot.



Balancing act

When designing a weapon, think about how it will affect the robot's centre of gravity.

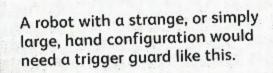
GENERAL PURPOSE

Here is a basic assault rifle; its frame and receiver will remain consistent in all the following derivations. Standard issue, and with a universal application in mind, this frame presents a basic weapon for infantry use.



CLOSE SUPPORT

An independent, under-barrel 40mm grenade launcher has been attached to this rifle for grenadier robotic infantry. An extended iron grenade sight points up from the gun frame. An opened trigger frame extends down to the base of the grip, allowing the weapon to be used by a robot with digits thicker than the average human's.





This gun would be used by basic, humanoid robots.



HEAVY SUPPORT

A large box feed of belted, tumbling rounds replaces the old magazine, and a downward-directed flash suppressor and bipod are fitted to the end of the barrel. A carrying handle is fixed to the top of the frame for aid in laying down large swathes of suppressive fire.

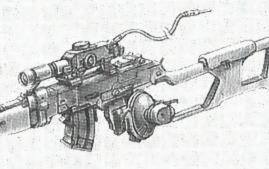


to always have this gun deployed prone for use.

SNIPER

An extended barrel offers more rifling for enhanced accuracy, and the scope jacks straight into the processor of the robot. The magazine has been shortened to better facilitate prone shooting, and the standard grip has been replaced with an actual robotic hand fixture for the sake of immediate and enhanced trigger pulls. The hand fixture would attach straight to the wrist of the user robot.

This scope would require a matching female port on the robot to be plugged in.



CQB/SECURITY

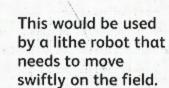
This version has been rechambered for pistol rounds, and the barrel has been drastically shortened. A slanted foregrip has been installed to control climb, and a sliding stock has been fitted (seen unextended here). This version of the weapon would be used with concealment in mind for close-quarters security roles or for use by robotic tank and artillery crews.

The smallest of all the variants, the short barrel means it is only useful for close firing.



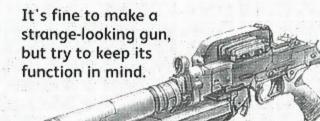
PARATROOPER

A ceramic bayonet is affixed to the front of the shortened barrel, and a folding stock can dramatically shorten the overall length of the rifle when needed.



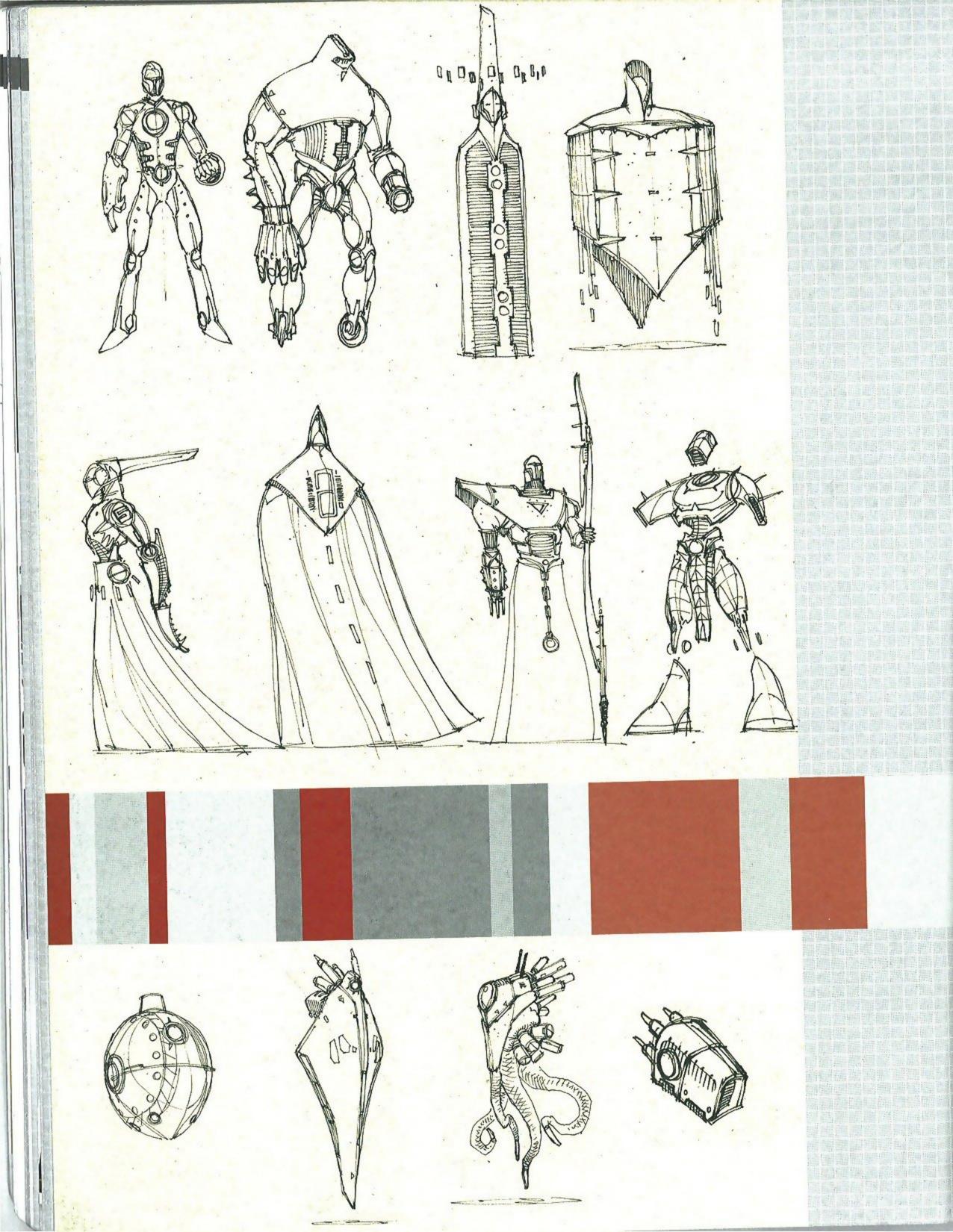


This rifle is for clandestine and internationally illegal roles in assassination and hostile-territory reconnaissance. A large, baffled sound suppressor surrounds the shortened barrel. The magazine is an under-barrel helical system housing 50 rounds. A padded brass catcher covers the ejection port, silencing the action of the chamber and collecting bullet casings to lessen forensic evidence.



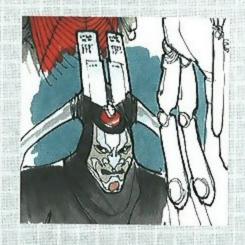


Not all weapons need to be guns. In this sketch, this combat robot leans forward, left fist aggressively clenched, right fist grasping a a long military sabre, ready to swing. The best way to draw authentic looking military weapons, and to find interesting inspiration, is to do research by looking at historical military styles in museums and books.









This section describes and demonstrates how to draw and paint 50 robots. The text and visuals guide you through each robot's artistic construction, explaining different points along the way. You'll be told what the robot is, where and when it exists, and what it does. There are stepby-step sequences that let you see the creative process, and each robot is broken into primitive shapes, so you can see its construction and easily recreate it yourself. Some basic robots are shown at the beginning of this section. Start with these.

Mass-produced and structurally simple, some robots are created only to

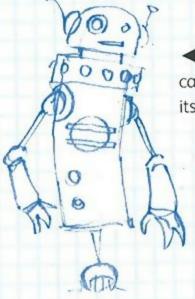
be easy to use, cost effective and relatively disposable.

These robots offer a great opportunity for you to become familiar with the fundamentals of robot art. Sparse detailing, and a basic physiology, allow you to develop a vocabulary of · core techniques that will also come in handy for creating more complex robots.

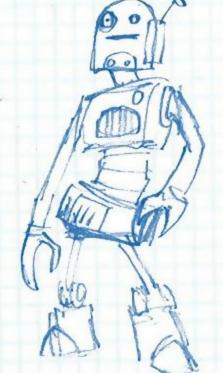
Variations

Simple robots allow for a wide range of approaches that can be attempted and discarded quickly. This immediacy can result in some pleasantly unexpected designs.

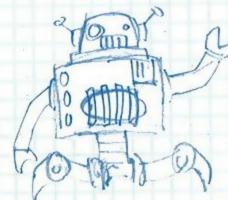
■ This robot appears a bit too much like a creature that has dressed itself up to imitate a robot.



◆This design has cartoonish bends in its posture.

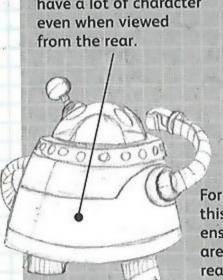


A jaunty pose and a slight smirk give this robot too much of a cartoonishly human character.

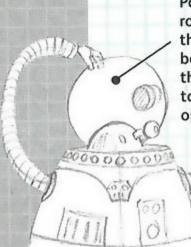


■ While stable, this robot's leg configuration suggests movement might be difficult.

A good design should have a lot of character even when viewed from the rear.



For a robot this rotund, ensure that the arms are long enough to reach around its girth!

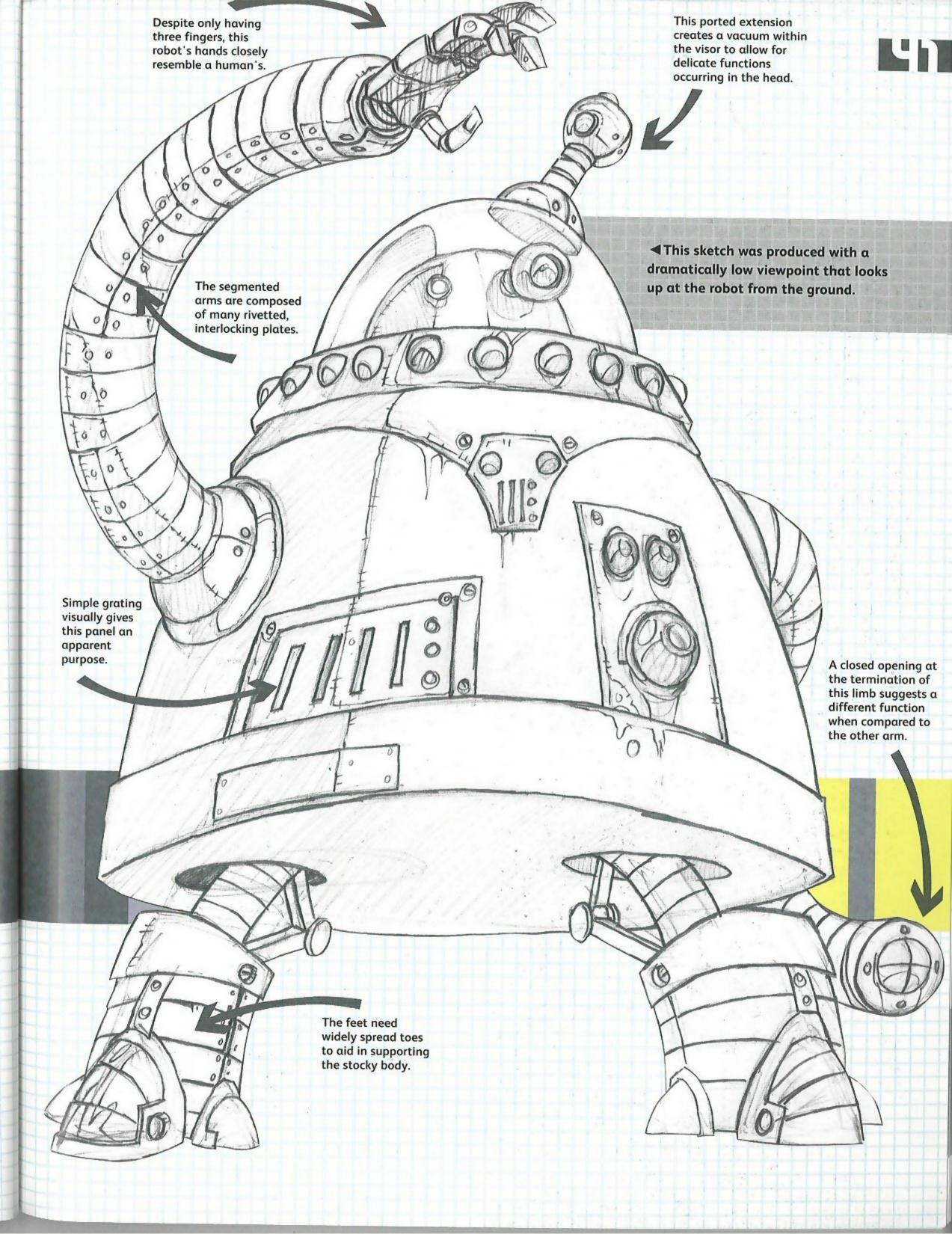


Parts of your robot, such as this visor, may be so simple that they have to be manually operated.

STOCKY ROBOT

From all angles

Play up your visual decisions when creating your robot: if you want a stocky, fat robot, then details such as short, lumpy legs will add to the effect you're looking for.



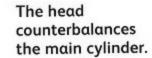
45 EMULE

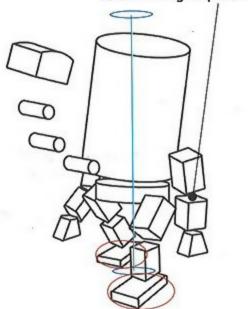
MAIL-DELIVERY BOT

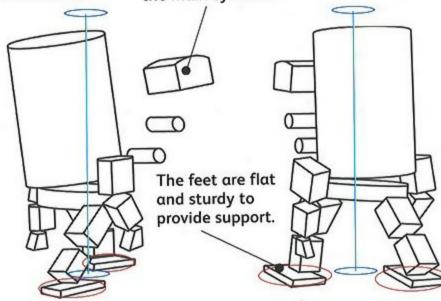
Basic shapes

The Emule was introduced in 2023 as an efficient means of coping with the colossal amount of physical mail that was created once everyone shopped solely online. Prepacked at the sorting office, the capsule is secured and sealed, giving complete protection to its contents.

The angle and bend of the arm add to the impression of the robot being depicted in midstride.



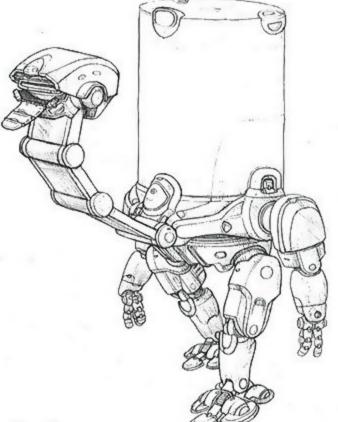






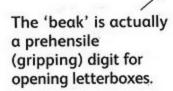
The arms are almost superfluous, only occasionally used for self-righting and for opening awkward gates. It is common to see models without the arms fitted at all.

Streaming DGPS coordinates ensures efficient and accurate navigation.



Shading

3 Try to emphasize the shape of the object with crosshatching to make it appear more solid and to give an indication of the light source.



Rendering

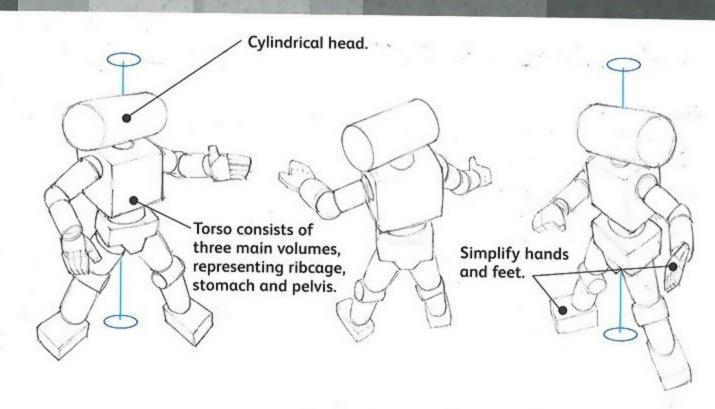
The shape is basically a cylinder on legs. To get a realistic sense of motion and posture remember that this robot basically functions as a humanoid bipedal with unique weight distribution.

The Emule can walk comfortably on tiptoe and on any uneven surface.

PERSONAL ASSISTANT BOT

Basic shapes

Adiuvo is a human-friendly domestic personal-assistant robot, an advanced evolution of early twenty-first-century robot toys that began the rise of the robots. This robot has a very simplified human form. The joints are all ball or cylinder joints, depending on how the relevant body parts are required to move.

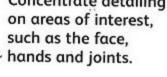


Outlining

adiuva

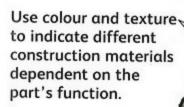
Quickly sketch the basic forms with a light grey marker. Once you're happy with the pose and proportions, you can go back over the marker with a pen or pencil to tighten up the details.

> Concentrate detailing on areas of interest, such as the face, hands and joints.



Shading

Use the Airbrush or Paintbrush tool in your digital painting programme (e.g. Photoshop or Painter) to establish volumes quickly, keeping in mind a constant light source and light direction. This can be done on a separate layer in black and white for now – you can colourize the layer in the next step.



Use text-warping tools in your painting programme to create logos or labels that appear to follow the plane of the surface on which it's imprinted (see Decals and Logos, p.20).

Rendering

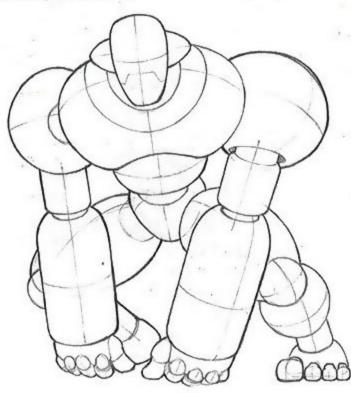
Clean up the simple shading from the previous step.
You can add colour at this stage (a subtle, desaturated colour is preferable, so that 'hot' spots such as eyes and logos stand out more). Go back with a solid brush to render details and establish clear edges in the painting.

TH MONKEYBO.

ROBOTIC ZOO

Basic shapes

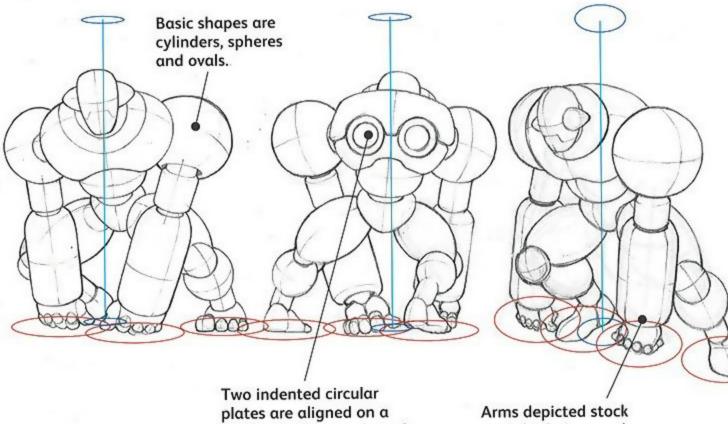
One of the more popular designs used in robotic gladiatorial fights, the Monkeybot uses its basic humanoid structure to adapt efficiently in differing combat situations. Its design also allows human pilots to take control of the robot directly if needed.



Outlining

2Primarily spherical, the Monkeybot's curved surfaces are kept as a consistent theme throughout the design. A contrast is created with angular segmentation in some parts.

Add highlights and scratch marks to the edges of the robot's panels to enhance the mechanical look and for a feeling of wear and tear.



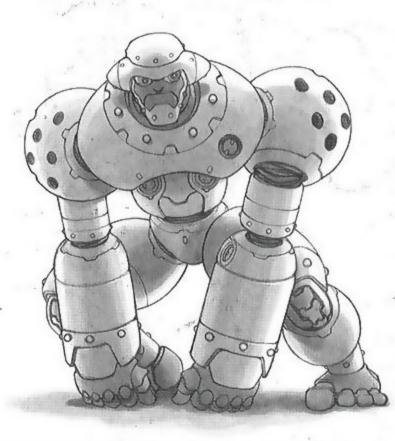
curve that follows that of

the torso.

Arms depicted stock straight, being used as extra support.

Shading

3 Paint in the robot's basic shadows. To enhance the dynamism, two light's sources were used for this robot.



Rendering

Lay down the basic colours; red and green are used for the basic undertone colours on this robot because they are complementary and will create an attractive effect together.



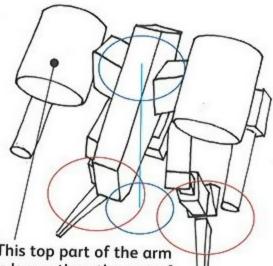
PAHS 58

SUPPORT FIGHTER

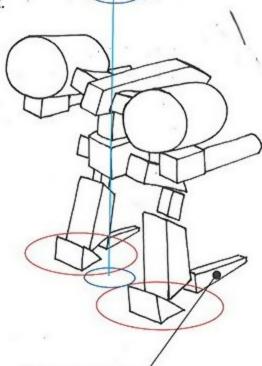
Basic shapes

This robot has a profile that leans forward due to the extended cockpit. The gun arms and missile bays are situated further to the rear, which aids balance. The triple-jointed legs help it move smoothly over rough terrain, allowing for both rural and urban applications.

This axis, along with the secondary axis further down the arm, allows for a full range of movement.



This top part of the arm is larger than the rest of the limb because it houses the missile bays.



Elongated toes help the robot stay balanced when firing its weapons.

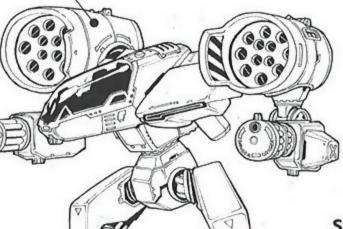
Outlining

2Keep your sketch rough and light. This will help you work quickly and make it easier to erase the pencil once you have inked the design.

Tighten up the details as you ink. Evaluate the overall look of the robot as you go. Eliminate some of the smaller details if you think the robot is looking too cluttered.

Be careful how you use highlights. Too many highlights will make the PAHS 58 appear wet or fake.

This decal follows the same slant that can be seen in the contour lines defining this part's surface plane.

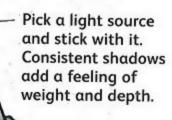


Shading

Create a consistent hierarchy of highlights and shadows. The black shadows seen inside gun barrels and joints can be laid in first as a reference point for other shades.

Rendering

Avoid using a multitude of colours in your design. A main scheme of two colours with one or two accent colours works best.



6 PROTOTYPE HOVER ROBOT

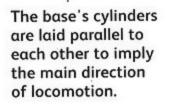
ROBOT WARS

Basic shapes

One of the newest entrants to the robotic gladiator arena, this robot has performed admirably even in the prototype phase. Its relatively simple structure allows it to absorb huge amounts of damage and still maintain prime functions.

Pointy shapes imply a very aggressive attitude.

The large spherical head functions as a focal point to all the other parts of the robot.





The robot's pose and overall composition tell its story. Use expressive shapes and body postures. This robot takes an aggressive pose and appears to be preparing for imminent engagement with an enemy.

Heavy shadow implies that the robot is floating.

Shading

3 Lay in some dramatic full blacks to act as a touch point for all the other shading.

It's easy to imitate existing ideas, but the fun of drawing robots is that they can be in any shape and colour.

Bright colours are appropriate to the confrontational attitude of the robot.

Rendering

Imply a variety of textures in your design to show off all the materials used. Shiny areas will read like chrome, glass and glossy plastic. Dull or matt areas will convey a feeling of metal, cloth and painted surfaces.

FATTYBOT

ROBOTIC CARHOP

Basic shapes

The Fattybot is the carhop at a chain of fly-in diners run by an entrepreneur who acquired his fortune in the dog food industry. Its basketball-shaped construction suggests fast food rather than sporting health.

The Fattybot is primarily a sphere with two long arms extending out.

Cylindrical thrusters are located just above the stubby legs.

The head is not articulated and is basically a bump protruding from the body.

Shading

Once desaturated, the blue pencil texturing mixes with the sharper contour lines. Dark-cast shadows and highlights show the direction of the light.

Foundation

2 Some of the pencil work here has been used to create an ambient texture on the surface of the robot.
Use this all over to unify the appearance.

The Fattybot is giving change to a customer responsible for a very small tip.

The gruff appearance and spikes appeal to the type of customer who would voluntarily drink a liver and kidney milkshake.

Segmentation allows the arms to bend at any point, giving the Fattybot's limbs a wide range of movement.

Rendering

A unified colour-scheme ties the whole design together. Fading off certain parts of it gives an atmospheric perspective that aids in the 'readability' of the final design.

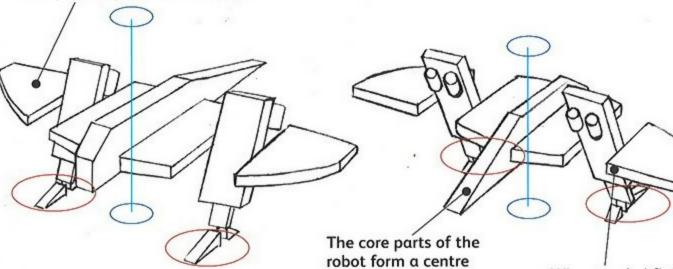
48 MANTA

HOVERING DROID

Basic shapes

This hovering maritime surveillance bot has a simple, flatfishlike structure. In the next step you would just need to refine and vary the shapes in order to get more complex surfaces and curves.

The wings complete a full shape that's been broken in two places by the landing gear.



robot form a centre section differentiated from the wings.

Shading
Shading w

The communications

retracts into the hull of

the robot during flight.

array rotates and

When angled flat, these parts will complete the full wing shape.

> Protrusions are kept horizontal

and pointing in

as the intended path of flight.

the same direction

3 Shading was done digitally in Photoshop. After choosing the direction of light, take a normal round brush, make sure to control the opacity with your graphic pad, and quickly paint in the main shadow and light areas. Clean up the pencil outlining, too.

Outlining

2 Outlining was done in 2B pencil to give energy and a textured grain to the lines. Think about mechanical joints and how the different parts are connected. Get the perspective right before moving on.

Panels lie flush due to aerodynamic considerations.

A reinforced structural line runs straight through the robot, passing through the landing gear joints.

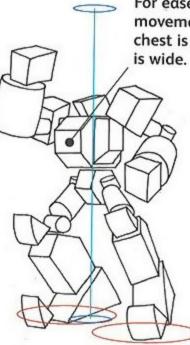
Rendering

Use metallic colours and add texture layers to achieve more details. Don't use too many colours, though. Push the values in order to gain contrast and create heavily lit areas that will bring out the Manta's shiny surface. Add decals to finish.

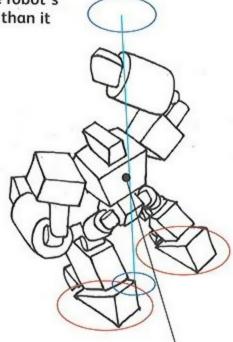
COMBAT SPECIALIST

Basic shapes

Fundamentally humanoid in shape, this intelligent foot soldier shows many signs of its close physical-combat role. Joints and limb segments are human-based, and these should be familiar to an artist when working on this design.



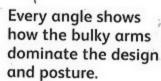
For ease of arm movement, the robot's chest is longer than it



The pelvis is quite small. It really only functions as a joint and houses hardly any other internals.



There are many techniques you can use to make an initial sketch. Try alternating between pencil and light grey markers. The lines will be easy to remove when you scan your inked drawing.

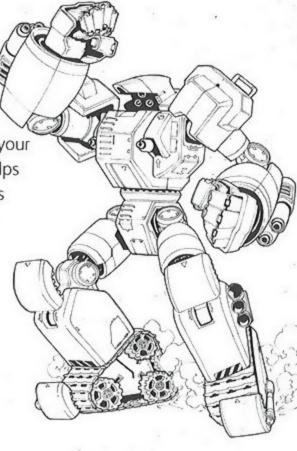


The head canopy closely protects the robot's optical sensors during combat.



Shading

3 Be sure to use a variety of line weights when inking your final drawing. This helps add interest and gives more volume to your shapes. Use a set of different-sized pens to sequentially build up your line weight.

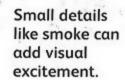


Two support cannons are fitted in the chest and, being intended for point-blank use, have a limited range of fire.



Rendering

Bevelled edges tend to pick up more light and give you a good opportunity to add some highlights. The joints are perfect places to add rust and grime. Tint internal lines to make them seem enclosed.

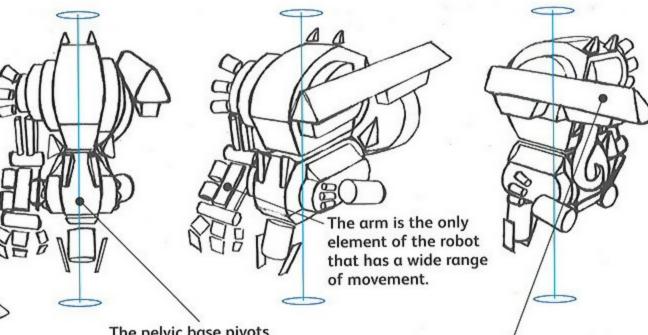


50 PREDATOR

SPY HUNTER

Basic shapes

The simple underlying shapes of the Predator belie its hidden complexities as an infiltrator behind enemy lines.



The pelvic base pivots very little, leaving the robot's posture stock straight.

The rear of the gun extends farther back than the muzzle protrudes (for aiming clearance reasons).

Outlining

Text decals such as numbers will give

to the robot.

additional authenticity

2Use a 20% grey-shade marker to sketch the robot and all the relevant details. Outline with a 0.1 fineliner. To give more emphasis to the shapes, accentuate certain lines and make them thicker with a 0.5 fineliner.

Add details so that each feature of the robot looks functional and believable.

more wear than the other

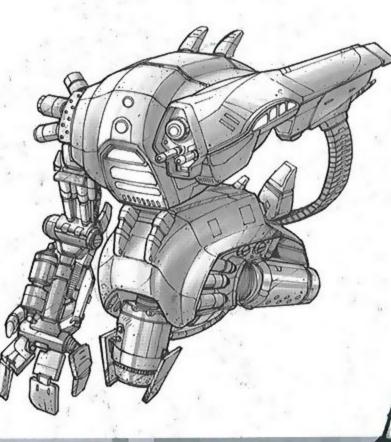
sections of the robot, and

their function.

slight evidence of emissions tells the viewer more about

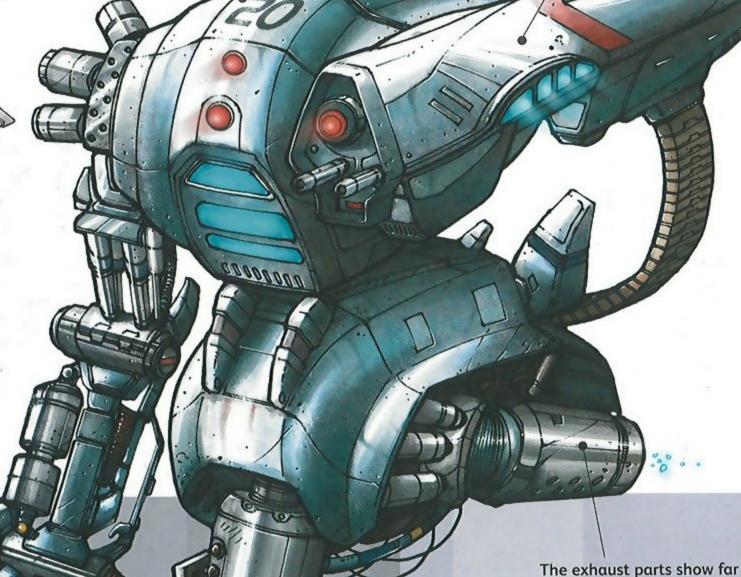
Shading

3 Some elements of this robot are illuminated, which can create a slightly strange impression at the shading stage.



Rendering

The slightest evidence of pitting, wear and discoloration add an invaluable air of believability and solidity to the robot design.

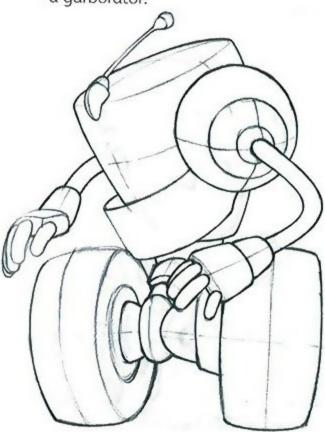


The small antenna

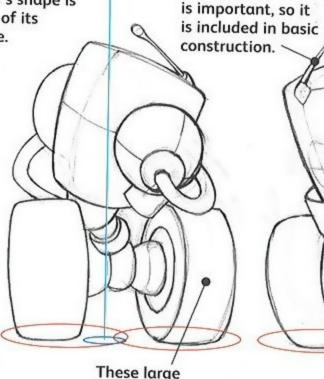
GARBAGE DISPOSAL

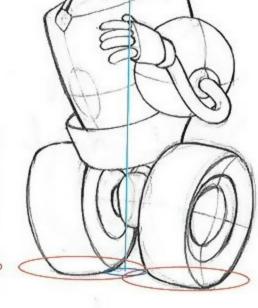
Basic shapes

The Wheel-E bot resembles a trash can on wheels. It is used primarily in a janitorial role on factory farms. Trundling along on its sturdy tractor wheels, it shovels food unit by-products into its hinged waste disposal container which also doubles as a garborator.



This robot's shape is indicative of its simple role.





Outlining

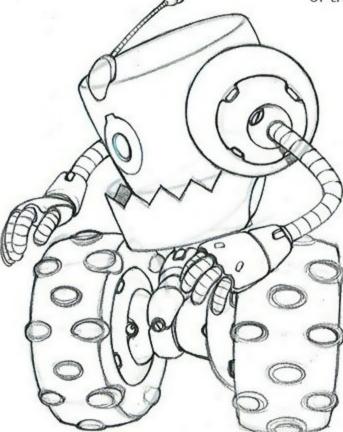
Simple cylinder shapes are used initially, as the core of the robot is intended to resemble a basic waste receptacle.

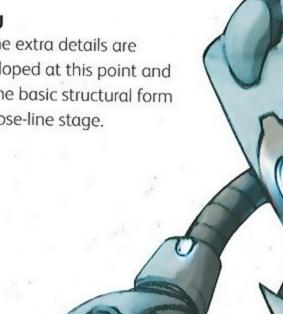
These large inflated tyres will later be treaded.

The Wheel-E bot can become so caked in detritus during work that these warning lights spin and flash to warn farm workers when the clumsy robot draws near.

Shading

All the extra details are **5**developed at this point and laid on the basic structural form of the loose-line stage.



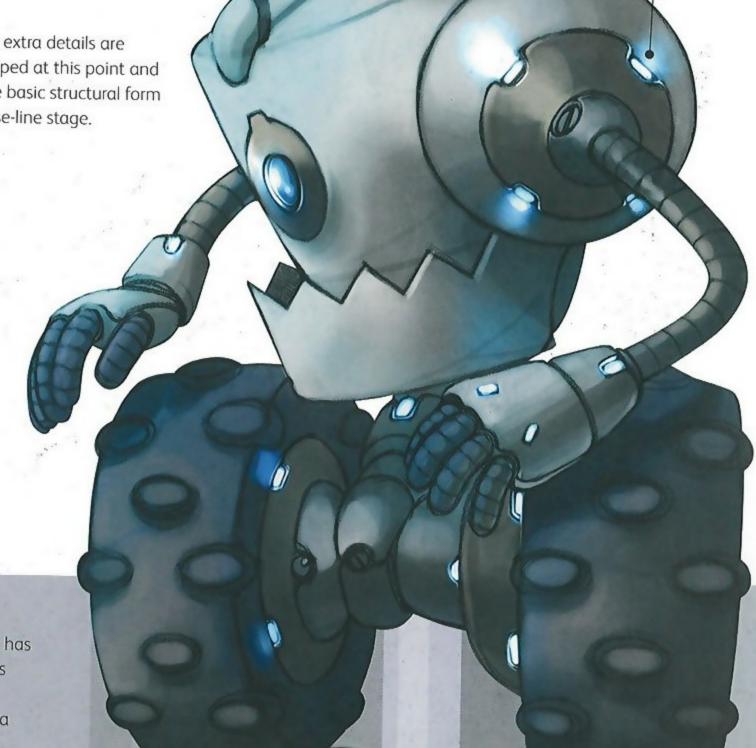


This antenna swivels

forward and is actually a highly sophisticated olfactory sensory device.



With the exception of warning lights, this robot has a simple, utilitarian paint job. The Wheel-E bot's designers weren't too concerned with decorative aesthetics as it won't win any beauty awards after a couple of days working on the farm!



ROBOT FOUNDRY: BASIC The jointing of the NATURAL WONDER legs is based on a sphere-joint system. Wheels **Basic shapes** are used for long ■ The company Chanzon Industries rides on flatlands. introduced this crab-shaped prototype in 2012. Its mission covers a full range of national park surveillance from the poles to the equator, helping to predict the behaviours of migrating creatures as the ice caps melt. The geometry of this robot is fairly simple. The geometric construction shows the general shape With simple blocks and the balance between you can understand legs and main body. how the elements are connected. Blocking in Now that you understand the skeleton, it's easy to block in the shapes and start to outline. If you don't feel secure, go for the values with grey tones. You can paint over the shaded image later using new layers. Shading Block out general shapes with Rendering Because digital images can look too monochromatic tones, then erase neat, think about using textures and this shape and start to define the design of your robot. customized brushes in Photoshop. Add some textures over your actual painting Greenbot is made of composite using Overlay, Soft Light or Color Dodge. recycled plastics on an aluminum To finalize your image, cast a shadow on frame. All the components for the ground surface. observation, navigation, communication and analysis are placed inside the body. This robot actually walks on its knuckles, using its extended digits for climbing and environmental interaction.

HIGH-RISK ROBOT This head portion will The body and appear to be split in legs of this robot the more developed are bilaterally **Basic shapes** phase but will still symmetrical to the The robot is designed to perform conform to this axis of balance. basic shape. high-risk operations in harsh terrain. It uses contemporary technology, but the look of the robot is relatively simple, primitive and clumsy. The legs connect to this central section; the head Outlining and lower container branch off from this part as well. Tenlarge the picture to the desired final resolution. All the lines will be a little blurry and pixelated, so it's necessary to make the drawing clearer. Enlarge the picture on the monitor to play with the details. Add dirt or rust to make the Sentinel look used. Shading Light source affects the whole look of The picture. The best way to add shadows and colour in Photoshop is to make a duplicate layer of the line drawing and Your various colour THE ST work on the layer beneath. tones and shadows will create a real feeling of the depth Rendering in the picture. This robot has a military function, so drab olive greens are appropriate. However, it's easy to change the colour anytime – unlike the direction of light. Sticking with your choice of light source is crucial at the finishing stage. Keep in mind that both shadows and colours behave differently on flat or round surfaces.

Squashed squares define squat stature. DOGWALKER DELUX Triangles add strength Basic shapes to an image. The initial basic shapes of boxes, triangles and circles are still apparent in the finished design. A third wheel is included on a flexible limb, adding balance, and the simplified pincer hands further enhance the nonhuman shape. Simple cylinder shapes are Each section of easy to draw. the body can turn independently of the others. Freehand approach All the underlying shapes of this domestic friend are drawn freehand. Crosshatching This makes the robot seem well-used Use crosshatching and shading to identify which direction the light is and friendly. coming from. By giving the nuts and bolts a dark outline, the robot gets a very functional, industrial, worn look. Contains recordings of the dog owner's voice. Multipurpose hands cope with multiple dog leashes simultaneously. Dodi was discontinued because of dog leash tangling concerns. Colour palette A colour-scheme with brightly contrasting colours reveals the Dodi as the domestic servant he is. Any semblance of his industrial past is wiped away by these cheery tones.

BRAINBOT

PROSTHETIC COMMANDO

Basic shapes

The face plate opens

equipment for long-

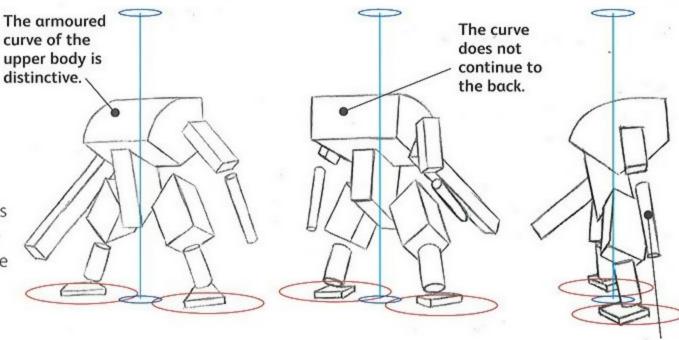
range detection and

to reveal more

precise optical

engagement.

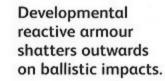
Some highly decorated soldiers of the Interspace Army who've suffered debilitating mutilation can awaken to find themselves interred in robotic shells. The robot's stance is wide, stable and stiff, and its arms are elongated to compensate for limited agility. The profile is brutish and hunched.



Arms are held out somewhat.

Outlining

2All of the armour is bulbous and curved so keep the lines sinuous and flowing. Don't worry about shading. Your focus at this stage should be form and texture.





3 Some of the internals are in danger of getting visually muddled at this stage. Differentiate the organic from the metal by using separate hues. Keep the brain's shading delicate.

Rendering

Used in a more public and ceremonial role, this robot can have an eye-catching and purposefully decorative colour scheme. The distinctive red star and numbering decals have been applied to complete the theme (see Decals and Logos, p. 20).

Fashioned to put an end to peace, these robots have been applied to the lamentable cause of perpetual destruction and horror: Asimov's first law of robotics didn't even get a second thought. Military robots have a distinct attitude and appearance, their purpose clearly evident. Some may have thick, defensive armour, while others may have only thin shields to allow for ease of movement. All, however, will be blessed with aggressive tendencies.

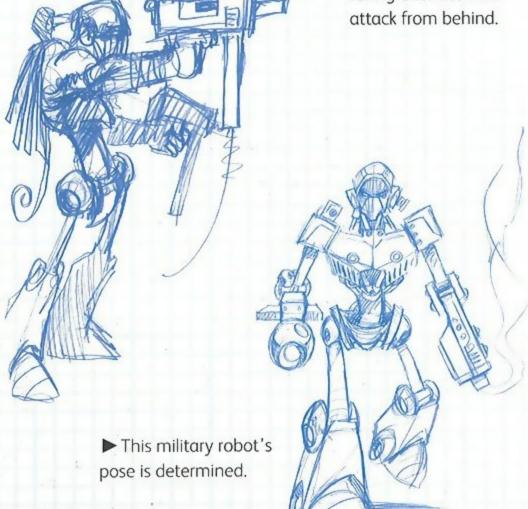
Developing ideas

One of the primary things to consider on this type of robot is its weapons. Military robots will often have integral weaponry; changing them may affect entire limbs, or even the whole robot itself.

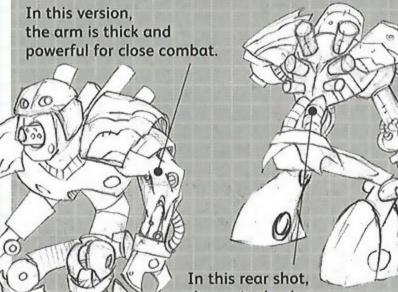
▼ The gun is primed, arm steady, ready to fire.



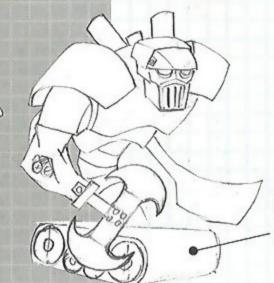
▲ The bladed back extension is useful for felling enemies who attack from behind.



MILIARY ROBOTS



In this rear shot the major back protrusion has been left off.

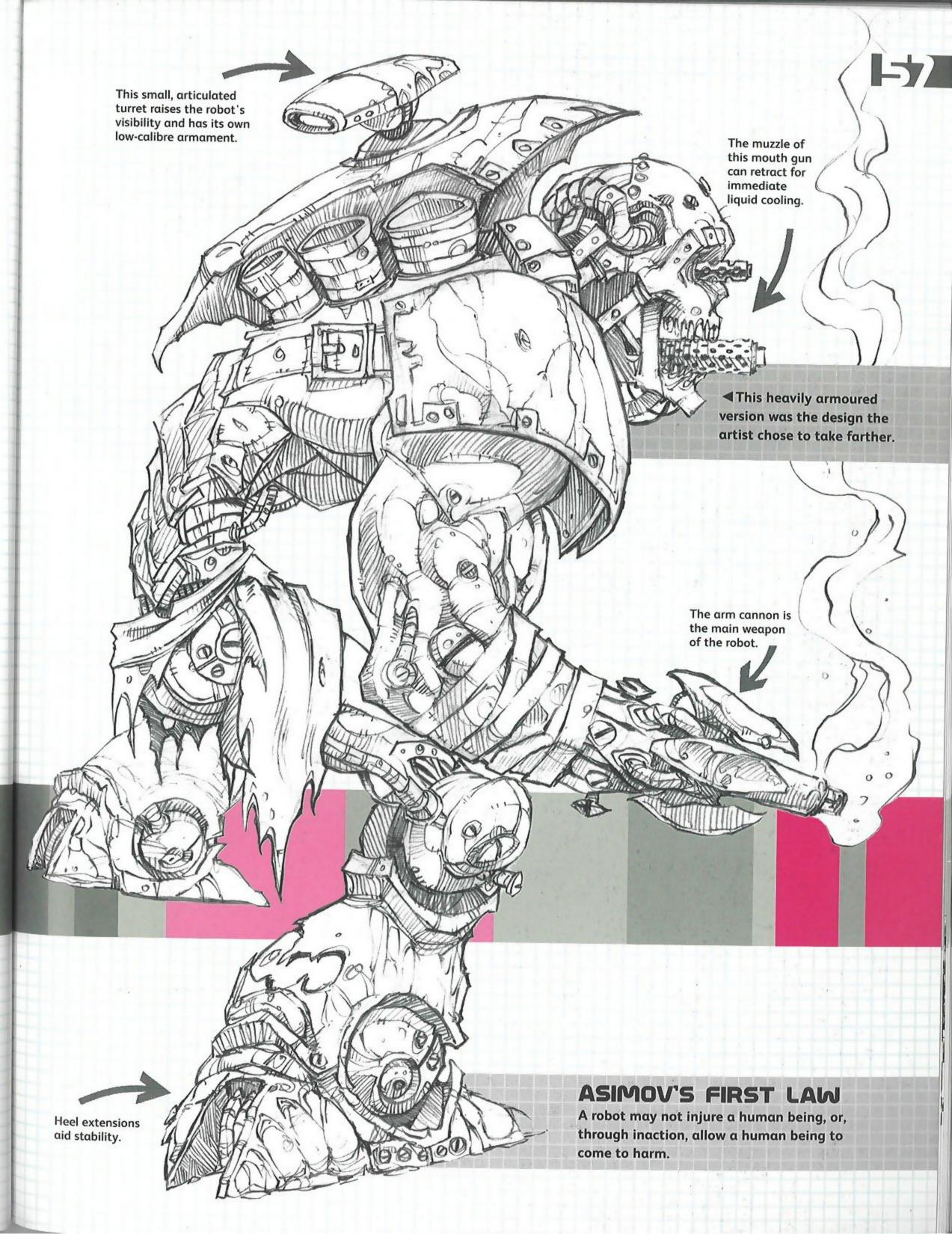


ON THE WARPATH

From all angles

Draw the figure from several angles while you fine-tune its design.

In this side view, tank treads replace the legs.



58 BRASS LION

Designed by engineer

Isambard Kingdom Brunel himself, the Brass Lion was a marvel even at the height of the British Industrial Revolution.

The robot achieved

international fame when a single Brass Lion saved the charge of the Light Brigade in the Crimean War by smashing into the Czarist artillery

eventually felled, but not before bursting open and

spraying its attackers with boiling water.

Forward wheel-arms used as base when the robot settles into firing posture.

Steam-age robot

Being steam powered, this robot needs some recognizable signs of its power source – such as this wooden-handled lever, and gauges for assessing internal pressures.

Ornate and functional

There are two distinct design styles in this robot: the ornate and decorative armour and gilding, and the more functional-looking steamers and boilers. The industrial parts function more as a structural core, with the more ornate elements acting as an armoured, decorative shell.

Primary coal furnace.

Series of adjustable and interchangeable telescope lenses.

This narrow cannon is intended as a one-shot, disposable weapon that splits open and is discarded after firing.

SEE

p.18

ALSO

Drawing and Research, p.10

Rendering Materials

Developing Your

Ideas, p.26

Enlarged sixshot revolver affixed to sabre arm.

Adaptation

of a cavalry

slicing at foot

soldiers from

an elevated

sabre for

position.

Victorian inspirations

Surprisingly, a lot of the design is as much influenced by Victorian British furniture as it is by steam engines. When dealing with such elaborate ornamentation, even greater care has to be taken to allow the limbs and moving parts to function freely of each other.

Slim but strong

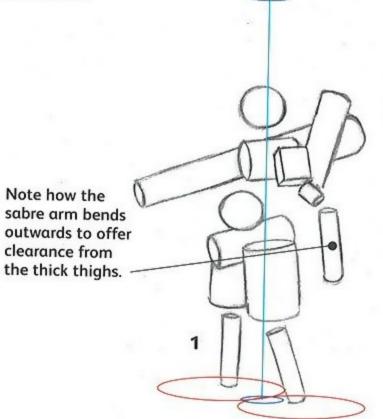
The key connection point in this design is where the chest meets the belly, and it must be slim for manoeuvrability but still remain strong looking.

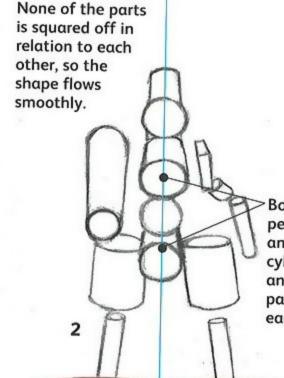
Frontal view

2 The main shape of the torso and head almost converge into one large shape in the front view.

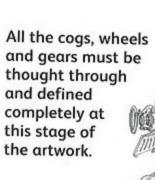
Axis of balance

The whole body profile curves to allow the axis of balance to run through the middle. (Assume the central steam engine is heavy enough to prevent the cannon from overbalancing the robot.)





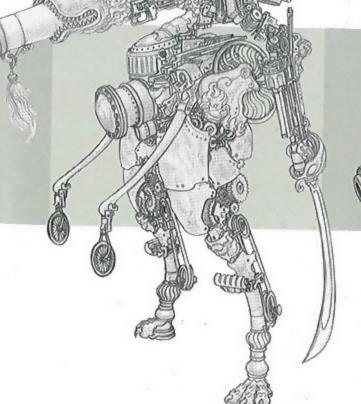
Both the pelvic cylinder and the chest cylinder are angled almost parallel to each other.



▼ Distinct shading

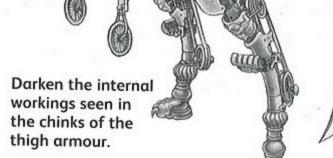
Distinct and strong shading is necessary on the dominant cylinders in the design. Complement areas of high detail with stark areas of shading.

The splash of intense red in the plumage is an ostentatious 'period' touch to the design.



▲ Plume detailing

Remember to use some loose pencil lines to add the fibres of the plume and to create some denting and roughness to the thigh's brass plating.



▲ Metallic hues

Many differing metallic hues are used here, varying through greys, blues, greens, yellows and reds. Their shine and texture are what indicate their metallic construction, and not their colour.

60 PANZERFLUCH AUSF G

SEE The Third Reich's answer to the British MBW **ALSO** (Main Battlefield Weapon) is fully committed to an Rendering Materials, p.18 antiarmour role. Loud and lumbering, this Decals and Logos, p.20 monster crashes through the Joints and Hatch leads to Movement, p.30 undergrowth, its presence small compartment **Exhaust pipes** for a single from engine. surveillance and instilling dread in enemy communications crewman. tank crews. Eventually its lack of speed and Standard-tank-issue manoeuvrability, entrenching tools and tarpaulin. however, made it much too vulnerable to antitank infantry. Clamp used as self-righter and to carry extra loads Cannon terminates in a of equipment. tightened muzzle-break that employs a 'Gerlich' antirecoil design.

Details and accessories

Hatch details and conventional tank accessories add to the richness of the design. However, ensure that these details are carefully selected and add to the overall impression of the robot without cluttering or muddling its profile.

Presence and strength

Far larger than the other MBWs, the Panzerfluch design needs to convey its great size and presence. Many elements have been cannibalized from genuine German tanks of the period, such as the distinctive exhausts and paint job.

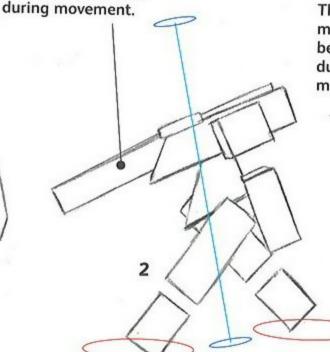
Armoured guncarrier

Primarily rectangular, this robot has a limited range of limb movement. It's still fundamentally a tank, no matter how anthropomorphic the design becomes, which means the entire design should service the most important component: the gun. Elements such as the distinctive grid armour-plating are repeated in sections across the front part of the robot.

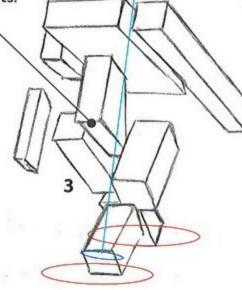
The head is set far forward on the torso, creating a

hunched effect.

The gun is positioned parallel to the torso



The axis of balance must still lie evenly between the legs during straight movements.



Intent pose

Another good example of a robot moving with a tipped axis of balance (in the direction of its movement).

Low-slung power

2 Note how low the knees are, shortening the shins dramatically.

Lean and mean

The lower torso and pelvis are quite thin and contain minimal internal parts.

▼ Details and lighting

Areas of high detail will often begin to appear darker than the rest of the robot (when you actually may want them to be lighter or shinier). Don't worry about this, as it will be addressed in later stages.

■Shining joints

Note how certain cylindrical joints are receiving a slightly different shading treatment due to being polished metal (as opposed to roughened armour-plating).

Notice how the armour's grid pattern becomes far less dominant in the shaded version.

► Green and grey

Much of the grey metal in this robot is actually quite green; it only appears desaturated because of its proximity to the strong yellows of the paint job.

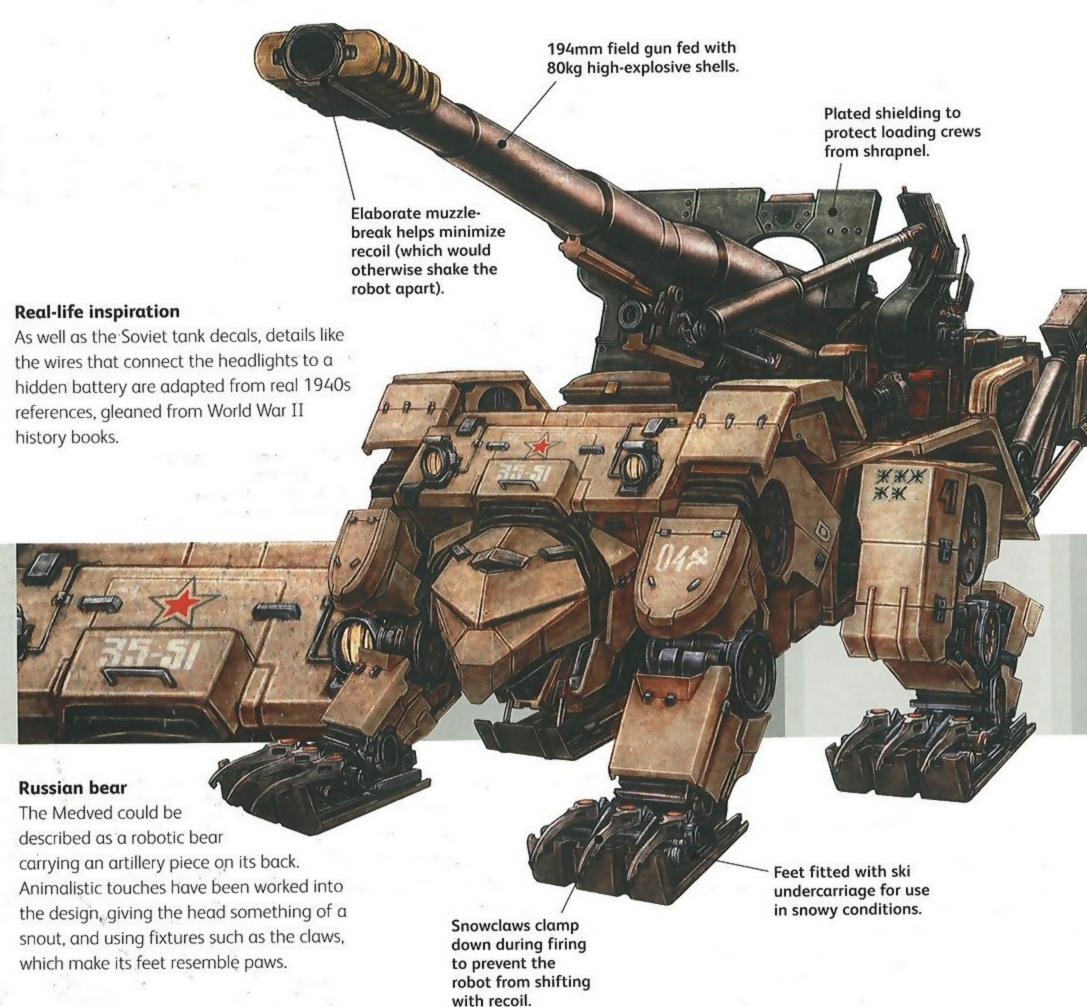
The decals are simply loosely painted additive colour (directly applied, not glazed).

62 MEDVED PRODUCTION TYPE

Churned out of Soviet factories with the initial intent of recapturing Stalingrad, the Medveds tore a path through the German Panzer divisions in the great armoured conflicts at Kursk, in July 1943. A wartime expedient, the Medved was just as temperamental as previous generations of battlefield robot but still shone when pitted against German mechanized troops.

SEE ALSO

Rendering materials, p.18 Bits and Widgets, p.32 Attachments and Embellishments, p.34



Powerful ally

The design is of a quadrupedal robot whose function is to trudge around and fire the huge gun mounted on its back. Keep the front heavily armoured and bare of overly exposed joints and details (this is the most likely target in battle). The back legs have been given a slight increase in size, complexity and strength because they have to absorb the gun's recoil as well as carry a heavier load than the front of the robot.

The forward-tilting head makes it look like it's glaring under its brow.

Weight distribution

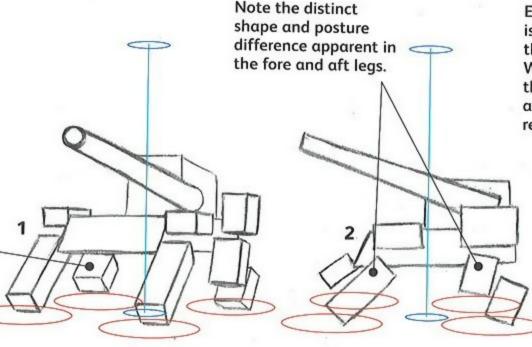
A huge amount of weight is distributed in the rear of the robot, and the axis of balance is placed quite close to the rear.

Boxlike body

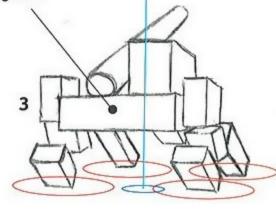
2 The body of this robot is quite squared off and could even have been adapted from a conventional tank.

The bear's muzzle

The cylinder of the gun barrel tapers towards the end until it arrives at the muzzle-break.



Extended reach
is more important in
this design. Like many
World War II robots,
the entire structure is
almost completely
rectangular.



▼ Angles and curves

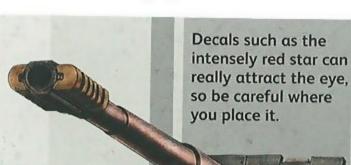
The linework is composed from many hard angles and tight curves, so keep everything tight and be careful as you draw it. That said, slight flaws, such as dents and scuffmarks, are good things to include.

The rivets and small details almost clutter the piece at this stage, so they'll need to be knocked back in later work.

◀Strong shading

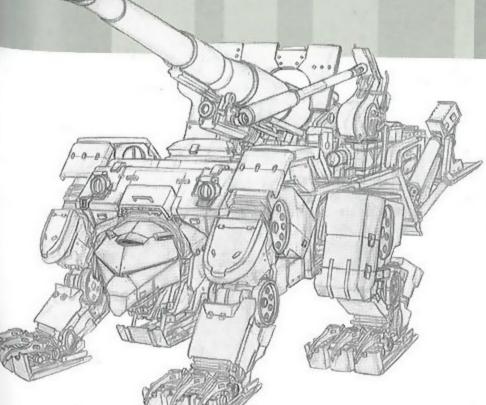
Use very bold planar shading. With so much going on in the design, shading is key to visually separating the legs from the body.

Within the planar shading, apply some metallic texturing on the armour (separate it into two stages).





An 'arctic' paint job has been applied here (except of course to the actual gun barrel), and the entire robot has been lightened, but as the paint job has been additively glazed, the underlying shading is fundamentally unchanged.



64 TAS-21 NEEDLE

The Needle is an evolution of

the guided cruise missile. Once it has been deployed behind enemy lines by sea or by HALO airdrop, the Needle advances on all fours to an optimal vantage point, whose coordinates are continuously fed to the robot by satellite tracking. As soon as it has arrived at its destination the Needle becomes dormant, concealing itself until the

designated target comes within range, at which point the cruise missile launches and the exoskeleton detonates to keep the technology out of enemy hands.

Initial targeting sensor paints the target with a marker, and then feeds this information to the cruise missile's internal guidance system before firing.

Forefeet can function as opposable digits for easy access to

high vantage points, even allowing the

Needle to climb trees

and buildings.

SEE ALSO

Drawing and
Research, p.10
Artistic Rendering,
p.16
Rendering
Materials, p.18

Small gas canisters on the side emit a smokescreen that gives the Needle enough time to fire and self-destruct in the event of its discovery.

Highly accommodating bas and frame allow new cruise missiles to be retrofitted fo use in the Needle.

▼ Plating and linework

The slightly curved plating of the articulated, robotic sections offers an attractive contrast to the more simplistic and purposeful linework of the missile.



At this point the robotic form is little more than a support frame for the cruise missile. Simplifying the robotic parts in this area helps the viewer understand that the missile and robot are two separate entities.

Do not worry too much about textural aspects at this point; the difference between the robot and the missile can be made more apparent at the later stages.

The missile is tilted

Use contrast here

Your design should make obvious the fact that the robot is nothing more than a sophisticated delivery system for its payload. The missile is the core and the robot is built around it – not obscuring it, but rather drawing greater attention to the missile through contrast.

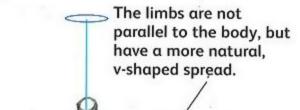
The weapon is key

The robot's core is the cylindrical missile, which makes an excellent base to work with at this stage. Being a quadruped, the robot gives the artist far greater scope for where to place its axis of balance.

slightly upwards (for a degree of clearance when firing).

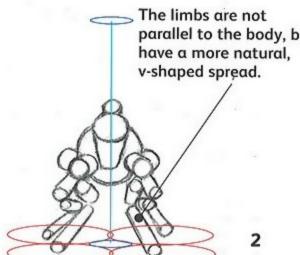
Weight dispersal

Note that the robot is placing more weight on its rear legs than on its forefeet.



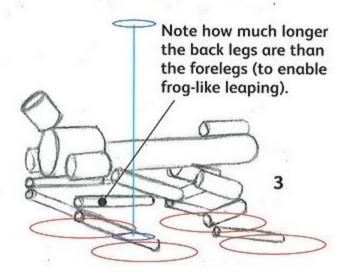
Leg structures

The structure and jointing of the legs are virtually identical at the rear and to the fore, but the proportions are different.



Firing function

3 In reality, the rear end would be an open channel with no obstructions (for recoilless firing of the missile).



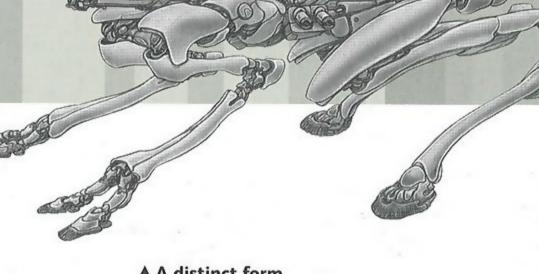
Keep the shading smooth - the missile should appear aerodynamic.

Communications array extends

from split rear bay.

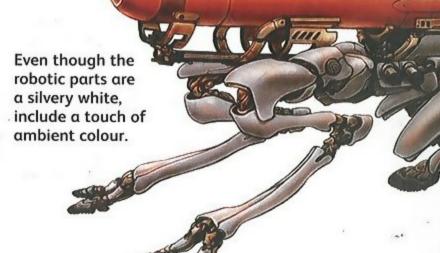
▼Emphasis through paint

To emphasize the separation of robotic frame and cruise missile, apply different paint. A difference in the paintwork's reflectiveness indicates that the missile is of a different material from the robot's plating.



▲ A distinct form

Again, tighten up on the shading of the missile. A distinct, cylindrical form is key to making the design work.



55 M24 HAUSEN

Brought late into the war by the Americans and first deployed from the landing craft on the Normandy beaches, this robot benefited from a

Set of four 35mm

Rotating turret.

flak cannons.

design already tested by years of application in war.
Originally intended to fulfill an **antiaircraft role**,

the Hausen was found to be an invaluable aid in the urban combat taking place on the long road to Berlin.

Its four guns proved to

be a boon to Allied

troops, with the ability to lay down a withering curtain of lead to tear through sniper roosts.

Enemy in sight

The head is fitted with two main sighting systems: forward and upward.

The forward sight is more complex and telescopic to better locate well-concealed sniper positions.

City deployment

A mobile AA (antiaircraft)
vehicle is the basis of
this robot, and the rest
of the design has been
developed from that
starting point. Since it's used in
urban situations, enlarged forearms
have been added for interaction with
its environment.

SEE

Secondary

sighting system

antiaircraft role.

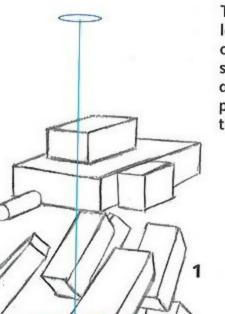
aimed at the sky for an Drawing and Research, p.10 Rendering Materials, p.18 Joints and Movement, p.30

> Plated skirt protects shoulder joints and allows for quick servicing.

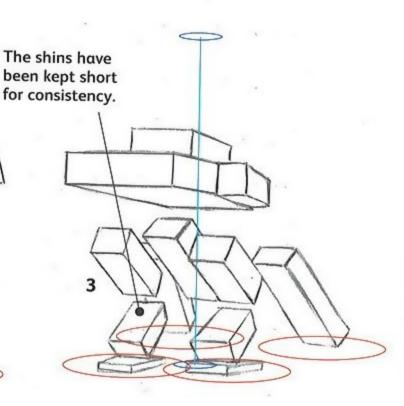
Extremely large forearms used for added stability and for breaching walls and barricades in urban environments.

Tanks for the memory

Angular and boxy, this robot has to look like an extension of an existing World War II tank. Small elements and basic shapes have been lifted from real tank designs for use in the robot. Again, symmetry is key, and a vehicular feeling should be maintained in this large robot.



The arms and legs spread outwards in a slight v-shape and are not parallel to the torso.



Axis power

The axis of balance is shifted forwards as the robot is resting some of its weight on its arms.

Torso balance

The upper torso extends widely outwards but is still balanced on its lower torso.

Centre of gravity

The legs are constantly bowed to bring the centre of gravity lower for improved stability.

Lay down more line than you need - you can always erase it on the computer if you've overdone it.

▼ Plane changes

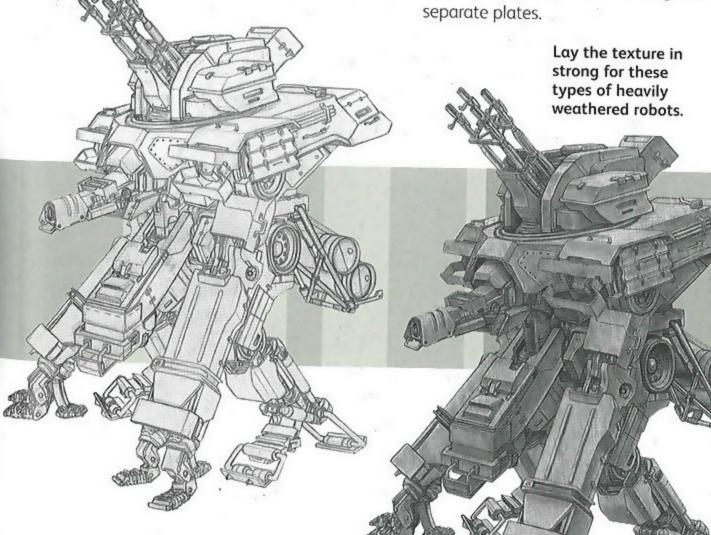
Every time a change of plane occurs, the shade should differ to indicate it. Use lighter highlights around the edges of separate plates.

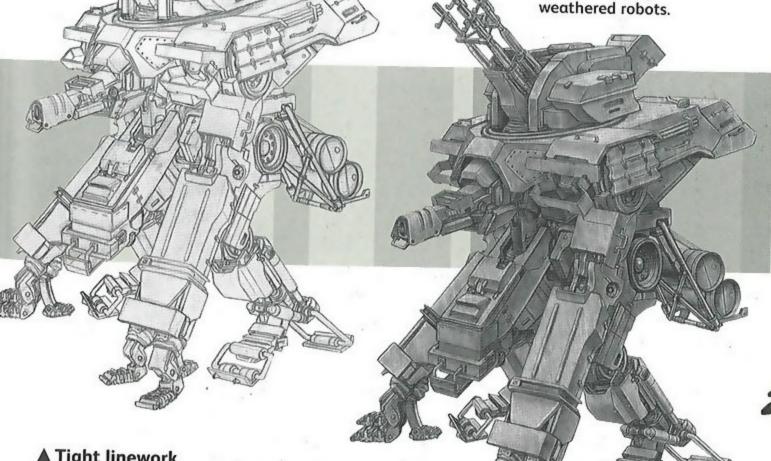
▼ Camouflage style

with the darker

paint job.

A sandy paint job has been applied here to camouflage the robot in areas of dusty brick ruins.







▲ Tight linework

Keep the linework tight and geometric, but within that constraint remember that a degree of weathering and ruggedness should also play a part.

68 ORGANIC GENERAL-USE SOLDIER

Long, thin, highly

Mortar for bunker

penetration.

flexible neck allows for excellent visibility.

The OGUS has become an indispensable asset to the military forces of all Category One nations. A hybrid of mechanical parts and specially tailored,

components, the robots of the OGUS series have attained a battlefield strength superior to anything a conventional human soldier could muster. Although expensive to build, maintenance is simple: the OGUS series is primarily self-healing. All

models are meat-eaters powered

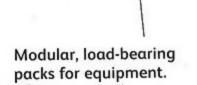
by methane, the by-product of

processing organic matter.



Worming into its consciousness

The staring face is serpentine, annelidic – segmented and wormlike – and slightly disturbing in appearance. The robot's sensor array can detect numerous substances, trace elements or signs of life, such as the frightened breath of a human soldier, vehicle exhaust, and even the warmth generated by bacteria, the possible evidence of a human presence.



SEE ALSO

Life Is Your Palette,
p.21
Attachments and
Embellishments,
p.34
Military

Attachments, p.36

Humanlike limbs facilitate the use of enemy weaponry when deployed behind enemy lines.

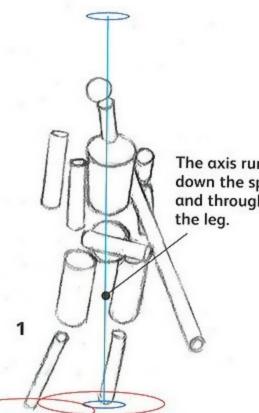
Compact profile presents the smallest possible target for enemy fire.

Insect meets Man

Sinewy and bowed, the OGUS is primarily a predator. The robot is intended for stealthy operations and is cased accordingly in dull, matte, ballistic plastics that deflect sensors. Its mix of insectlike carapace and humanoid muscle-forms is offset by hard-edged additions, such as its equipment compartments. Think of the OGUS as essentially an insectile humanoid that functions in a similar way to a human soldier.

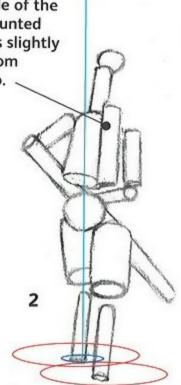
Classical pose

Note that the OGUS depicted is in a 'contrapposto', or counterpoise position, meaning he is standing in a relaxed, classical stance with his weight on one leg. Statues in museums are great references for your robots. Of course, these classical applications are adapted and modified for the OGUS's unique anatomical structure.

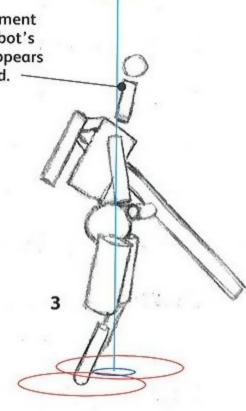


The angle of the back-mounted mortar is slightly offset from the torso.

The axis runs down the spine and through



Every element in this robot's design appears elongated.



Balance

Note how different parts balance themselves around the axis. The mortar serves to compensate for the long rifle.

Sum of its parts

Though this illustration represents the overall structure, remember that the individual parts curve significantly.

Keeping a low profile

The robot slouches to reduce its profile.

▼ Mixing it up

This robot is a mixture of design aesthetics, so remember to intermingle the organic curves among the angular elements. The weaponry stands out boldly in the linework.



The shading is uniformly heavy but appears darkest on the metals of the gun.

▼ Organic versus metallic

Emphasize the contrast between the organic and the metallic. Sharp highlights draw attention to the glowing lenses and the glinting metal.



▲ Defining with lines

Dark and serpentine, the shading should conform to the design of the robot. Remember to hold back on the bright highlights in order to maintain the robot's characteristic matte finish.

70 HEPHAESTUS' ANVI

A walking tank, the Anvil fills a semistationary armour role. Extremely vulnerable to attack helicopters, the Anvil is primarily used for 'hold and defend' campaigns and military occupations. The Anvil is efficient and intimidating, making it perfect for keeping down insurgencies; however, friendly fire incidents are common, leaving it dreaded by friend and foe alike.

SEE

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p.34

SAM bay for protection from attack helicopters.

Dedicated sighting systems mounted on Vulcan arm.

Dome-mounted 11mm machine gun is intended for close-quarter, antipersonnel roles.

Machine of war

The Anvil is a conventional military robot and should, therefore, give the impression of function over form. Rectangular and clunky, the Anvil is intended to soak up small-arms fire. This robot's locomotion is entirely for strategic placement, not evasive manoeuvres.

Gun

One of the focal points of the design is the huge Vulcan that the Anvil is armed with. Here we can see where the segmented, fully covered ammunition belt is fed into the chamber. This ammo chain drapes back to the feeding arm and then into the huge drum carried on the robot's back.

Liquid-cooled, 32mm Vulcan used in an antimaterial/ antiarmour role.

Rubber treads to reduce damage done to city streets.

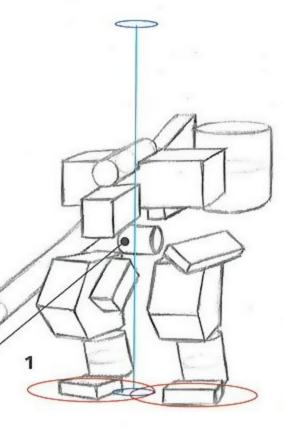
reactive armour.

Heavily armoured drum, containing coils of 32mm belt-fed ammunition.

On solid ground

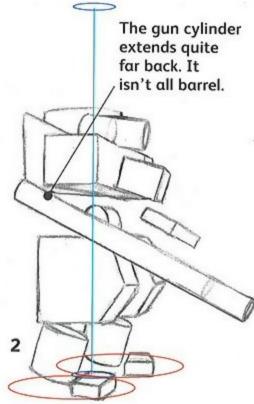
Even when joint articulation becomes obscured by blocky armouring, it remains important. The Anvil's legs have extended feet resembling those of a horse or goat. Because the robot is very large, expanded feet are essential for stability.

The abdomen and pelvis are less heavily armoured to allow for pivotal movement.



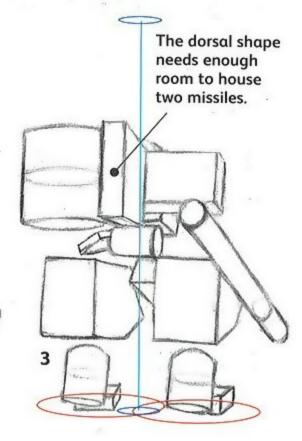
Blocklike elements

The form is blocky, so much of the feel of the design will be decided in these stages.



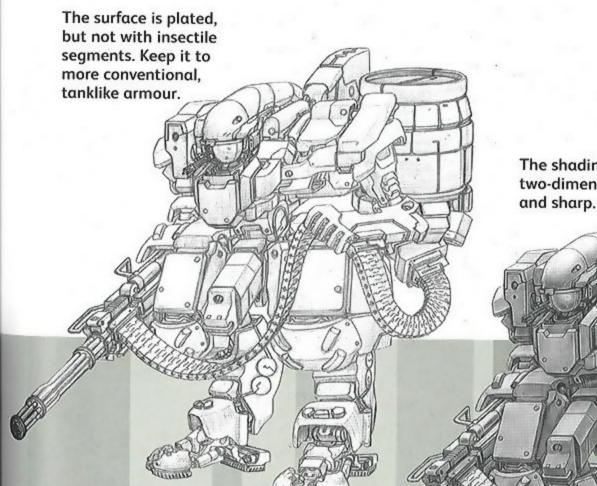
Inhuman construction

2Note the distinctive jointing of the legs and how they differ from those of a human.



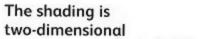
Gun placement

3 The gun offers a degree of balance for the huge drum of ammo.



▲ Balancing objectives

Chunky and angular like a tank, this robot is composed of still recognizable primitives. However, curved surfaces will reflect projectiles well and can absorb more punishment. Maintain a balance between the two.



▲ The right tone

Every time a surface plane changes, the tone you use should change accordingly. Again, shinier metals – as on the guns – will reflect light differently from the painted armour.

▼ Military garb

Drab military colours are the prime scheme for the Anvil. Cooler gunmetal greys offset the warmer body colours. Occasional splashes of warning reds liven up the paint job.



Spice it up a little if you need to – you want it to look like a military robot but not too realistically drab.

22 MK1. MAIN BATTLE WALKER

First introduced in the European Theatre of War in 1943, the MK1 changed the battlefield.

As unreliable and temperamental as the first tanks in World War I, the MK1 still functioned as an incredibly versatile, all-purpose weapon. This

Hatch placed on rotating head. _

model is fitted with a 105mm Howitzer.

SEE

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Materials, p.18
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Attachments, p.36

Light machine-gun mounting for a close quarters antipersonnel role.

Modular clamp hands for multiple weapon-mounting options.

Arm joints covered in a jacket to prevent the elements from fouling operation.

Gun detail

Designing your own guns is fun, but sometimes using real reference can add a sense of reality to your art. Researching actual examples such as this light machine gun can also help you learn the look and feel of a time period and translate this into your future work.

Legs are plagued with problems; an escort always accompanies with spare parts and repair and maintenance engineers.

Conceptualizing the robot

Good reference is invaluable for the robots from this era, and a wealth of military equipment was used by the artist for inspiration. Organic curves had no place in this design, as everything is hard edged and utilitarian. A worn, weathered look was also required, so the illustration shouldn't be too clean.

Constructing the robot

Much of this geometric construction can still be clearly seen in the final design. When making initial sketches, always take balance into account, especially with top-heavy designs like this. Repeat design elements to ensure unity create a set of rivets, handles and so on that is reused throughout the design. Remember to space out these details and not clump them together. Proportion is very important when objects that have set sizes are introduced.

Getting the balance right

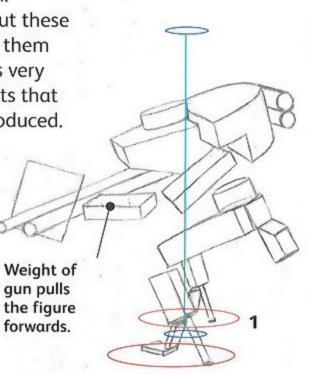
Balance is tricky when the artist is rather unsure of how much different elements may weigh. Here, the main gun is assumed to be heavy.

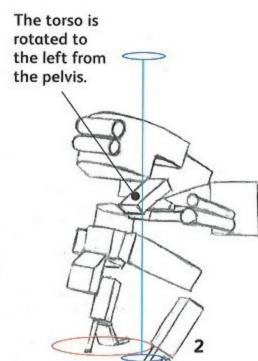
Using oblongs and cylinders for basic construction

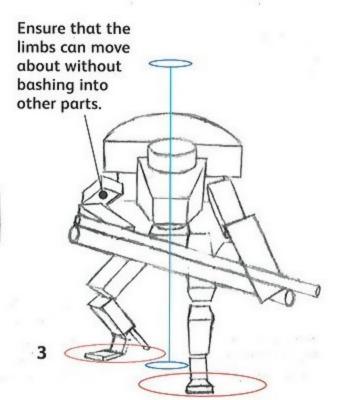
2 As long as the main structural shapes are sound, detail can easily be added onto the initial structure.

Look, no hands

The arms are attached to the gun at the wrists, so no constructional guides are needed for the hands.

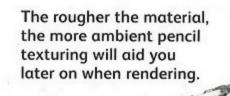




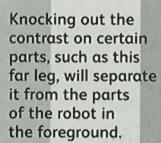


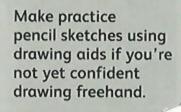
▼ Creating the linework

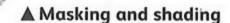
Using rulers to draw lines tends to create accurate, but stiff, lifeless forms, even on very angular designs like this one, so draw freehand. Lay down lightly sketched shapes using blue Col-Erase pencil. Scan the artwork at a higher resolution, erase the pencil lines, then drop it down to the desired dpi.



Colour can indicate rust stains and places where the paint has scraped off.







Use the Magic Wand to select the areas you want to work on, and use Dodge and Burn to modify the tone of the drawing. Shading is extremely flat here and care should be taken to keep tones on equal planes the same. Light reflects brightly off the shinier bits of metal (like the handles and barrel).

▲ Colouring

Always adapt the colours to the material.

Use the Colour Balance adjustment in
PhotoShop to add red and yellow to the
shadows and midtones of the drawing. Now
place a layer over the drawing set to Soft
Light. When applied, the colour will glaze
over the drawing, slightly changing the tone
you've already set down.

SUBHUNTER

In an age when nuclear,

biological and chemical warheads are delivered primarily by

submarine, antisub robots are

numerous and highly developed.

These robots are too small

for the passive system of a submarine to detect, and they can silently approach these nuclear leviathans to drill explosive charges into

their hulls. Modified

Subhunters are used by pirates to assault and board tankers and

merchant ships.

Drill head with projected, high-explosive charge used for breaching hulls and causing irreparable damage.



Undersea inspirations

The nautical design and component shapes of the robot are derived from a combination of pre-existing machines, namely submarines and torpedoes. An element of complexity is also added by using crustacean carapaces as structural influences.

Large central propeller and jets are the primary mode of propulsion.

SEE ALSO

Rendering Materials, p.18 Developing Your Ideas, p.26 Bits and Widgets,

p.32

Variable vents for

adjustments.

steering and speed

Limbs cling to body during nautical travel to reduce drag.

Powerful, superheated talons for anchoring to hulls and tearing open bulkheads.

An amphibious robot

The Subhunter is unique in that it needs to function both in and out of the water. When folded into itself for long-distance travel, the Subhunter is intended to resemble a small, deep-sea submarine.

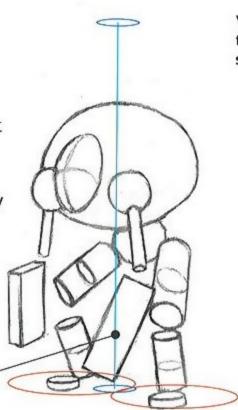
Remember

that the drill

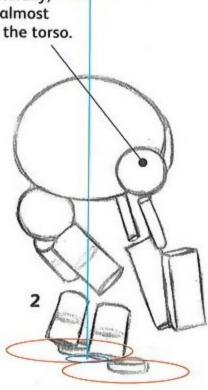
Nautical robots

A believable-looking machine that encompasses hydrodynamic contours is integral to any nautical robot design. Although it is seemingly overbalanced in the torso, much of it is simply a hollow sluice for the propeller and jets.

The talon comes close to, but doesn't actually meet, —the ground plane.



Viewed laterally, the head almost sinks into the torso.



bit protrudes, so don't make the main body of the gun too long.

Great ape

The posture, proportions and joints are almost gorilla-like.

Sublike contours

1 Everything in this robot is rounded or cylindrical, apart from sections of the retractable limbs.

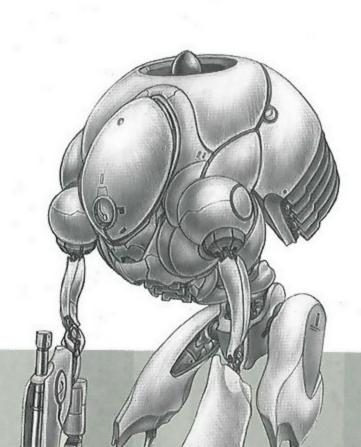
Ready to dive

Note the permanently bowed posture and the legs that don't lock perfectly straight.

▼ Out of its shell

A crustacean is an excellent reference for the kinds of postures and shapes present in the drawing. A hunched, crablike design also creates a predatory impression.

> Keep the shapes rounded, and make sure they interlock for an overall smooth profile.



Add very little texture to keep it smooth for travel through water.



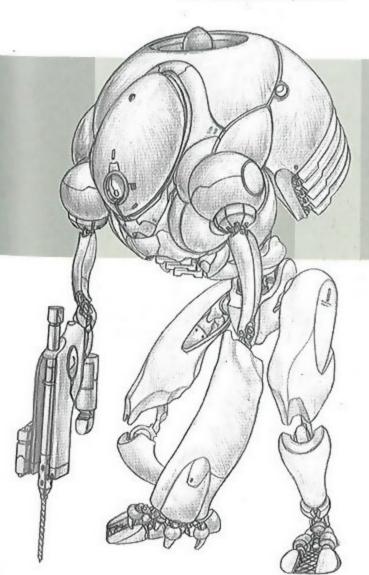
Darkly camouflaged, this robot is designed to approach targets undetected, so a dark, smooth finish is essential.

▼ Deep-seα blue

Apply a deep blue to most of the design (remember the role this robot plays). Small, complementary spots of orange add key points of detail.



Splashes of orange and shiny silvers liven up a uniform colour-scheme.



6 ELEKTROGRAD

Had it not been for the

Elektrograd, the Russian stand against the German invasion in World War II would have been doomed in the bleak winter. A

masterpiece of construction

when it was originally created, this 11-foot tall robot could punch holes in a German Panzer

with ease. Long out of fashion and out of use, it is now considered a nostalgic museum piece and used only in military parades.

Battlefield machine

The robot is inspired by Russian constructivist propaganda posters as well as by the design of the top war machines of the era. It is rough around the edges but was an inspiring sight in the trenches and the driving snow.

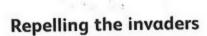
Early cog-driven processors in the head use colour recognition to identify enemies on the battlefield.

SEE

Working
Traditionally, p.12
Joints and
Movement, p.30
Bits and Widgets,
p.32

Powerful, gyroscopically balanced hands for repelling invaders.

Composite steel and iron superstructure, tempered for resilience to fire, explosives and chemical agents.



This robot had a heroic and glorious past on the battlefield. The feet are large and long so it can't be knocked over easily, and the legs are attached by means of ball-andsocket joints for ease of movement over the rough terrain.

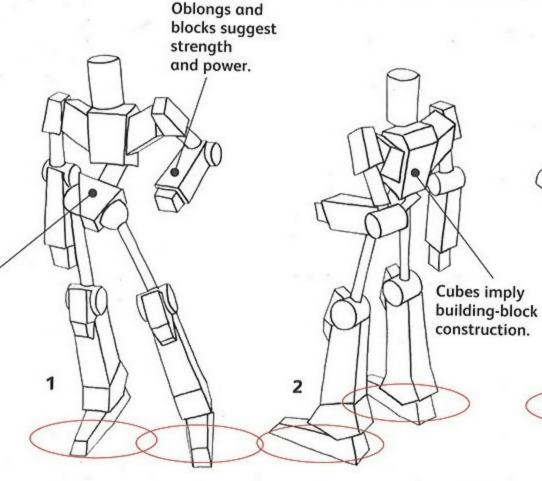
Shoulders

remain in line, symmetrically, above feet.

Industrial might

The Elektrograd was cobbled together from industrial parts and battlefield wreckage in the grim economic climate of the war. The finishing touches of bolts, screws and vents create the impression of a real, functional war machine.

> Basic geometric construction.



Counterbalance

Hip area juts forwards, counterbalanced by feet and head.

Alignment

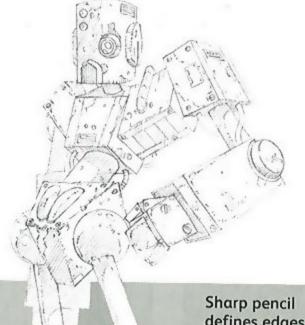
Use of an axis to ensure that each extension is counterbalanced by an equivalent extension, for stability.

Balance

Basic shapes in balanced arrangement define the robot's superstructure.

▼ Irregular profile

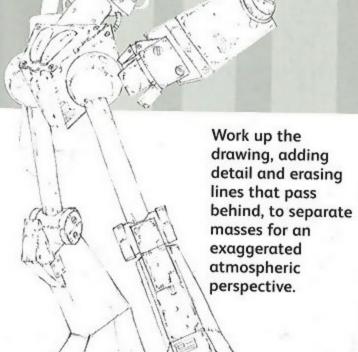
All the basic shapes that underlie this robot are drawn freehand to keep a naturally irregular feel to the profile. Don't be afraid to draw as many lines as you want afterwards you can always erase any that you don't need.



defines edges and adds shading to enhance solidity.

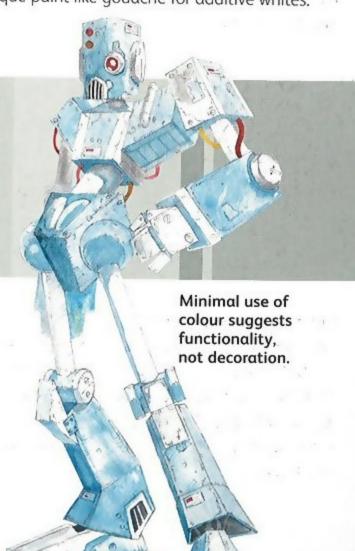
▼ Watercolour effects

Watercolour paint (real or digital) is applied in light, loose washes over the pencil, allowing the white paper beneath to show through and giving the colour a natural brightness. To create darker areas of tone, paint over the original wash, but avoid muddying the colour with too many coats. Use an opaque paint like gouache for additive whites.



▲ Directional light

To create a feeling of light coming from a particular direction, imagine which surfaces face the light source. Alternatively, set up an action figure toy and use a spotlight on it for reference.



As the ideal of the new-andimproved laborer, an urban robot may be expensive, but seeing that they work hard and well in any environment, and all without the slightest complaint, they have rapidly taken over in most sectors. Adopted by wealthy companies and governments, these robots have changed the way the city works. Purely utilitarian, remember that these robots are all function and no fashion. Use warning labels, dust covers, and rusting and worn metal to decorate.

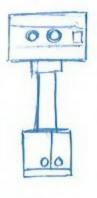
Devloping ideas

Urban robots will have very apparent utilitarian functions made evident in their appearance. Their tools of the trade will have to be fine tuned and adjusted by the artist during the sketching phase.





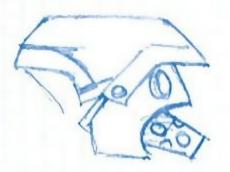






■The original head had a soldierlike appearance, which was scrapped in the more developed version. ▲ Here, the artist has played around with different drill bits and connectors, while developing the visual vocabulary for the robot.

► The mouth belched exhaust, but its appearance was decided to be too aggressive in the subsequent version.



show profit the

This front view shows the blocky profile planned for the final design.

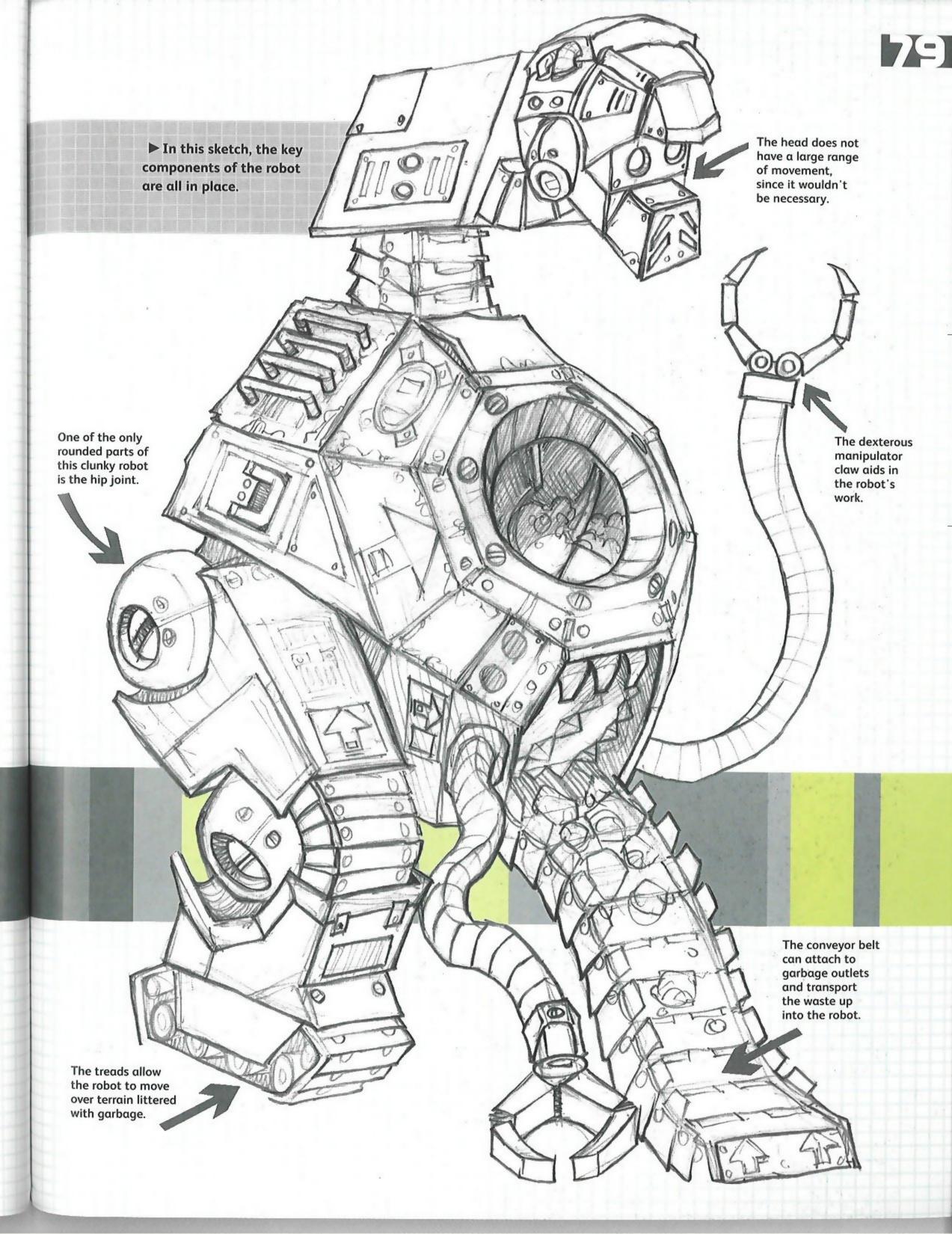
In this side view, the robot is depicted in action, performing one of its set functions.

The rear view gives excellent detailing on the legs, and how they work.

GARBAGE COLLECTOR

From all angles

Developing a rough cartoon of your robot is an excellent way to familiarize yourself with the fundamental appearance and mechanisms of your creation.



BO NANOBO'

Shaped from proteins,

this robot travels through human bodies performing delicate surgery and, alternatively, delivering minute payloads of poison to enemies. Nanobot – of

molecular or atomic scale —
is something of a misnomer;
this robot is actually only
microscopically small, but it
can work on a subatomic level.

Wholly organic, the Nanobot

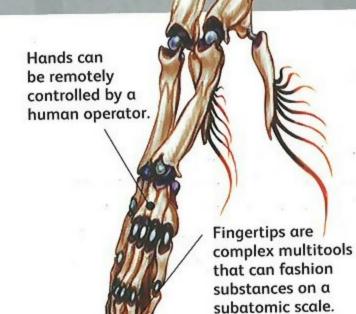
can self-destruct to be absorbed by the host's circulatory system, leaving no detectable trace.

Multiple sensors detect all manner of trace elements and energies.



Lifelike systems

The flagella glow with heat as a by-product of the energy fed through them. As they work, they glow with a brighter and more intense hue. Their shape can be compared to any other organic, microscopic flagella, as on small sea creatures.



When not needed, elastic arms remain bunched in lumps on the body's surface.

SEE

p.16

p.21

Humming-bird-style wings allow for aerial travel.

ALSO

Artistic Rendering,

Life Is Your Palette,

Developing Your

Ideas, p.26

Pulsing flagella

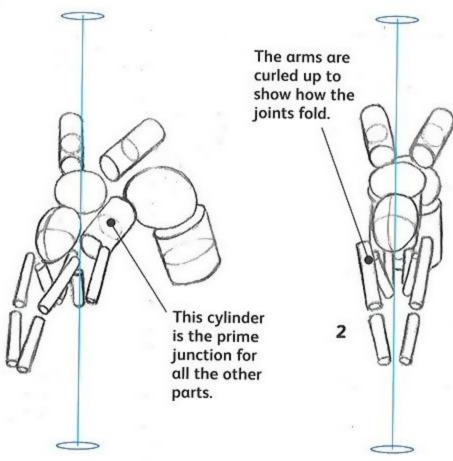
propel the robot through liquids.

Take inspiration from life

This robot is obviously inspired by microscopic organisms rather than by the usual mechanistic influences.

Right way up

While suspended in liquid and functioning at a scale that makes gravitational considerations difficult, the Nanobot still has limbs that affect its centre of gravity. Certainly in design and in direct human application, this robot definitely has a 'right way up'.



Arms and hands

Arms have multiple joints and an expansive, dextrous reach.

Basic shapes

2Two limbs branch off these cylinders.

Lobster-like form

Pointed shell-

plates extend

off the rear cylinder.

The thick body curls back on itself like a lobster tail.

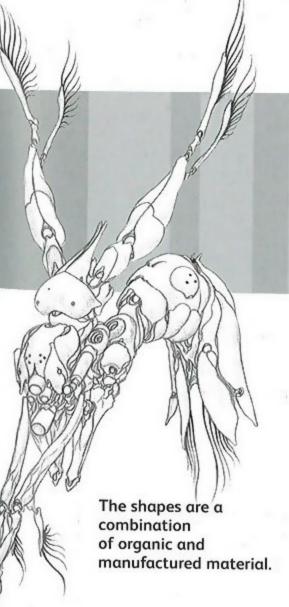
▼ Create a functional robot

Smooth and organic, the shapes of the Nanobot are functional, despite their delicate beauty. Although based on microscopic organisms, the shapes are also closely comparable with those of large crustaceans. Remember in your design that these shapes have evolved for movement in liquids and are not merely decoration.



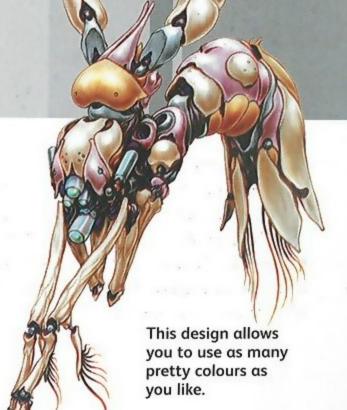
▼ Be imaginative with colour

Built from laminated proteins, this robot cries out for imaginative colour-schemes. Iridescent colours make it look like a beautiful bug or a delicate piece of jewellery.



▲ When to light artificially

Lighting and shading are based on the artist's personal interpretation. Any depiction of something as minute as the Nanobot would have to be artificially lit, in any case.



82 FACTORY-LINE WORKER

This Factory-Line

Worker is a project designed to curb widespread corporate use of 'Third World' labour and sweatshop practices.

Mounted in a mechanical

cultured 'high-wear'
parts are grown in vats
and regularly replaced.
Not only are the meat
components cheap to
fashion and replace, they
are extremely efficient in
operation.

Reactor core encased in thick sphere of titanium alloys to prevent explosions or leaks in case of accident. Four eyes used by CPU to coordinate assembly and work processes.

CALLING ALL

Leave details like decals, labels
and textural effects to the very
end of the illustration process.
In this case, the blood vessels,
bruising and chipped paint
were the final touches added.
Don't overdo these effects, or
you may overwhelm your design.

Docking bay connects worker to recharge stations and assorted heavy machinery.

Nutrient cocktails and preservatives pumped into organic parts prevent rot and rigor mortis.

Hazard pattern to alert human workers.



One of the main points of interest in this design is the juxtaposition of organic components with harsh, industrial ones. Details such as the chipped paint on the metal are matched by the rashes and engorged capillaries on the flesh.

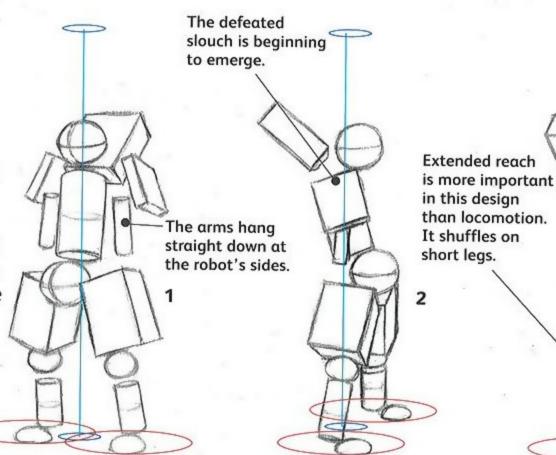
Feet are toughened, and mechanically reinforced but often need to be replaced daily.

Emotional reactions

Although not aggressive in any way, this robot is unsettling to the viewer. Designed solely for industrial purposes, the Factory-Line Worker is distinct from a military or civilian robot. Imagine it as run-down and neglected, serviced by technicians who have no real concern beyond keeping it functioning.

A humanoid drone

The main form of the Factory-Line Worker is humanoid. Of course, the proportions have been twisted and skewed (especially in the mechanical sections). However, the underlying layout and jointing remain human in effect. A great weight seems to crush the body down into a slumped posture that shows it operates in an environment where there is little concern for its health.



Balance the mechanism

The extremely heavy sphere in the abdomen counterweights the back block.

SEE ALSO

Rendering Materials, p.18 Life Is Your Palette, p.21

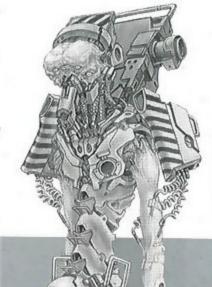
Developing Your Ideas, p.26

Focus on details

The legs have more **distinct** jointing because they're more mechanical than the arms.

▼ Poignant character details

An especially poignant effect is achieved in this design by emphasizing the strangeness of the human parts mounted in the cold, lifeless shell. Hard, industrial shapes make an excellent complement to the disturbingly familiar limbs.



Contrast the materials

Note the contrast

between the geometric

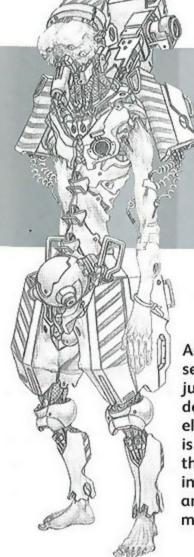
metal parts and the rounder

flesh parts even at this stage.

Keep those hazard lines striking by darkening them to almost absolute black.

▼ Utilitarian design

This is an industrial robot, so try to convey a functional 'utility' feel in the colour-scheme. The bright, striped hazard markings vitalize the design, as do the warm hues of the bruised flesh.



Articulation and segmentation are just as important as design. The torso is elongated and care is taken to ensure that no part interferes with another during movement.

▲ Shading tips

Make a distinction when shading the differing materials that make up the robot. Simply put, the flesh should be lighter and softer than the metals.





84 INDUTEX URBAN RENEWAL BOT

A municipal council commissioned this robot from a foreign multinational to combat urban blight. The Urban-Renewal Bot fills an omnipurpose

maintenance and repair role in

cities. Fully modular, it can

features limited AI (artificial

be fitted with an unlimited

range of equipment and

A series of latch clasps shows where large, modular additions can be fitted before deployment for carrying out a variety of tasks.

SEE

Artistic Rendering, p.16 Joints and Movement, p.30 Bits and Widgets, p.32

Articulated arm unfolds. The robo can extend the arm platform up to eight times the current height.

intelligence), which allows it to speak to pedestrians in a soothing, female voice.

Internal parts
viewed between
segments would
probably be
obscured by
dustcovers during
actual operation.

This series of limbs is merely a repetition of the basic, multi-use claw, and any of these can be replaced individually with task-specific heads.

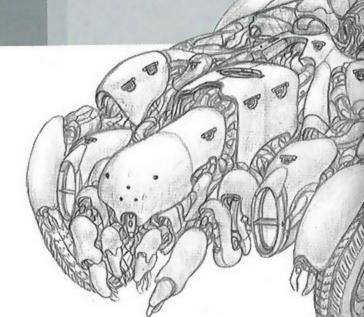
Entire chassis can deform and stand up to allow it easier clearance into tight spaces or to spread out to form a more stable base.

Municipal finery

A shorter set of stronger limbs is located below the forward set of sensors. These are used for heavier, more industrial work, such as road- and foundation-laying. The city's Urban Beautification Association's crest adorns the hood.

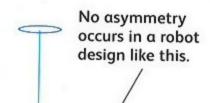
Workhorse stylings

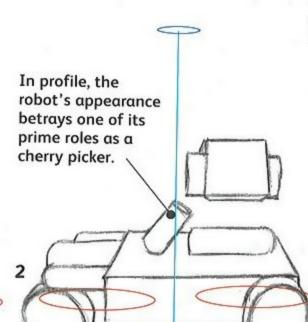
This robot is not used in combat but still has to be made of resilient materials to cope with its arduous tasks. A slightly worn and pitted plastic forms much of the casing.



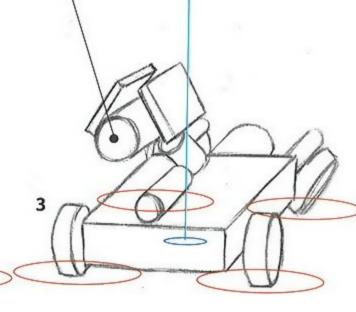
Buglike and functional

Strange and insectile, this robot is nonetheless a helpful and constructive creation, and its posture should make this apparent. While it is fourwheeled like a car, the front wheels are extensions of two articulated arms and are not constrained by a shared axle.





Give the extending arm plenty of radial clearance.



Frame versus casing

Whereas the casing is organic, the basic chassis and structural frame are quite geometric in form, not differing greatly from that of a present-day automobile.

Central arm is the focus

The main part of the robot is simply a bed for the large, folded arm.

Approximate with shape

Because the top arms are rested in a position flush with each other, they are shown here approximated as a simple shape.

To separate the materials from each other, elements such as the tyres and rear casing should be darkened overall.

▼ Tightness and looseness

Loosen up on the plastic casings, but ensure that the more structural shapes such as the wheels and rear compartments are tightened up.

▼ City-state colours

Being a civilian robot that performs public duties, the URB gives the artist a good excuse to apply a purely aesthetic paint job (perhaps the official colours of the city-state).



A serial number is

included for servicing and

identification purposes.

▲ Smooth the shading

Keep the shading smooth and flowing but, as you are drawing beaten-up plastic, you can loosen up occasionally and add a little variance in the surfaces.



Even though much of the detail would be hard to see when the robot is operating (the tyre treads, internal cables and joints, for example), they're still fundamental to the design and so shouldn't be skipped.

86 519 SYRINGE SAINT

Increasing amounts of urban conflict and

a rising population in areas prone to natural

disasters created a demand for a quickly

deployable victims' aid

robot. **The S19**

Syringe Saint

is fitted with five articulated air jets that keep it afloat as it steps nimbly across hazardous ruins, scanning the area for the injured with its array of sensors.

Segmented body plating to minimize dust and dirt from fouling internal systems.

> The fifth air jet is on the back. The four seen on the front act as stabilizers.

SEE ALSO

Rendering
Materials, p.18
Developing Your
Ideas, p.26
Bits and Widgets,
p.32

Long arms that can unfold to become even longer.

Mouth part carries many independent sensors to read the environment (for example, to detect gas fumes and biological contaminants).

Arms are multi-jointed to better reach down into rubble.

Long legs with wire ratchets (intended more as stabilizers than support).

Head detail

Robots will often show glimpses into more internal parts, which usually look quite complex. These internal components should appear as though they stretch back into the body and are integral to parts the viewer can't see.

Conceptualizing the robot

Before you begin, decide on the kind of 'feel' you want your design to reflect and what you want your robot to be capable of. This will give you direction. This artist wanted to make a robot that was light and ethereal, that floated and tiptoed about with its sterile white shell. It needed long, dexterous arms to reach people trapped inside rubble.

Constructing the robot

Heavyset robots usually have problems with believable articulation of limbs, whereas thin robots need extra effort to ensure limbs look strong enough to function properly. Organic curves are a great way to solve this problem because they've often developed in nature to efficiently absorb shock and stress. These basic curved shapes are your building blocks - start by drafting or tracing these shapes.

Get the balance right

Pose is midmovement, so the axis of balance tilts in the direction of travel. This tilt is tricky because the robot is also half-floating (torso almost lifts the legs up).

Using ellipses for basic construction

The first set of elbows

are here (the arms

are folded back during movement).

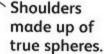
The only true spheres appear on the shoulders. You can keep the organic shapes vague, but remember the volume (denoted by ellipses in the wire frame parts).

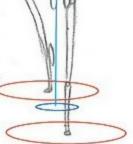
Conveying movement

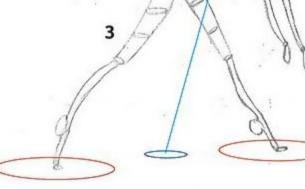
Think out the robot's movement. This lurch looks odd but not predatory; the robot has direction and purpose.

Head rests back into the body.





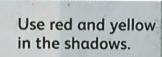




▼ Creating the linework

Line is very important on sleek robots. Use a blue Col-Erase pencil to sketch light constructional shapes. It's easy to erase pencil after scanning but harder to work on places missed at the pencil stage. Scan the art at a high resolution, erase pencil lines, then drop it down to the desired dpi.

Multiple source, ambient light makes cast shadows. Use Dodge and Burn tools to modify the shading.



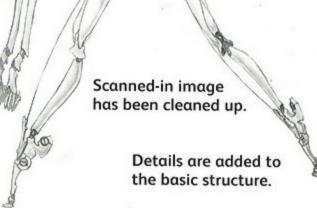
Light reflects off local parts.

▲ Masking and shading

Set drawing layer in Photoshop to Multiply and fill in masks of colour on a layer below (separate it into foreground, midground and background). Use the Magic Wand to select areas to work on, then Dodge and Burn to modify the drawing's tone. Shade according to the robot's material.

▲ Colouring the robot

Use Photoshop's Color Balance adjustment to add red and yellow to the shadows and midtones. Place a layer over the drawing set to Soft Light, and the colour will glaze over the drawing. Add the 'garnish', in this case the play of light and added LED effects.

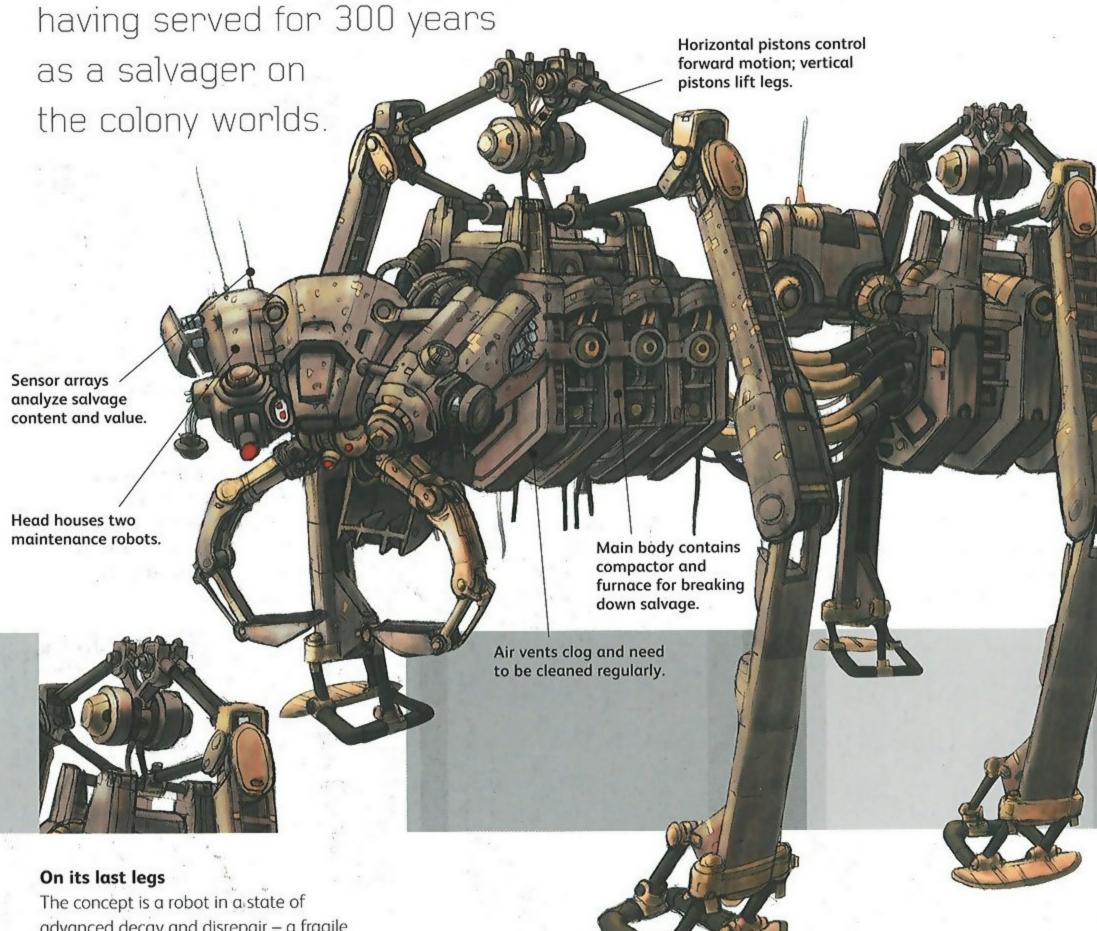


88 GRUNTER

The Grunter was obsolete before it was even finished. Too big and cumbersome for most environments, the 10 Grunters that were originally manufactured were soon decommissioned by the army and sold to private companies. The model shown here is the last survivor,

SEE ALSO

Working Digitally, p.14 Artistic Rendering, p.16 Joints and Movement, p.30



The concept is a robot in a state of advanced decay and disrepair – a fragile machine, despite its bulk. Leave the edges scratchy and sketchy to emphasize decay.

Surface details

There is a lot of surface detail, so try using a programme such as Painter for the shading rather than crosshatching in pencil, which will make the detail too hard to read.

Years of wear

After the salvage is compacted and melted down, it is categorized and stored in the abdomen. This means that the surface of the robot will be pitted and damaged by 300 years of wear and tear.

Sturdy design

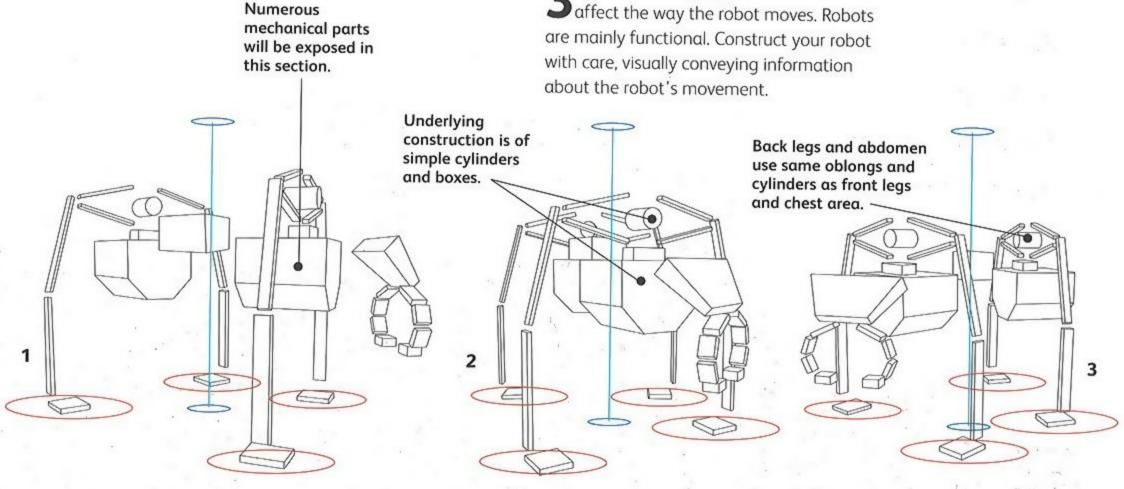
The enginelike core of the body is perfectly balanced and supported by the hinged, slightly bowed legs. Although the robot itself is very old, the underlying construction remains strong and sound.

Timesaving 3-D options

Use 3-D software and save yourself hours of perspective drawing. You'll find it easy to construct your basic robot using default shapes in a perspective view.

Functionality

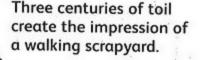
Any jointed hinging you create will affect the way the robot moves. Robots with care, visually conveying information



▼3-D options

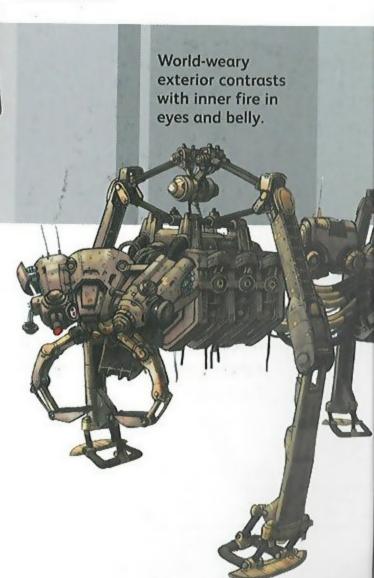
The robot is a mess of crammed together shapes and surfaces: flat, curved, sharp. There is nothing smooth about the Grunter. Linework is reminiscent of engine parts and other intricate, but convoluted, machinery.

Quadrupedal construction means weight distribution is less of an issue.



▼ Colour and contrast

Choose earthy, dull colours to emphasize the age of the robot. Use red on the lenses in the head as a contrast to the duller tones.



▲ Layers

Apply your colour flat on a Multiply layer, and then add highlights and details on a new layer.

90 NAKATOMI CLERK

The Nakatomi Clerk

hovers above the marble floors of corporations and embassies, greeting people with its computergenerated human personality. Fully customizable, the Clerk fills a myriad of roles, and its impeccable manners and on-the-fly networking capabilities have led many executives and dignitaries to admit that they now prefer dealing with Clerks to networking with people.

Nakatomi

Reference and reference

Professor and reference

Reference a

Nakatomi

Corporation logos, tags and labels.

> This computer-general representative is an embassy diplomat for the Tatar Mercantile Republic.

Externally assisted magnetic induction levitates the robot, which is able to float only in magnetically facilitated buildings.

Sets of hands for physical interaction.



Drawing computer imagery

Artificial lighting illuminates the computergenerated figure, and scan-lines are overlaid as an illustrative device to indicate that she is presented onscreen (and not sitting inside the robot!).

Form equals function

Illustrating this style of robot creates unique considerations for the artist because of its lack of resemblance to other, more familiar forms (humanoid, vehicular, and so on). Being a civilian robot designed to deal with people and put them at their ease, it is important to create a nonthreatening, servile form.

Docking port for instant connection with other robots and humans.

Artists should note that one of the

challenges in digital art is how to

overcome the sometimes

artificial-looking, machine-

generated results, that is, lines

that appear too consistent and

that look too straight and colours

exact. There are many occasions,

however, when these effects can

be desirable. A good example

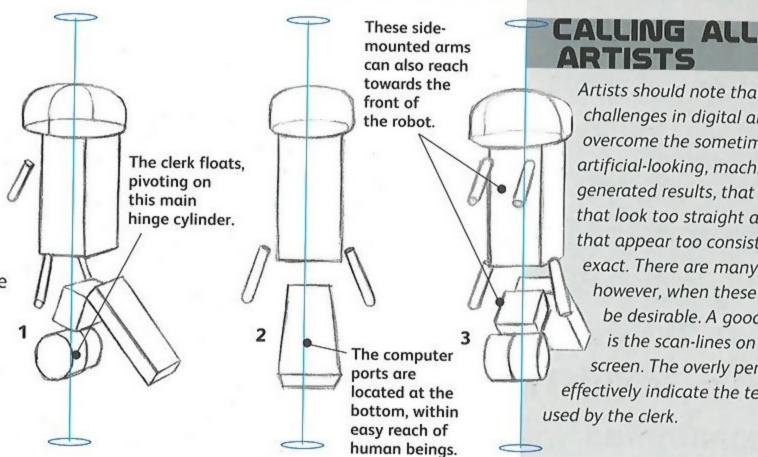
screen. The overly perfect lines

effectively indicate the technology

is the scan-lines on the clerk's

Design a realistic machine

Although this robot floats, that does not mean that its axis, balance and relation to the horizontal plane (in this case, the floor of the lobby) are irrelevant to its design. The robot pivots on the bottom section, so ensure that you illustrate a believable hinge mechanism and balance. The general shape of the robot should almost resemble the consumer electronic appliances that we use everyday without a second thought.



Extending arms

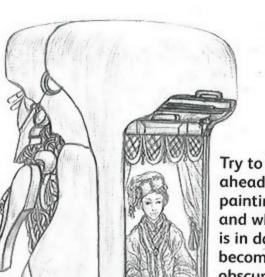
These arm cylinders are folded up on themselves and can double in length.

Simple shapes

Note how simplified the design can become and yet remain recognizable.

Vision

Because the robot can see in any direction, the arms are tucked back from the screen so as not to impair vision.



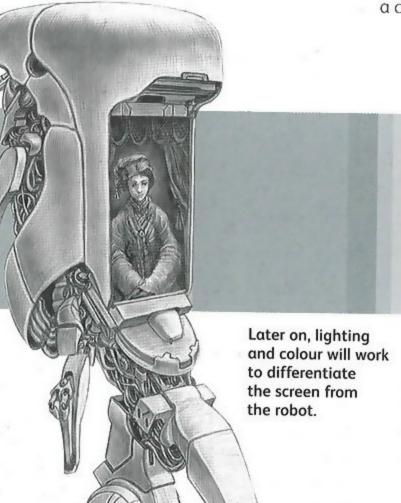
Try to think ahead to the painting stage and what is in danger of becoming obscured.

▼ Shading and light

Choose a shading style to show that the brushed metal plating reflects light differently than the self-illuminated screen.

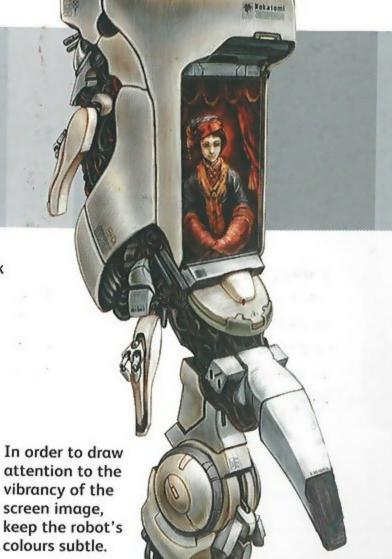
▼ Industrial art

Clean, attractive colours suggest a robot that an industrial artist could have spent time designing. The colours of the on-screen personality are closer to the colours used in a classical painting than in a photograph.



▲ New line styles

The linework requires a slight shift of style between the smooth, sharp forms of the robot and the more organic curves of the woman on the screen.



92 OFF-WORLD TRADER

The alien-looking Off-World

Trader (OFT) droids were designed by EarthAid
Cybernetics as a means of infiltrating the civilizations on colony worlds to source vital food supplies for sale back on Earth. The OFTs are programmed with one million colonial bartering protocols and are multilingual.

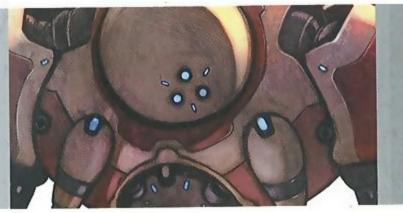
Recessed head contains a high-definition, heat-sensor, and night-vision cameras.

Slouching, primeval shoulders create a hunched and suspicious profile.

SEE ALSO

Working Digitally, p.14 Rendering Materials, p.18 Joints and Movement, p.30

Articulate hands with delicate fingers enable the Trader to type at computer terminals and participate in auctions.



Exoskeleton can be modified with clip-on plates for protection in hostile environments.

Brains and brawn

The recessed head is set into powerful shoulders that house an extra-large 'Calculus' brain designed to process millions of complex transactions a second.

Unusual design

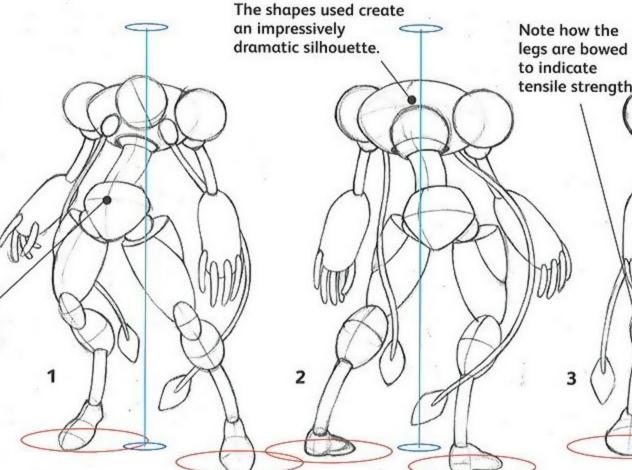
The strange form of the robot includes an almost monkeylike upper body, biomechanical tentacles for product testing, and ultrastrong legs.

Tapered knees, bulging calves, and feet like hooves, give the Trader a racehorselike quality.

Consumer aid

The Off-World Traders were an offshoot of the first line of Radian checkout robots, which were designed to carry bags of food and consumer goods through war-devastated streets to the homes of needy civilians.

> Sketch the shape first before working up the design using your software.



Experimental shapes

Experiment by bending and warping your shapes when doing your initial figure doodles.

Elegant motion

→ Looking at the ball-andsocket joint of the hip, we can get an idea of the sinewy way the OFT walks.

Powerful build

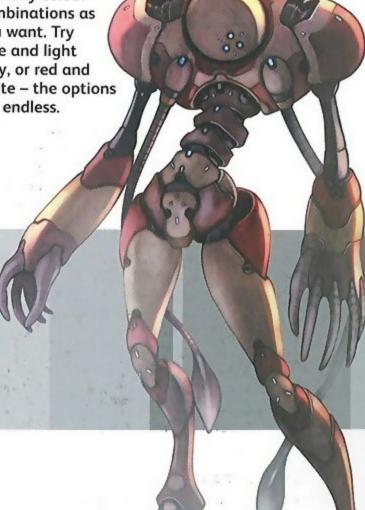
Strong upper body has a yokelike structural reinforcement for carrying heavy loads.

Two-tone colour-scheme is a chance to explore colour combinations.



Accurate lighting aids realism. Think about where the light will fall on the robot's curves as the low evening sun strikes him from behind.

Mix and match as many colour combinations as you want. Try blue and light grey, or red and white - the options are endless.



▲ Shading

Use dark lines to define the shadows, which will help depict which elements of the design are round, flat or square, just by placing the shadows correctly.

Satin-metal texture is imperfect, suggesting wear and tear.

▲ Extra rendering

The white fogging on the legs and tentacles integrates the robot with the scene, whereas a shadow can plant him firmly to the ground so he does not look like he is floating.

Law-and-order robots, used for policing, are unique in that their interaction will be primarily with the civilian populace. They are human-friendly but have a disconcerting potential for violence beneath the surface.

Though not engineered to be attractive, the appearance of these peace-keeping robots is nonetheless important.

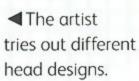
They have been painstakingly designed both to calm a crowd of agitated rioters and to intimidate and terrify wayward suspects.

Developing ideas

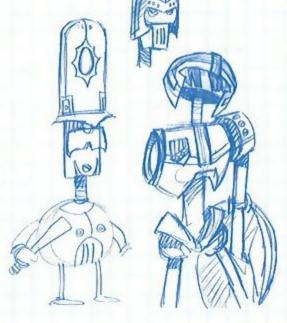
Robots whose roles lie in law and order have similarities to military robots, but their aggressive aspects may be downplayed. One major consideration is how public the robot should be in its appearance; it could bear official markings or function in a more 'plain clothes' role.



▲ An aggressive stance implies a robot who means business.

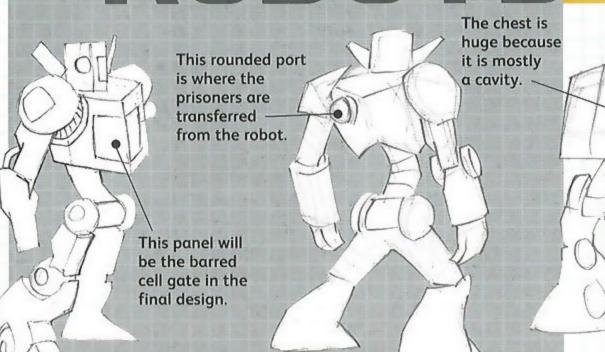






► Shoulders are flanked by rubber appendages.

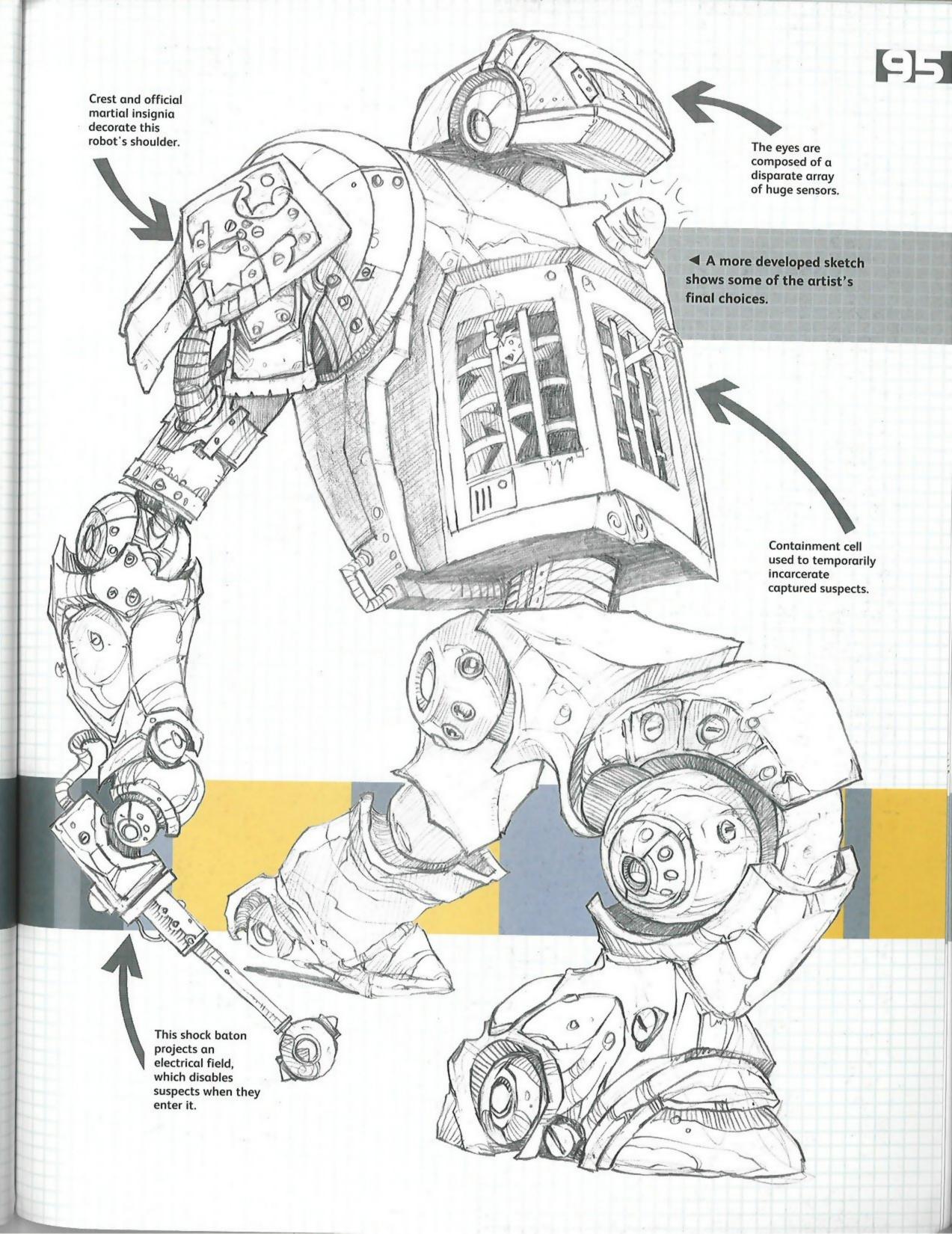
LANGE RIER ROBOTS



PRISONER-CONTAINMENT ROBOT

From all angles

This illustrative rotation of the robot shows its exaggerated posture and its large chest. Notice that the joints are developed even at this stage.



96 STEEL LOTUS TANK CALMER

When the Imperial Chinese land armada stole into Tibet, the holy men of the mountains defended their peaceful land by willing into being 15,000 tank-calmer robots, known as 'Steel Lotuses'. Far from being a killing machine, each robot was powered by 1,000 prayer wheels.

SEE ALSO

Working
Traditionally, p.12
Artistic Rendering,
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Attachments and
Embellishments,
p.34

Together the Steel
Lotuses swept 46,000
Imperial tanks back
over the border
with the people's
collective prayer
for peace.

Exhaust system produces minimally hazardous byproducts.

Peace-ray appears as a gur to invading hord Brain powered by 1,000 miniature prayer wheels. Harmonious elements

Farsighted design

The eyepiece is an ingenious piece of equipment, allowing the holy men to see through remote eyes in all weathers, day or night. The robot also has olfactory sensors to smell out invaders.

Sturdy multijoint leg-units, weighted for extra stability.

These beautiful robots moved effortlessly across the landscape. The holy men allowed a handful to fall into Imperial hands, secure in the knowledge that the invaders could only understand the prayer-powered mechanisms by first accepting the message of peace.

Tail-like curved

arrangement.

cylinder

Shape and balance

This design is essentially a tapered cylinder on legs. Constructed in segments, it decreases in diameter towards the rear where it curves upwards to form the exhaust. Oblongs and triangles in the legs create a visual contrast.

A multitude of curved elements creates impression of a robot 'creature'.

Let your imagination and hand run freely to create a fluid

drawing style.

Legs resemble the limbs of a quick, scampering animal.

2 Legs must be positioned carefully for a realistically balanced posture.

Realism

Axis

The axis of balance will shift depending on the pose of the robot.

Simple forms

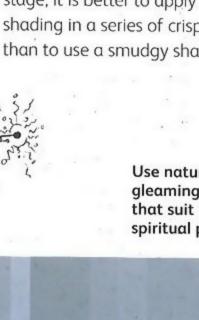
Note how an arrangement of simple forms underlies the complexity.

- FS

◀ Clear line style

As watercolour will be used in the next stage, it is better to apply pencilshading in a series of crisp, thin lines than to use a smudgy shading style.

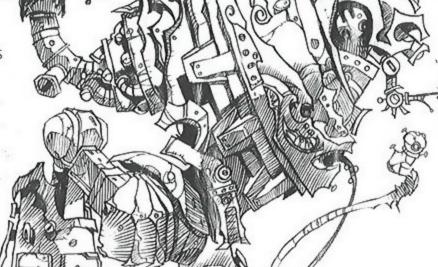
Use natural tones and gleaming elements that suit the robot's spiritual purpose.





Block in the colour using actual watercolour, or use diluted colours in Photoshop with a measure of translucency to create the same effect.

Sketch in the solid elements once you've caught the mood of your robot.



▲ Digital colour

When adding colour digitally to a pencil drawing, create a layer in Photoshop with the blend mode set to Multiply. This maintains the brightness of the colour, while allowing the black lines to show through.

TL98 THE EXTERMINATOR

By the late 25th century, most humans had given up their organic heritage and become cybernetic organisms. The few remaining Bioforms were forced to hide away or face immediate extermination. The elite cyPods were not allowed to pollute themselves with filthy biological matter, so a hit squad of flying robots was pressed into service to finish the job for them: the Exterminators!

SEE ALSO

Working
Traditionally, p.12
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Wings act as guidance foils.

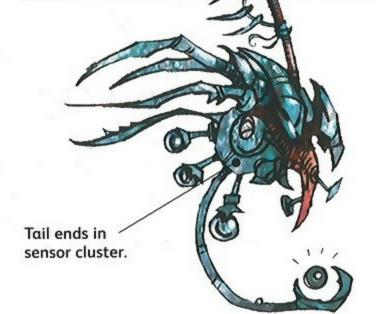
Stabilizing rods filled with gyroscopic adjustors.

Antigravity generators housed within body casing.

Heαt-sensitive 'seeker' orgαn, mounted on gripper proboscis.

Deadly armoury

The primary tools of the Exterminator's trade are its claw-tipped arms. Other weapons can be attached as well, including flame throwers, electron-pulse cannons and heat-seeking killer-virus grenades.



Monstrous creations

Created by their masters to resemble insects and other creatures that terrified Bioforms, Exterminators became fond of adorning themselves with gruesome trophies from their hunting expeditions.

Hand shapes

human aspect.

have oddly

Distinctive shapes

Each Exterminator is a challenging collection of contrasting shapes – flattened and distorted oblongs, spheres and cylinders. The finished design is very distinctive, so think carefully about construction.

Aerodynamic lines

2 No need to think much about balance when drawing the Exterminator.

Instead, give it an impression of speed and manoeuvrability in the air by focusing on its sleek, aerodynamic lines.

Axis for flight

3 The axis for a robot in flight is different from a regular, land-based creature.

Nothing natural

The underlying shapes may be insectlike, but the construction is distinctly mechanical, sharp and sinister. If this robot is an insect, it is an aggressive, deadly one.

Distorted oblongs suggest mechanical elements.

Plated arrangement

real-world insects.

takes inspiration from

Ink chosen to define edges and enhance solidity.

■ Multiply mode

Scan into Photoshop, then create a new layer and set the mode to Multiply. Add colour with Pencil, Brush and Airbrush tools and adjust using the Color Balance, Hue/Saturation and Brightness/Contrast menus.

▼ Appropriate style

The drawing style is jagged, jittery and detailed to create a sense of insectile complexity and advanced machine engineering.

Drawing was scanned before adding colour and texture in Photoshop.

► Experiment with colour A

When adding colour in a programme such as Photoshop, you have an amazing amount of freedom to adjust or alter the colour in any way you like. It is also easy to create new colour variations on the underlying drawing itself.

Iridescent colours suggest insectlike parts.

100MARTIAL OUELLER

dissidents with its electric baton.

As the multinationals gain ever-increasing power, they also face greater hostility. Their aggressive weakening of federal powers has relegated much policing to being handled internally. The Martial Queller is used to put down protests and riots, and its mere presence acts as a deterrent to those who would fight the authorities. Whenever corporate property is threatened, the Martial Queller wades into crowds, vomiting tear gas and shattering

Silk-fibre-composite plating in a

blastproof shield, which is also magnetically shielded to protect the robot from directional EMP

(electromagnetic pulse) blasts.

SEE ALSO

Rendering

Materials, p.18
Attachments and
Embellishments,
p.34
Military
Attachments, p.36

Plated communications array maintains constant satellite communication with corporate HQ.

Nonmilitary tough guy

board of directors.

Although heavily armoured and aggressive, this robot is not a military device, so you can expose areas between the armour plating. The humanoid warrior design creates the impression of a 'corporate Samurai', ever loyal to its lord – in this case the

A weave of rustrips encases explosive chawhich is deto the robot find mobbed by overwhelming numbers of ci

Chemical canisters fire tear-gas and other suppression

shells into crowds.

Implying strength

Hexagonal plating implies great strength in the shield's makeup. Polygonal shapes are an excellent way to create attractive, yet technically believable, large surface areas in robotic design. High-powered electric baton with plastic splash-shield (to prevent bodily fluids from shorting the open electrodes).

10

Powerful pose

A squatting warrior pose can be used to great advantage in this robot. Its shield is also shaped and sized for use in protecting the torso without obstructing the already heavily armoured legs.

Torso design

As with many robots, its lower torso and pelvis are relatively thin and mostly structural.

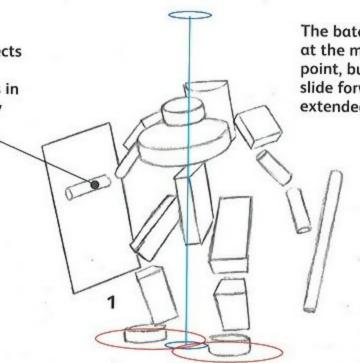
Tilting shields

The shoulder plates are tilted forwards to deflect bullets away from the torso.

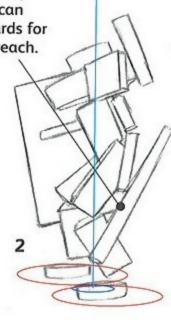
Aggressive aspect

3 Both the shield and baton are held away from the body in a defiantly aggressive display posture.

Though the arm connects with the shield at the elbow, it still continues in length as a structurally strong mooring.



The baton is held at the midway point, but can slide forwards for extended reach.



The shield doesn't differ fundamentally from this simple rectangle; a section has merely been cut out.

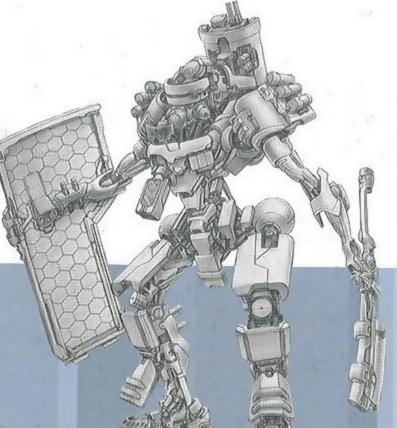


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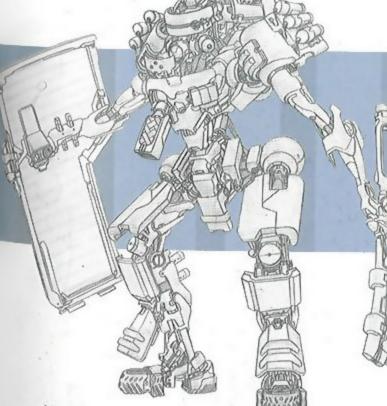
vilians

Although curved, the shapes used in the design are not quite organic, giving an industrial and unpleasant aspect to a robot that's more brutal than it is sophisticated.



▼ Officer robot

Use of blue, white and yellow add to a police-officer-like appearance, which has been adapted by the leasing companies to maintain the identifiable colour-schemes of the old authorities.



Note how the hexagons will be laid in later with the aid of the computer (don't bother with a ruler).

The hexagons are keyed in with the elements they touch (notice how other elements seem to line up with them consistently).

▲ Perspective on details

Darken the muscular cable bundles that can be seen in the gaps between the armour plating so that they 'sit back' from the viewer's eye, creating the impression of a glimpse into the anatomy of the robot.



The modular riot-shield and baton do not share the same colour-scheme as the robot itself.

DZENCYCLICAL PURGER

A personal satellite

floats around

robot, offering

reconnaissance

and detailed

information

to its host.

sensory

In the age of the globalized Unified Church, heresy has ushered in a new Inquisition.

It's in this crisis that a robot like the Purger must play the dual roles of spiritual healer and cleanser of heathen communities. Whenever a

heretical movement is detected, the Purger is sanctioned to descend on the community at night, cutting down men, women and children, burning everything to the ground to cleanse

Fixed flamethrower with bayonet and tank of compressed, jellied napalm.



Complex circuitry

the land of sin.

The satellite is almost Art-Deco style in aspect. The satellite is designed to be a completely unarmoured entity with almost bare circuitry, indicating that it's packed with complex sensors and electronics.

Fierce and fearless

'Intimidating' sums
up the impression
you want to create with
this design! The majority of combat takes
place at very close quarters, resulting in the
Purger's predatory appearance — and its
large complement of blades.

SEE ALSO

Holy symbol

branded on

the Purger's

forehead.

of the

Unified

Church

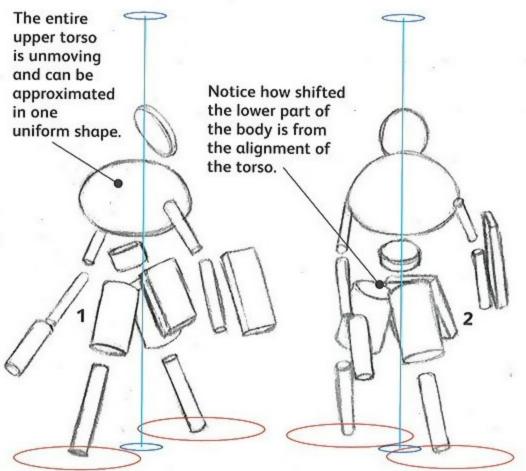
Decals and Logos, p.20 Developing Your Ideas, p.26 Attachments and Embellishments, p.34

> Enlarged sheath and bayonet array.

Electrically motivated razor wires with bayonet heads thrash and flail around the robot.

The fear of God

The Purger is a bogeyman: designed specifically to instil dread from every angle, even with its profile and the shapes of its body parts. Bristling with knives, and with a bare skull sunken into the hulking torso, the Purger is a twisted, humanoid design. Playing more of an assassin's role – with its target being unsuspecting civilians - this robot is more agile looking than it would be if it had a heavily armoured, military appearance.



Look out!

The robot is twisted round to its left, as if looking over its shoulder.

Built-in weaponry

The flamethrower is an extension of the forearm rather than a limb section replacement.

For all intents and purposes, the weight is placed straight down the leg and on to the heel.

Amazing razors

The skirt at the back of the robot houses twin rolls of razor wire.

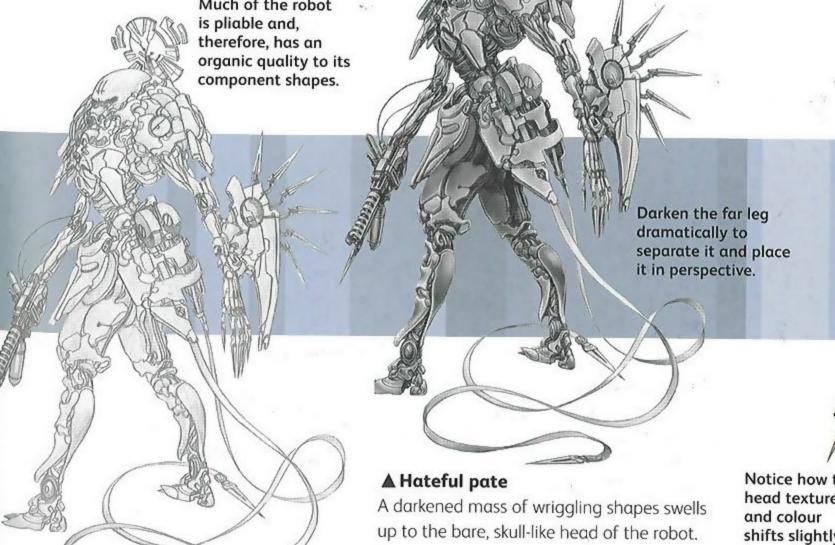
▼ Bug-like segments

A strange, insectile segmentation is used uniformly in the design - in marked contrast to elements like the satellite and flamethrower.

> Much of the robot is pliable and, therefore, has an

▼ Regal colours

Use an opulent colour-scheme here to imply the almost regal status invested in the robot by its owners, who've obviously poured incalculable funds into its creation.



The distinct, metallic sheen of the blades is applied at the colouring stage, so leave out bold highlights at this point.

Notice how the head texture shifts slightly from the rest of the robot, almost resembling bone.



While not combat This robot is an exhaustive SEE armoured, the robot is **ALSO** plated for protection overhaul of the second Soviet from asteroids and Drawing and space debris. Research, p.10 Space Programme's cosmonaut Artistic Rendering, p.16 buddy system. Mounted with Attachments and Embellishments, independent and solar power p.34 sources, and equipped with dual gauss guns, the Orbital Delegate Docking extension for connecting to its now circles the Earth service space station. shooting down any **Extensions unfurl** satellites that contravene into huge solar collecting panels. sanctions and treaties. Coil guns mounted in dual setup for more controllable recoil.

Don't design a heavyweight

These mechanisms seem slender and delicate when placed beside the large robot. However, in space, the only real stresses to the guns are caused by firing them. Their design is linear and specialized, but certainly not robust by terrestrial weaponry standards.

Flower power

The Orbital Delegate does not need to be a rugged robot, as it floats in the vacuum of space. It is an astro-artillery piece rather than a machine designed for combat. Additional parts and equipment blossom out of it like petals on a flower.

Legs terminate in complex retro-boosters.

Zero-gravity design

Due to its environment, the Orbital Delegate encounters no gravitational stresses and strains. Its limbs function only as articulation and are not load bearing. The exception is the arms, which connect the guns to the torso and need to be relatively reinforced. This is one of the rare cases where axis and ground plane are not vital factors in your design.

The two coil guns are completely identical, as are their mountings.

Zero-atmosphere considerations

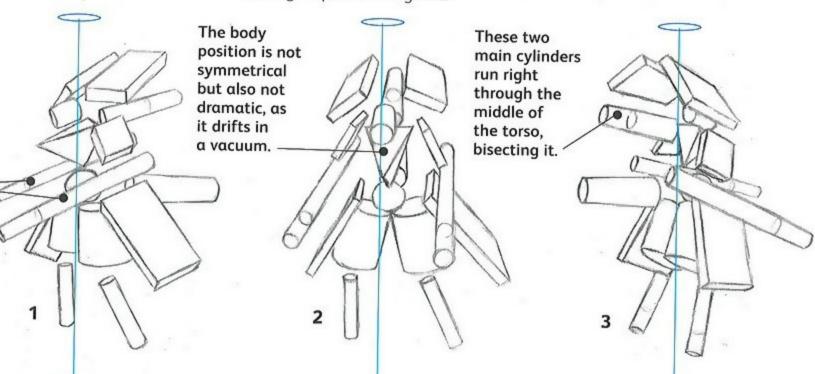
Remember this robot floats but doesn't fly, so its profile is not aerodynamic.

Points to remember

2 This robot is very specialized, so full articulation and manoeuvrability are not really necessary.

Designed for its environment

The robot moves in an unnatural but precise manner, totally unlike a human, leaving its profile inorganic.



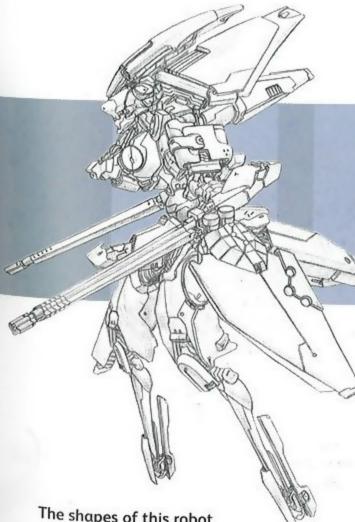
▼ Space robots

Space is an environment totally different from that in which most robots will have to function, and this will be reflected in every aspect of your design. Satellite and space station shapes and proportions are excellent sources of reference here.

Even the large flat planes in this design should have a slight degree of ambient shading.

▼ Environmental hazards

Use reflective whites and metallic colours, including golds, in abundance. On the robot they would prevent extreme overheating from the sun's rays. Glowing lights and LEDs resemble those of satellites and contemporary space technology.



The shapes of this robot are a result of its complex structure and serve no outward purpose.

▲ Getting the lighting right

Although not wholly accurate to the sharply contrasting lighting of objects in space, your shading should lean towards a basically realistic portrayal, balancing realism with the need to maintain interesting detail.



of the Orbital Delegate resemble other pieces of machinery and space debris that spin in the Earth's orbit.

6BOUNTY HUN In the future, hardcore policing is entrusted to machines. Their impassive minds are Rendering foolproof insurance against corruption in Satellite dish establishes uplink the police force. The Bounty Hunter for data on current bounties. Search-Hunt-Kill (SHK) 300 deals with

the most dangerous criminals. It operates

SEE **ALSO**

Materials, p.18 Joints and Movement, p.30 Attachments and Embellishments. p.34

> Curved, hunched profile creates a smaller target for small-arms fire.

with great stealth, and can Differently coloured head and plating denote recently replaced parts that have yet engage in extended pursuits that to be camouflaged.

would not be humanly possible.

The SHK 300 uses an

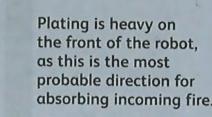
autonomous AI and, when needed, it can quickly connect with the central police mainframe. This

robot is deployed

when a judicial decision has been made.

Often, the target is executed on the spot.

Metal claws grip with a force of 400 pounds. SHK 300s have been known to rip the arms off fleeing criminals while in hot pursuit.



Death's head

The SHK 300's head can move freely to aim at anything in its field of view. Its intricate targeting systems are concentrated at the sides of its face and neck, as are its deadliest weapons: two linked pulse guns, one long-range laser, and one nonlethal ballistic disabler.

Simple purpose

This robot was designed to display its sinister function, and its predatory and hunched posture illustrate this role. Concealment being important, the robot was designed with a camouflaged paint job in mind (something that can, if not carefully planned, create a muddled image).

Shoot first

The shapes are strictly functional. It must move quickly, shoot accurately, and withstand the harshest conditions. The robot is fitted with jump jets allowing for short periods of limited flight. With the help of smaller articulated jets, it can make very complex and unexpected manoeuvres.

is organic and

The hunchback of interstellar space

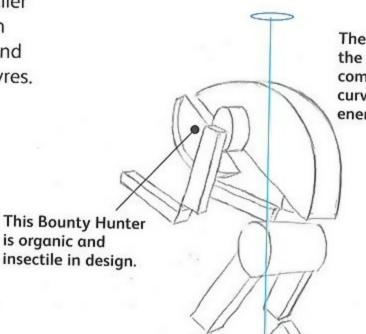
The Bounty Hunter is humanoid with a dominating, curved, armoured profile and a hunched back.

Animal-like

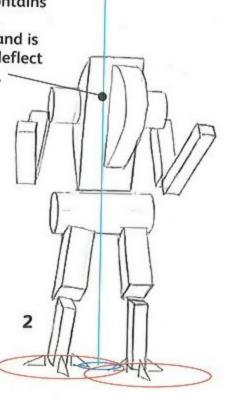
The long barrel shape above the legs acts as a forward hinge to allow the Hunter to leap on to all fours at a moment's notice for swift, catlike movement.

Core stability

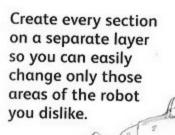
Although hunched in shape and stance, the robot has a very stable structure.



The hull contains the central computer and is curved to deflect enemy fire.



Simple leg shapes will become animal-like later.





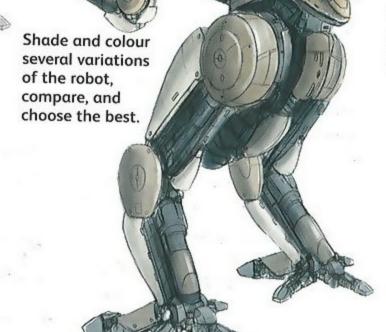
When you're satisfied with the linework and have committed it to one layer, the next stage is adding colour and volume. Fill in the layer under the linework. Choose your light source carefully, and let it guide you when you start adding your colour.

▼ Layers and detail

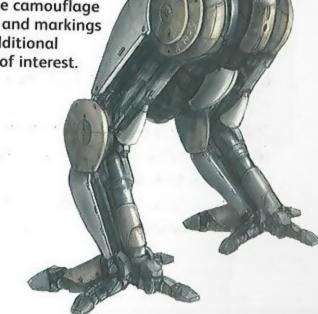
The final application of details can be the most time-consuming phase. Flatten all layers to one for painting ease. Use the zoom function to add very fine details. To make the robot appear used and worn, create a new layer on top and paint on some scratches and stains.

▲ Digital drawing

Though the whole image is done in Photoshop, the first stage is always freehand linework. The best thing about drawing on the computer is the possibility for changing the picture throughout the creative process without loss of quality. You can easily zoom in and add fine details.



Add some camouflage patterns and markings for an additional element of interest.



108SAMURAI GUARD

The Samurai Guard is a repurposed military robot converted for private, civilian use. The civilian model lacks the built-in weaponry of the military version but retains some of the armour plating and ECCM (electronic counter-counter-measures) protective systems. The head is separate from the

systems. The head is separate from body, held in place with a proprietary antigravity/electromagnetic system.

This allows the pelot to the pelot to

This allows the robot to use the head as a floating remote camera.

The clothing is primarily composed of synthetics and is designed to rip easily to prevent opponents from using it as a combat advantage.

The KEIGO personal security robot

This particular consumer model was designed with integral armour and joint protection built into its 'clothing'. Its proportions also preclude it wearing human clothing. Commercial retailers often customize the robot's face plate.



Decorative intimidation

The KEIGO was planned to resemble a fearsome statue standing still in a room during a sensitive meeting, causing the intimidated to fret over the likelihood of this statue suddenly springing to life and attacking.

SEE

p.14
Artistic Rendering,
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Working Digitally,

This sensor actually extends during use, and can retract during combat.

The face mask is decorative, and clients who desire less aggressive appearances for guard duties tend to have the factory default replaced.

Plated robotic parts match the hue of the synthetic cloth.

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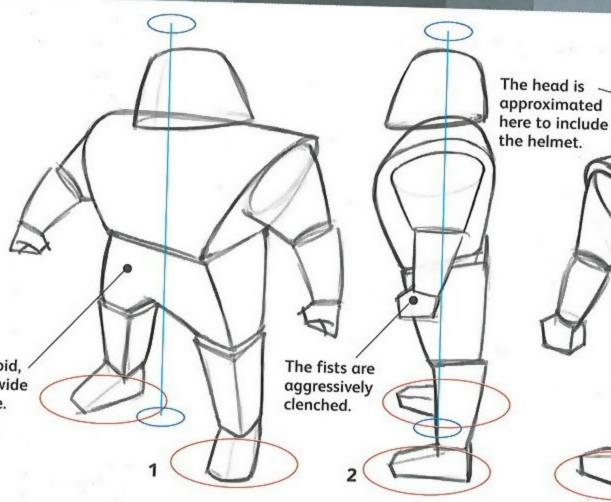
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Human nature

This robot, like the others, can be broken down into simple shapes such as cubes and cylinders. The design of this robot is intended to resemble the human body but with exaggerated proportions that emphasize its massive stature.

Basically humanoid, this robot has a wide and stable stance.



Shapely composition

The posture and attitude are defined at the basic construction stage, so be sure it conveys the feel you want for your final design.

Artist's model

2 Although humanoid, this robot stands at an artificially stiff angle, its chest thrust stoically forward.

Core stability

Once the elementary colour blocks are

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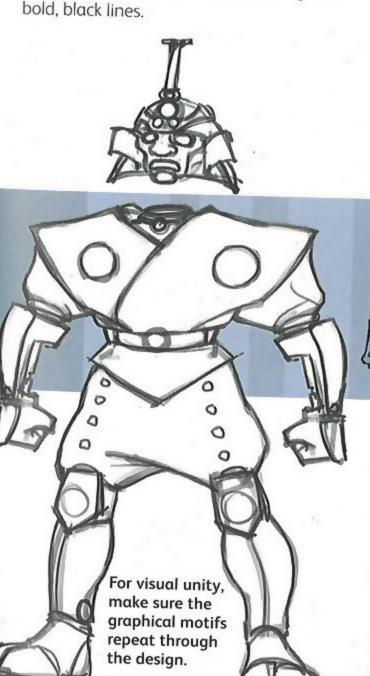
applied, work up the brighter spots of colour

and detailing, especially on the face. Apply

Though you may never show a rear shot of your finished robot, understanding its structure from this angle will help you.

▼ Bold lines

Refine and tighten up the details and design ideas that you explored in the initial sketch. Concentrate details in the face, and go for bold, black lines.



Use a simple light and dark colour scheme.

highlights where the light shines on the downward-facing surfaces of the head. Add a subtle wash of warm colour over the whole painting. Indicate the levithe pit a strong

▼ Basic colour

Indicate the glow of the levitating device in the pit of the neck with a strong highlight.

▲ Background

In your digital painting programme, lay down a rectangle of a warm red, orange or brown colour in the background. Then try painting the robot in complementary hues.

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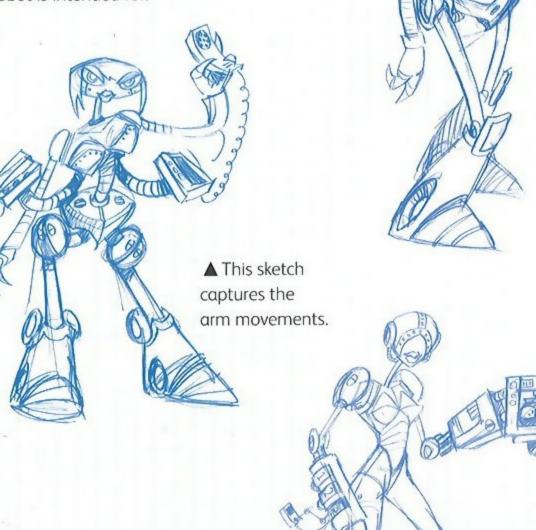
Many great robotic advances will be made in the consumer electronics market and tomorrow's robotic grenadiers may well be today's robots designed to walk the family dog. Pleasant in appearance and adapted to a variety of tasks, these robots are a boon to humanity. Although personal helpers have smiling, approachable faces and are very user-friendly, they incorporate all the high-tech design and intricate robotics

you would find in the most

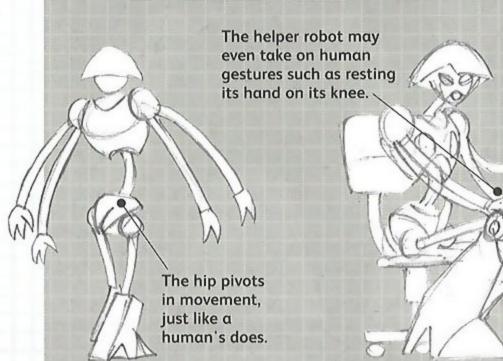
cutting-edge machine.

Developing ideas

It's a good idea to sketch out simple examples of your helper robot interacting with domestic human objects in the kinds of settings the robot is intended for. ► An early prototype has only two arms.



ASSISTAUT ROBSIS





MULTIARMED ROBOT

From all angles

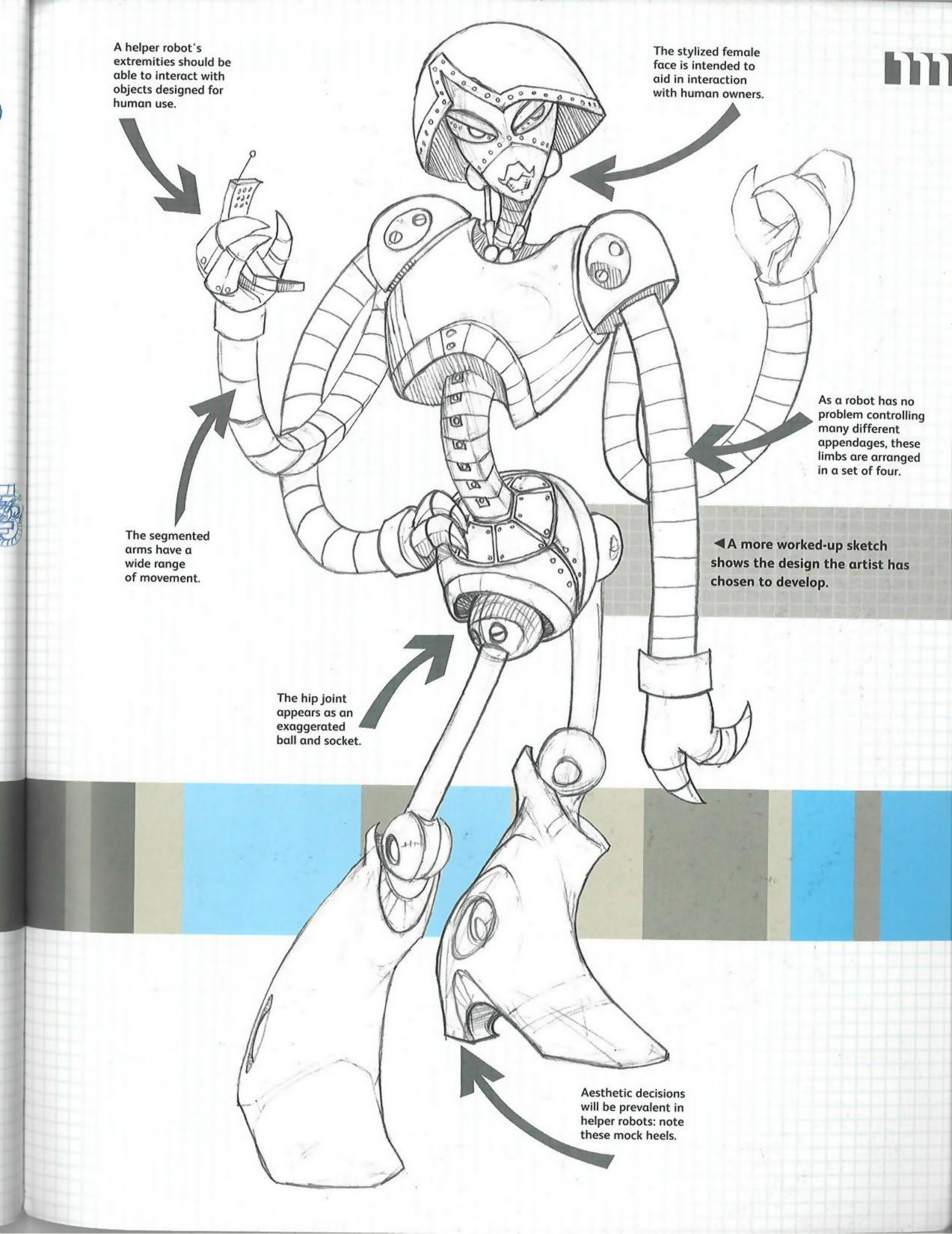
Helper robots give the artist a wide range of probable approaches. When designing, remember that your robot will have to interact with people.

Wheels instead of legs just didn't seem to match the dexterous upper body.

► This variation is

recognizably human

in appearance.



112 ADIUVO MARK IV

The ADIUVO Mark IV is the most advanced consumer personal-assistant robot in the Adiuvo range, which began in the late 21st century with the original toylike Adiuvo I (see page 43). The current model has greatly expanded functions and abilities and is often used in civil and industrial situations as well as in its intended domestic role.

The ceramic/resin material allows organic, aesthetically pleasing, humanoid shapes to be mass-produced. SEE ALSO

p.21
Joints and
Movement, p.30
Bits and Widgets,
p.32

The humanoid proportions and size of this ADIUVO model allow it to wear human clothes when necessary.



Humanoid rhythms

The overall design is intended to resemble the human body; the facial features and expression should also. Use the eyes to mimic a human gaze.

The exoskeleton is slightly flexible, but joints are still needed in the exterior skin to allow full range of movement.

Lightweight

ceramic/polycarbonate resin exoskeleton.

Simple construction

This robot can be broken down into simple shapes such as cubes and cylinders, which makes it easy to draw.

Off-axis stance

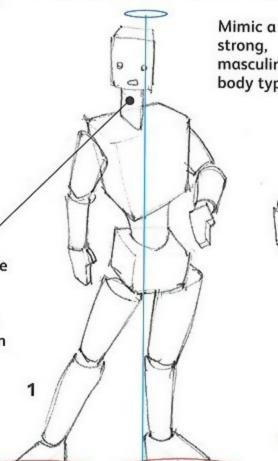
Segmentations and other design elements should

echo human

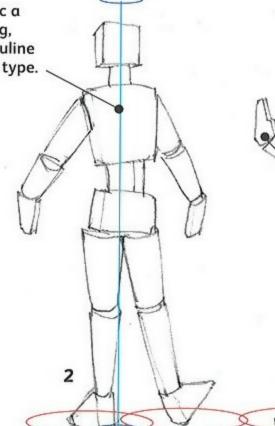
anatomy.

Push the boxes and cylinders off the vertical axis. The weight of the robot still needs to be centred, but its body can lean and introduce gentle curves and 'S' shapes into its standing pose.

> This robot can move subtly and convey meaning through humanlike touches such as a slight turn of the head.



strong, masculine body type.



Use humanlike joints and your robot will be able to make humanlike gestures.

Shapely shapes

By gracefully rounding the elementary shapes used, the robot is able to move in a fluid, human way.

Artist's model

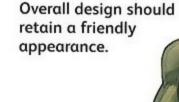
Make use of a wooden artist's model when drawing the Mark IV. Models are available at any fine art store.

Core stability

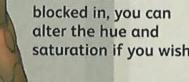
Likė a human, your robot needs a strong spine and a pelvis to enable an upright carriage and a strong stance.

▼ The right tone

Once the basic forms are rendered, adjust the colour and saturation, but keep it subtle to allow the saturated spot-colours in the eyes to stand out. The different shades will emphasize certain muscle groupings as well.



With the colour blocked in, you can alter the hue and saturation if you wish.



▲ Superhuman

The linework on this robot is essentially of the major muscle groups of the human body. Leaving these muscles exposed gives the ADIUVO Mark IV not only a human but a 'superhuman' look. Use anatomical charts to get the muscles just right.



▲ Finishing

The addition of dark, almost black, joint material adds a 3-D quality to the robot. Spectacular highlights and glowing green eyes complete the design.

KARAKUR

The seventh Tokugawa, a

great patron of Karakuri design during the Edo period,

commissioned this robot.

Used to entertain guests

with its charming grace as it carefully presents its hosts

with tea, the Karakuri has

also been used sparingly in

Japanese Noh theatre,

much to the shock of the audience when they discover that the masked actor is

a robot.

Joints and Movement, p.30

Tea for the host and his guest is presented on a lacquered tray.

SEE

ALSO

Drawing and

Ideas, p.26

Research, p.10

Developing Your

Two pneumatic pumps function as the Karakuri's prime mode of movement.

Large lacquer box contains the cogs and switching-boxes that control the air tubes that lead to the Karakuri.



Geisha-girl robot

The wig and face resemble a warped impression of a Geisha. The hair is real and has to be tied back and arranged in the traditional fashion, just like a real woman's. Details such as the heightened eyebrows and tight lipstick are applied to already-pale porcelain.

Tanned skin tubing delivers compressed air from the main pumps.

Delicate functions

With a design that's purely for show, the Karakuri performs only simple tasks; its primary role is to charm guests. Resembling a life-size doll in dress, the Karakuri is also constrained by the limits of how far the tubing will reach from the engine that powers it.

Shinto charms are fixed to the engine box and are said to help instil the Karakuri with a soul.

Humanoid figure

The robot is distinct in that it can be approximated as an elongated human figure. Basic structure and articulation are fundamentally humanoid, so employ your life-drawing skills to do justice to the figure's gestures.

Tube connections

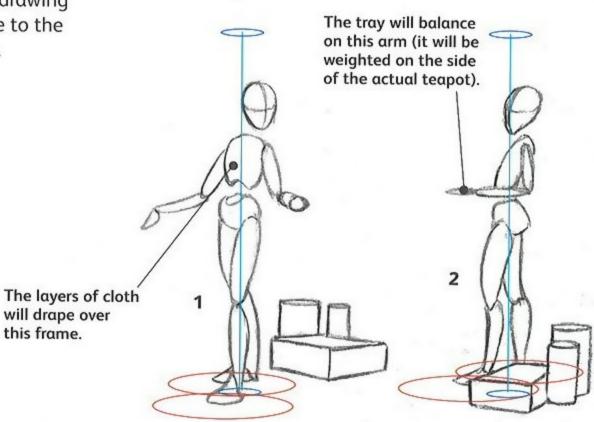
The figure and the engine are separate, connected only by tubing.

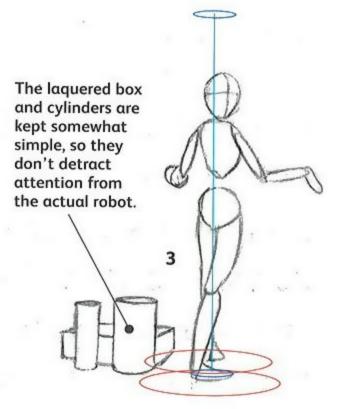
Posture and legs

2Note the permanently bowed posture and legs that don't lock straight.

Characteristic stance

3 A delicate, feminine posture is an important element in creating the impression desired by the artist.



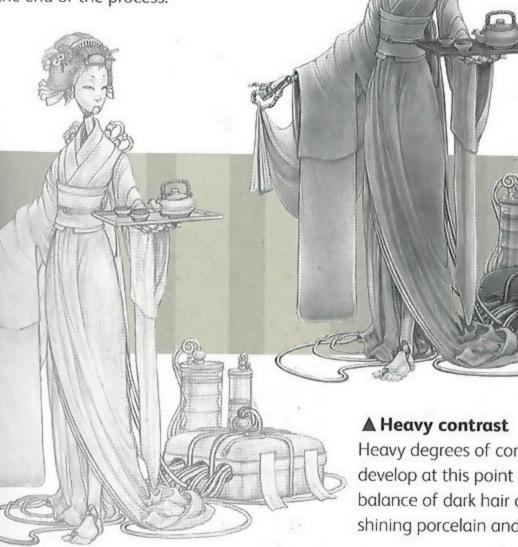


▼ Pattern considerations

Don't be too concerned with patterns on the kimono at this point – it would be far too much trouble to carry these through. Patterning can be applied in raw colour at the end of the process. The black lacquer is defined by the tiniest application of shine on sharp edges and points of highlight.

▼ Creating porcelain

The porcelain skin is of the palest white, like that of a courtesan or Geisha, and this starkly contrasts with the rich colours and patterns of the kimono.



Some influences (especially in the face) have been taken from the stylized ukiyo-e woodblocks of Japan. Heavy degrees of contrast are starting to develop at this point – for example in the balance of dark hair and black lacquer with shining porcelain and gold.



ROBOT FOUNDRY: ASSISTANT

116 THE GOLEM

This legendary living statue is sculpted from clay and instilled with holy life to function as a servant to its creator and as a protector of the community. The writing on its forehead gives it the spark of life and removing part of this

The Golem's guise is that of an ancient Judaic priest, a sign to people of a Golem's relation to

its rabbinical creator.

This eyeball is what

the Golem actually sees with, and it swivels and glows

as it looks around.

SEE

Drawing and Research, p.10 Artistic Rendering, p.16 Bits and Widgets, p.32

Golem is apt to get stuck in loops and perform the same tasks over and over again.

Golem. Although it makes

an excellent assistant, a

inscription can deactivate the

Metal plates tied to torso with red cloth.

All-seeing eye

Four arms aid in manual labour.

Whereas the conventional pair of eyes are blank and deadened, it's the glowing orb of the drawn eye that the Golem uses to see the world. This eye's inner light illuminates and colours the surrounding clay and complements the overall colour-scheme.

Creating clay textures

The Golem is a servant created out of clay for manual labour, so try to create a worn, chipped, rugged texture. The Golem is not an aggressor and appears strong and steadfast rather than dangerous.

Spikes in the feet ensure stability.

Doll-like joints

The Golem's shapes and joints are similar in appearance to those of a doll. It adopts a stiff, crudely humanoid stance.

The arm separates into a new segment at the elbow.

The upper arm section is more like a draping sleeve than a body part.

2



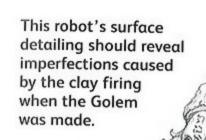
The ball joints connecting the arm segments allow a wide

range of movement.

This primitive shape is basically a hoopskirt surrounding a pair of legs.

An imitation of life The design is esser

The design is essentially humanoid, so call on your life-drawing skills.



▼ Watch your shading

Ready for action

his orders.

The Golem awaits

The shading of the clay is consistent over the whole robot.

In this case, the clay has been matte glazed, so the reflections and textures should be neither too shiny, nor too dull.

The central glowing blue highlights areas of orange glazing.

▲ Materials

Hard, chipped, earthen shapes are required here, so keep things organically rough and uneven. Keep in mind, however, that all the elements are quite stiff and unyielding. Consistency is important to ensure that the Golem's headdress, for example, is obviously made of the same material as his skin, and so on.

▲ Defining substance with colour

The clay is well-worn, chipped and glazed with deep, warm hues. Exceptions are the reflective metal breastplate, red ties and the glowing blue eye. The metal chest plate reflects the colours around it.

TINBWITCH PUPPET

An Obeah servant of a witch, fashioned from wood, bronze and gourds. Wholly subject to the will of its creator, a Witch Puppet is usually deployed for menial tasks and is kept out of sight.

A monkey has been sacrificed so its spirit can

inhabit each limb, and human remains are encased in the head to manifest a controlling spirit.

Folktales tell of a time when **Witch Puppets**

destroyed whole towns in just

of minutes.

a matter

Eyes on the mask are closed; the puppet sees through the painted third eye.

Scythe for reaping the witch's harvests.

SEE

p.16

ALSO

Drawing and Research, p.10

Artistic Rendering,

Developing Your

Ideas, p.26

Branch from a cemetery tree fools the captive soul into thinking of the puppet as its rightful resting place.

Second pair of arms ends in long, sharp fingers for threshing millet.

Cured gourds, hollowed and used as key parts.

Tanned skins drawn tight over bowed, wooden frames.

Period pieces

Remember to keep the materials in your design consistent with this ancient robot's time and setting. For example, this curved wooden crest is bound by grass twine, and the spine is made from stained, interconnecting wooden vertebrae. In your version, all of these materials should appear worn and well used.

Bundles of tied grasses.

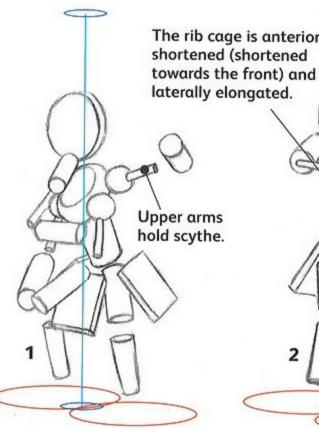
Spry, strong saplings used as feet.

Organic and constructed parts

Almost wholly fashioned from gathered, orgoparts, this robot's only artificially made elements are its blades and baubles. As with other puppets, all motion and strength are derived from outside forces (in this case, mag which leaves it strangely proportioned.

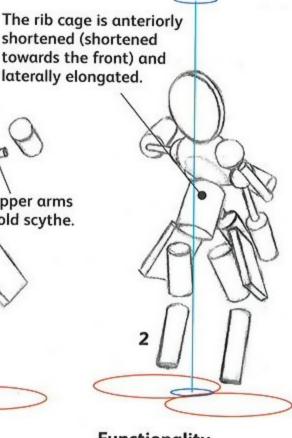
Texture emphasizes character

Most of the Witch Puppet is composed of lightly fashioned, organic shapes, so take a look at real twigs and grasses for inspiration. Sections - like the tree branches - can be drawn to resemble bones, emphasizing the puppet's deathly nature. Remember to keep a design like this sprightly, however, so that the robot appears light on its feet, rather than heavy and machinelike.



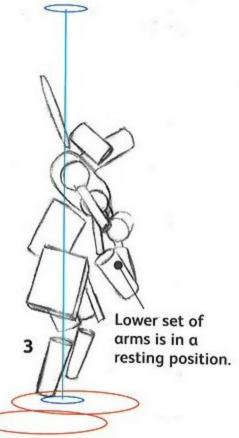
Arranging limbs

Be careful not to make the four arms too jumbled. Care has been taken in their arrangement to allow them a full range of movement.



Functionality

These primitive elements are the keys to designing a strange, but plausibly functional, body type.



Arms and shoulders

A laterally elongated torso provides a mount for the arm and shoulder rotation.

▼ Care with shading

Remember not to obscure the textures (the blades of grass, the grains of wood) when applying your shading. The wood is stained, but not varnished, so don't make it too shiny.

▼ Craftsmanlike colours

Colours are all warm and dry: stained wood, dried grass and plant material. The colours are influenced by traditional African arts and crafts.

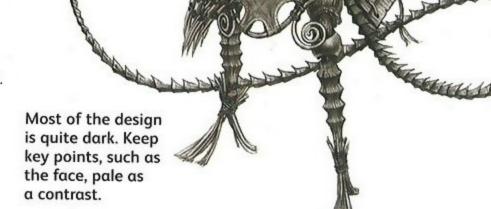
Loosen up when drawing this robot. Remember that these materials have been grown, not manufactured.

nic

ic),

▲ Deliberate looseness

The linework is loose, but it's not careless. The notches and imperfections in the lines should appear deliberately organic, not messy.



Use deep, organic colours, especially on the metals that have begun to rust. ROBOT FOUNDRY: ASSISTANT

120GENTLEMAN GARDENER

Revealed in 1770 to the amazed court of George III, the Gentleman Gardener was a gift from the French monarchy at the end of the Seven Years' War. The robot's creator was thought to be an apprentice of Jacques De Vaucanson (1709–1782) the great automaton builder. Sadly, the robot was destroyed in 1785 by the King who, in a fit of madness, was convinced that the robot was mocking him in French as it raked the leaves.

Programmed activity

The glass-fronted chest piece has a secret lock mechanism to allow access to the clockwork interior. A rotating device inside holds a variety of task-specific cartridges. With a little study, it is possible to alter the information on these cartridges manually and reprogramme the robot.

The head is lacquered wood – light, but resilient to weather and wear and tear.

Drawing and Research, p.10 Rendering Materials, p.18

ALSO

Incapable of speech, the Gentleman Gardener whistles several popular tunes as he works. Powered by bellows in his chest cavity, he seems to breathe between songs.

To protect the delicate workings inside the robot, the coat is treated, waterproof leather.

The hands and wrists are fully articulated and move realistically. Hands can open, close, and grip various tools.

The arms and legs are padded with straw to 'flesh' them out.

Secret mechanism Hidden within the

Hidden within the roller is a steam engine to aid locomotion. The Gentleman Gardener isn't strong enough to push such a weight and is merely the means to steer it.

The feet never fully leave the ground. A concealed metal wheel is always in contact with the earth for purposes of electrical conduction.

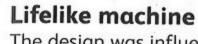
The arms are

mechanically

symmetrical, revealing the true

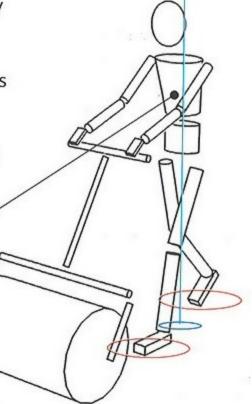
of the robot.

inorganic nature



The design was influenced by automaton designs of the eighteenth and nineteenth century. The craftsmen of this time strove for an 'imitation of life' and desired to create realistically human machines using the materials at their disposal.

In order to convey a sense of motion, make the robot lean forward very slightly.



'Roll' model

2 The robot leans forward slightly as he directs the roller.

Core stability

Add an overlay

to bring out the

the shiny metal

and the duller

cloth materials.

contrast between

3

The weight is distributed

mainly on to the front foot.

3 For the sake of pushing the roller, ensure that the robot is standing centred in relation to the handlebar.

Isolated shapes

The Gardener is a humanoid bipedal figure made out of cylinders and boxes.

▶ Linework

The drawing was done with a standard draftsman's pencil (HB).

▼ Shading in Painter

For shading, use an acrylic drybrush in Painter. This brush gives a nice grainy texture and is especially good for clothing. Over the linework, colour a multiple layer in 60% grey.

Use gentle shading for most of the design as there are no high-contrast metals present.

5

Ensure that the roller is symmetrical and carefully constructed; it's the kind of device that can immediately look strange if slightly skewed.

▲ Traditional colouring

Apply an earthy palette layer in a flat colour. Do some colour research to identify the colours that would have been in popular use during the time period. Afterward, use a drybrush to add colour variants such as the heavily rouged cheeks and lips.

TIPEZDOMESTIC ANGEL

The Domestic Angel was the darling of the Ideal Home Exhibition in 1951. The working prototype was a glimpse into the future that few could resist. By the end of the 1950s, this robot was a common feature in suburban households. The inventor, Otto Braunwald, died mysteriously in 1960. Some say that he was silenced before he could reveal the otherworldy origins of his technology.

The computer controls all domestic chores. Tapes and updates are reasonably priced. French cuisine is one of the biggest sellers.

Mechanic vs. organic

This design is very period oriented, and very little mechanics were intended to be visible. The head has an unsettlingly disconnected feel to the rest of the body.

Retro inspirations

The main theme for this robot was 1950s American futurist design. The Angel was engineered to be functional and believable, while still retaining its retro sci-fi look.

SEE ALSO

Working Digitally, p.14 Rendering Materials, p.18 Bits and Widgets, p.32

The halo glows when the Angel speaks or repairs are needed.

A rubberized face can be chosen from a catalogue of both male and female faces and easily fitted on to the robot. Celebrity faces are available.

The iron is a standard fitting on every Angel. It is always readyheated and stored in the chest cavity.

The rail can be fitted throughout the entire house, allowing total automation of chores.

Voice comes

from a speaker

embedded in the chest.

11111

The housekeeping accessories are only available to the robot if it is positioned directly in front of them. This is a safety feature added after the fire of '57.

The winglike

elements from

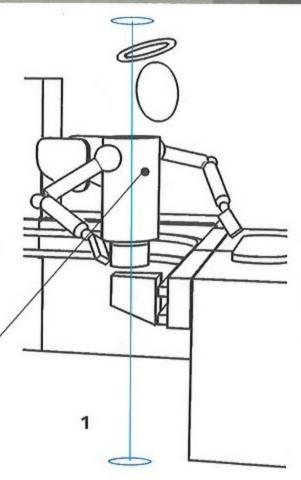
protrusions on the

back borrow design &

Made to measure

Resembling a basic kitchen appliance, the robot is stock straight and firmly anchored despite its humanoid appearance. Extremely specific functions are illustrated by the robot's planned structural limitations, lack of reach and apparent adaptability.

The trunk cylinder can rotate, giving the robot access to any part of the kitchen counter.



The neck is inclined forwards to better allow viewing of the counter.

automobiles of the same period.

Elementary shapes

This is a humanoid-shaped robot minus legs, attached to a series of boxes.

Crazy train

2 Because the robot is on rails, weight distribution isn't an issue.

Elbow room

3Ensure that there is enough turning space for the robot.

▼ Sketching

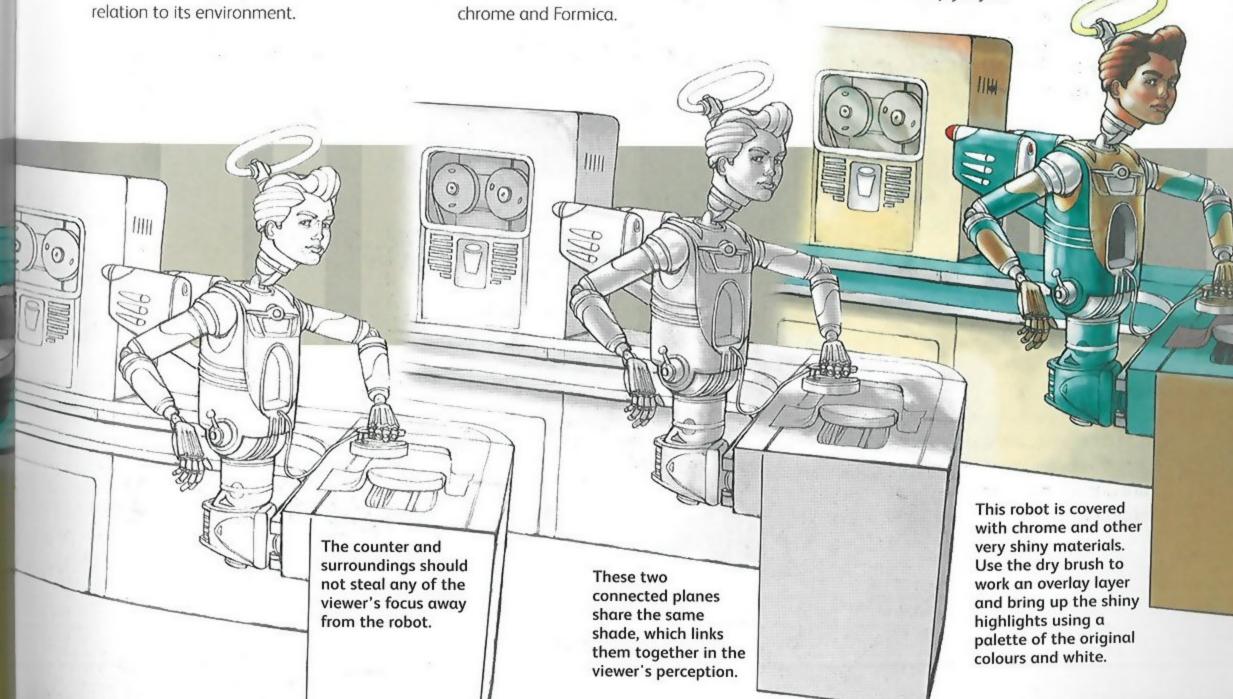
At the drawing phase, ensure that you're happy with the perspective and the robot's relation to its environment.

▼ Highly polished surfaces

Use an airbrush in Painter for shading. Over the linework, colour a multiply layer in 60% grey. This will leave you with a polished finish ideal for surfaces like laquered metal, chrome and Formica.

▼ Vintage flavours

Choose bright 'ice cream parlour' colours to reflect the time period. Apply the colour flat on a multiply layer until you are happy with the overall appearance. Add additional highlights and colours on a new multiply layer.

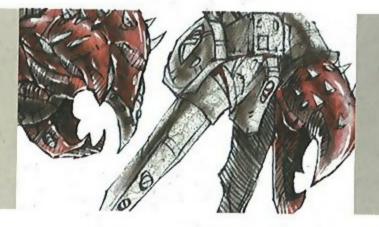


RUBUT FOUNDRY: ASSISTANT

24MARINE EXPLORER R

The undersea world has fascinated man for centuries, but the wonders of its deepest reaches proved impossible to explore until Merbot 5 was developed. Like a submarine, Merbots can withstand the pressure of extreme depths, but unlike manned craft these hyperintelligent machines can explore for months without surfacing while blending with the environment and gathering terabytes of data. Denizens of the deep

Merbots are designed to blend in with their environment, burying themselves in the seabed to escape predators and attracting colonies of coral and crustaceans. Biomechancial fins break up the crablike carapace as Merbot stalks the depths self-generating power like an electric eel.



Sensitive pincers

Merbot's crablike claws wield a multitude of tools that it deploys to analyze samples using an ecologically sound process that maintains the marine balance.

Crustacean-like head packs light beams and high-resolution photosensors.

SEE **ALSO**

Working

Traditionally, p.12 Bits and Widgets, p.32 Attachments and

Embellishments,

p.34

Sample-containe strips analyze samples.

Disguised hands hide massive array of tools.

Biomechanical skin attracts coral growth and crustaceans.

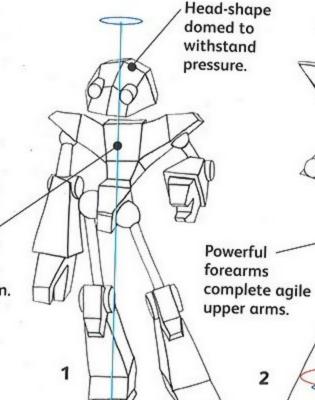
Hyperdense metal alloy withstands enormous pressures.

Body structure allows water to flow around it. Tiny hip area for minimal resistance. Mechanical detailing resembles iron warships.

Functionality

The finished robot still looks like it is made from distorted boxes and other simple shapes. Design flourishes such as spikes, fins and other features create the impression of functional reality.

> Humanoid body elements beneath complex surface design.



Deceptive surface

Simple shapes underpin detailed surfaces.

Long range

Thip angle and poise suggest stalking movement.

Resistance

Set the axis to suggest a machine pushing against the water.

▼ Natural machine

Note how the surface detailing initially appears warlike and aggressive, but is in fact designed to attract and catch natural elements and creatures.

▼ Watercolours for water dwellers

Try using watercolour finishes on your Merbot design – an appropriate medium for this marine inhabitant and fearless explorer of the undersea kingdom!



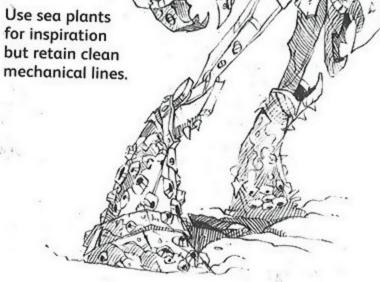






▲ Metallic tones

Begin to add rich shadows to suggest depth and perspective, and use crosshatching to give your shading a mechanical, metallic aspect.



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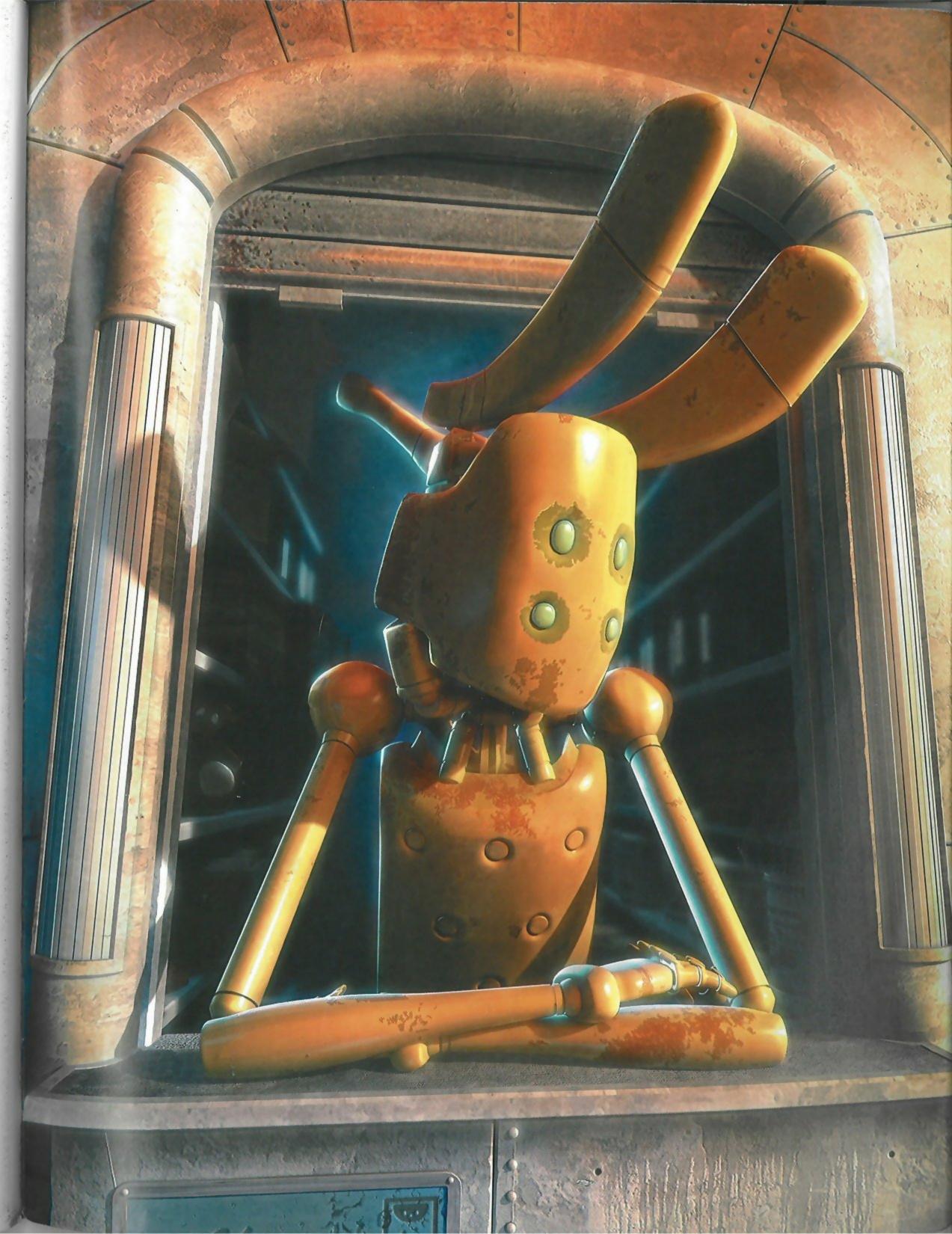
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