

*Guide to  
choosing  
the modules  
that make  
up a robot  
cell for:*



**DEBURRING**



**POLISHING**



**GRINDING**



**FINISHING**



**CUTTING**



**LINISHING**



**FETTLING**

**SURTECH**

Surtech offer you the widest choice of  
ROBOT CELLS , WORK STATIONS, ANCILLARY  
EQUIPMENT AND CONSUMABLES.

# What make of Robot?

You can specify the robot make of your choice or ask us for advice.



*Some examples of well known makes of robots*

## ROBOT SIZE

Choose the correct robot size. Robots used for grinding, finishing, deburring and polishing are available from 16 kg to 500 kg. For finishing a brass tap a 16 kg robot is often sufficient, but for polishing the same brass tap a 45 kg robot is required. The size of the robot is determined by the weight of the part, the furthest extension of the robot arm and the max. contact pressure.

## ROBOT TO HOLD PART OR TOOL

In the vast majority of finishing operations robots hold the part but in some cases the robot holds the grinding, deburring or polishing tool, with tool changes possible for a finishing sequence. Three such examples are shown here.



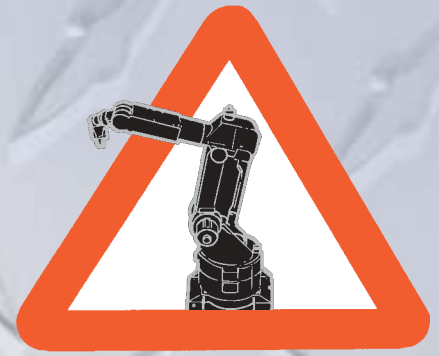
*A robot with a special rotary tool head deburring an engine block*



*A robot with an internal brushing head polishes the inside of a stainless steel bowl*



*A robot with a wide buffing head polishing car trim*



**ROBOTS AT WORK**



*Linishing and polishing of office chair legs*



*A typical linishing cell for sanitary fittings*



*Linishing of swan neck taps*



*3 robots in a cell, linishing and polishing door handles*

## Abrasive Belt Heads for Linishing

Abrasive belt heads are designed and configured to suit the part. Here are some examples:



A single abrasive belt head. For simple deburring and grinding operations



A twin abrasive belt head for simple linishing and grinding operations requiring two abrasive belt grit sizes.



A belt head with more than one contact wheel and suitable for slack of belt work. Suitable for linishing contoured parts.



A top of the range CNC abrasive belt head With several work positions. Will rotate and move back and forth to reduce robot movements and to reduce cycle times.

### LONG BELTS

Belts should be between 4m and 5 m long, for longer life and for greater efficiency. Long belt life is particularly important if the robot cell is to work unattended for long periods.

## Buff Heads for Polishing

### 960 MM OR 600 MM DIA. BUFFS

Robot buffing heads use large diameter buffs for more effective polishing action and longer buff life.

### SLOW BUFF SPEED

Bufs on 600 mm and 960 mm dia buffing heads rotate at predetermined buffing speeds and adjust automatically with buff wear.



### LONG BUFF LIFE

Constant contact pressure control systems further extend buff life to several weeks and in some cases several months.

### TWO STAGE POLISHING

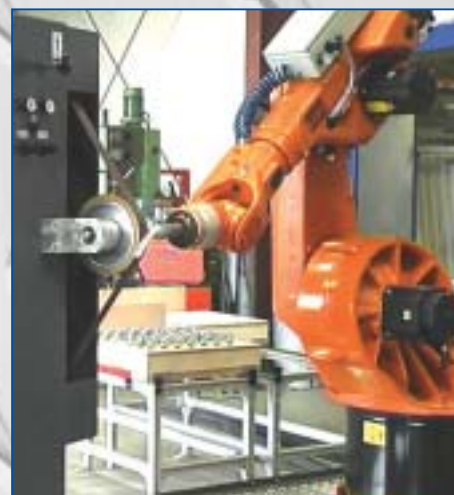
Most polishing operations are done in two stages: pre-polishing with a slightly more aggressive buff and compo and mirror polishing with a soft buff and colouring compo.



ROBOTS AT WORK



Sanding lacquered steering wheels



Linishing door handles



Linishing artificial knees

# Head Control Systems

## 1. Pneumatic

The traditional method of constant contact pressure control. Also the cheapest. Recommended for simple parts with few contour changes only. Does very little to improve consumables life and needs careful programming.

Pneumatic cylinders have a built in 'cushioning' effect which lets them follow some contours only with a little delay. This is not important for the majority of parts but can be detrimental for heavily contoured parts.

## 2. Hydraulic

Better than pneumatic systems but lacks consistency when oil temperature changes. Recommended for relatively simple parts with not too many contour changes.

A good compromise if the more expensive and better servo motor based system is not acceptable.

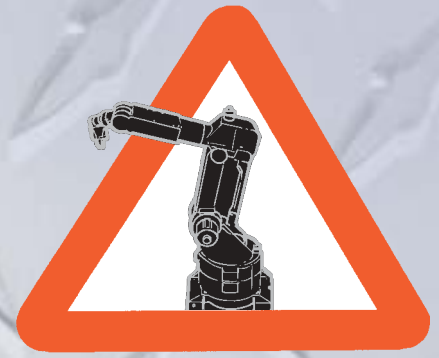
## 3. Servo motor

This is the ultimate constant contact pressure control. Perfect control of even the most difficult part. Reduces material costs by 50% and more. Reduces programming time by hours.

This system is based on brushless servo motors controlled by closed loop electronics. Because of the perfect balance between constant pressure and extremely fast response to contour changes the abrasive belt wear and buff wear is drastically reduced.

The higher cost of the system is paid back in a short time through savings in consumables and faster cycle times.

A further benefit of the servo motor constant contact pressure system is the faster and easier programming of the robot. It is no longer necessary to perfectly programme the trajectories of the part. Programming of the main trajectory points is generally sufficient, the servo motor system does the rest.



ROBOTS AT WORK



Deburring alloy wheels

# Handling Systems and Magazines

## Pallet magazine

The most common magazine for robot finishing operations is the pallet magazine, consisting of two tables on which are mounted jigs. The robot picks up and returns to one table whilst the second can be loaded and unloaded.

There is a limit to the quantity of parts that fit on such a table and they therefore have to be loaded and unloaded at regular intervals.



Robot on left, rotary magazine in the middle, pick and place arm on right.



## Rotary magazine

The most common magazine for high volume finishing and for unsupervised finishing over a period of up to 10 hours is the rotary magazine, holding several hundred parts.

## PICK AND PLACE ARMS

Robots can be programmed to pick and place and to finish and polish in one cycle. This is acceptable if quantities are low. To reduce cycle times a pick and place arm can be added. This arm picks parts from the magazine and hands them to the robot and vice versa.

## COMBINING MANUAL OPERATIONS WITH A ROBOT CELL

Robots can do most grinding, deburring and polishing jobs but sometimes an operator is faster. In these cases it can pay to let the robot share the work, say 90%:10%.



Longitudinal polishing of tubes



Grinding and polishing inside vessels

## Central Control Cabinet

Whilst in theory it is possible to use the robot controls for the finishing and polishing heads as well such a solution may be cheaper by approx. £10,000, the cost of a dedicated central control unit with its own PLC, but in the long run considerably less efficient, more time consuming and costlier.



*This shows the size of the central control cabinet in relation to the rest of the cell.*

## Ancillaries



*This photo shows a robot cell with ducting from the front and an extractor at the far end.*

### Dust extractors

All finishing robot cells create dust and depending on the amount of dust, whether it is non hazardous or hazardous and the siting of the plant it will have to be connected to an appropriate dust extraction unit of the right capacity.

Robot cells with wire mesh guards need a different design to robot cells with totally enclosed cabins. There is no standard solution, each installation has to be individually assessed.

To reduce the overall capacity of a dust extraction system it is possible to fit automatic dampers and to shut off heads that are not worked on at any time.

### Ducting

Choosing the correct ducting is as important as choosing the extractor. Ducting is part of the extraction system and as such falls under the same Health and Safety Recommendations.

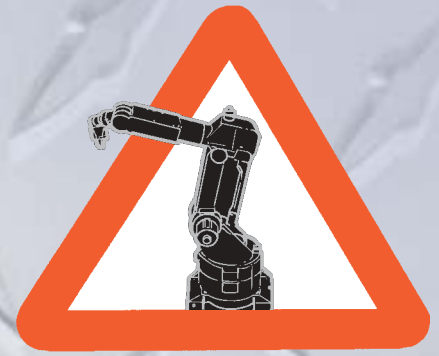


### Additional costs

To get a robot cell up and running at peak performance requires personnel who can maintain and programme the system. Some prior knowledge of programming would be a great help. Most robot manufacturers run training courses. A minimum of 2 courses, one for absolute beginners and one for

advanced students is recommended before we carry out robot cell specific training. These courses last on average 1 week and cost approx. £1500 per person. Contact the robot manufacturer for further details.

Grinding, deburring and polishing requires special skills which take a long time to acquire. The combination of metal finishing skills and programming skills is rare and therefore it is advisable to have a programmer and a polisher to work as a team.



ROBOTS AT WORK



*Polishing car trim*



*CNC polishing of fittings*



*Polishing stainless steel*

# Cost of Consumables

## ABRASIVE BELTS



Most robots use 4000mm long abrasive belts. To extend belt life for long unsupervised periods 5000 mm long belts can be used. The width of the belt depends on the part. For a typical finishing operation on brass taps the 4000mm long belt lasts between 7 and 8 hours. It is necessary to have variable speed belt heads equipped with sophisticated constant contact pressure controls.

**BUDGET PRICE FOR AN ABRASIVE BELT 4000mm LONG X 75mm WIDE, GRIT 100 +£3.50 to £4.00 nett.**

## CONTACT WHEELS

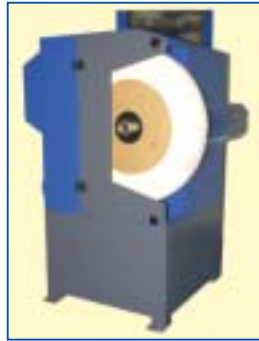
Contact wheels are not really consumables but they have an important role to play in the life of abrasive belts and the finished results. Contact wheels properly used last for many months, however they can get damaged accidentally and it is advisable to keep several in stock at all times.



**BUDGET PRICE FOR A 350mm Dia x 75mm WIDE CONTACT WHEEL £180.00.**

## POLISHING BUFFS

Robot polishing cells use 960 mm diameter buffs. These buffs last up to 3 to 4 months for pre-polishing operations and up to 6 to 8 months for colouring operations.



It is essential that the robot is equipped with a constant pressure control and a variable speed drive as otherwise the buffs will last considerably less.

**BUDGET PRICE FOR A POLISHING BUFF 960mm DIAMETER x 50mm WIDE (50 mm width are usually made up by several thinner section buffs) £320 to 360 for 50mm buff width.**

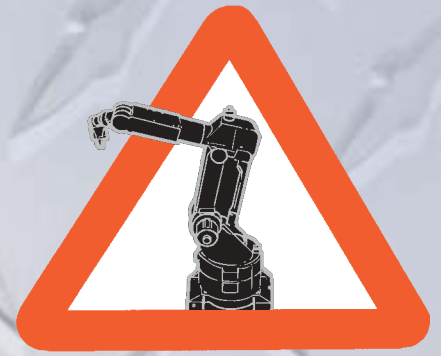
## POLISHING COMPO

With polishing compo there is a choice of bar compo or liquid compo. Both systems have their followers and it is only possible to advise after detailed discussions or even trials. Both bar compos and liquid compos can be applied automatically.



**BUDGET PRICE FOR BAR COMPO £1.20 per kg to £2.80 per kg (Depending on grade. The lower price is for tripoli compound for non ferrous metals, the higher price is for Aluminium Oxide compound for steel and stainless steel).**

**BUDGET PRICE FOR LIQUID COMPO £0.75 per kg to £1.20 per kg (Depending on grade. Lower price for tripoli, higher price for aluminium oxide).**



ROBOTS AT WORK



*Polishing bicycle frames*



*Polishing propellers*



*Gantry robot in an acoustic booth polishing long car trim*

## Performance Data for Robot Cells

Over a short period a robot is not significantly faster than a skilled operator working at top speed but the robot will carry on working at top speed for as long as it is switched on. The operator will be significantly behind the robot at the end of a shift. As a rule of thumb the robot will produce 20 % to 50% more parts during a shift. In addition the quality and consistency of the robot produced parts will be considerably improved.

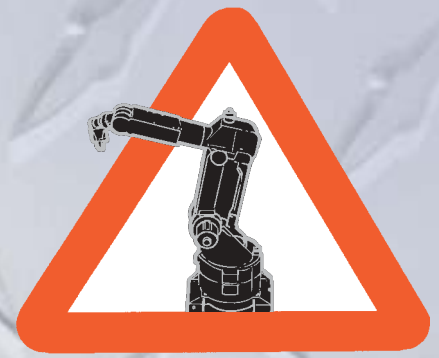
It is possible for one man to look after at least 4 robot cells.

Robots are designed to work for several shifts. The ultimate aim should be to run a robot cell for 3 shifts 7 days a week. Part of the time the robot should work unsupervised.

The justification for investment in robots should also include the improved quality and consistency, the fact that it becomes more and more difficult to recruit skilled polishers and the elimination of claims for personal injuries.

## Second Hand Robots

SURTECH can offer reconditioned robots with upgraded software and controls and with new or second hand finishing or polishing heads and handling equipment.



ROBOTS AT WORK



*Grinding, deburring and finishing of a subframe*



*De-flashing a casting*

## Alternatives to Robots



Polishing operations with robots usually take longer per part than finishing operations and instead of doubling the robot polishing facility it may be better to transfer polishing to a dedicated polishing machine like a rotary table polisher. Polishing does not need the same precision as finishing and therefore most parts can be transferred to a more traditional polishing machine.

### LIMITATIONS OF ROBOTS

Robots are perfect for automatic finishing and polishing of relatively difficult parts, ie brass taps, door handles, aluminium castings, surgical implants, etc.

For the finishing of complex parts there are no real alternatives. Even if a single robot or a three robot cell cannot cope with the quantities of parts the only choice is to duplicate the number of robots or cells.



A rotary table polishing system is faster because it can be built with as many heads as are necessary to polish the required quantities. This means that 4 or 6 or 8 parts can be polished simultaneously.

Many customers with mass produced parts choose robots for finishing and rotary table machines for polishing.



*A typical robot cell in a booth and with rotary magazine*



*A typical robot cell in a booth and with pallet magazine*



*Linishing a motorbike tank*



*Linishing a motorbike exhaust*



*Linishing a wheel*



*Linishing door handles*

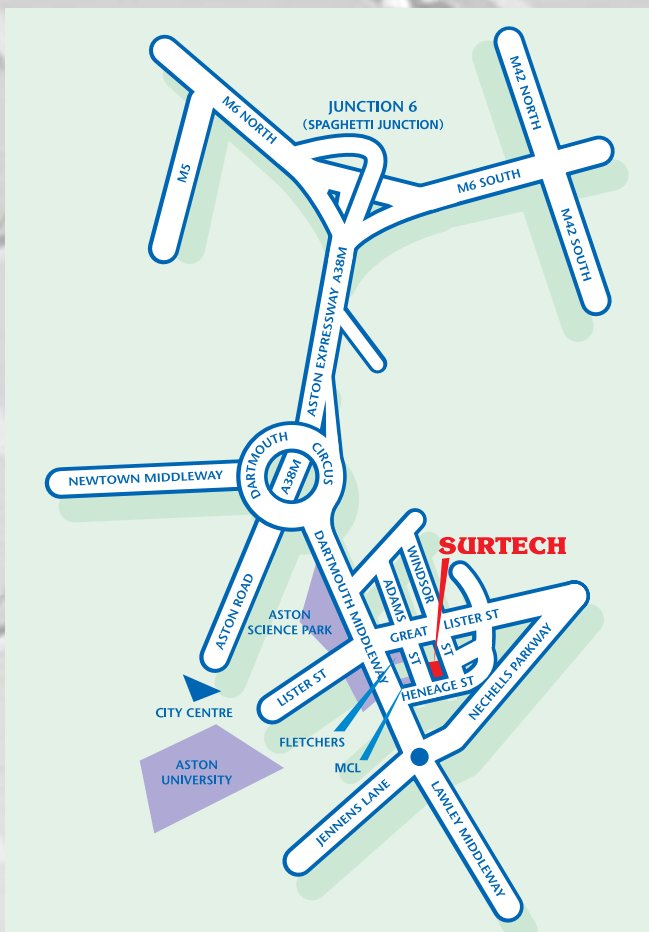


*Linishing an aluminium housing*



## Surtech Abrasive Test Centre

Here you will find a large selection of the very latest grinding, deburring, polishing, satin finishing and brushing machines. Bring your own components and discuss your requirements with our skilled engineers.



Surface Technology Products Ltd  
244 Heneage Street, Birmingham B7 4LY  
Tel: 0121 359 4322 Fax: 0121 359 1817  
E-mail: [sales@surtech.co.uk](mailto:sales@surtech.co.uk) [www.surtech.co.uk](http://www.surtech.co.uk)



*Cutting castings off the mould*



*Linishing brass taps*



*Linishing knee joints*



*Deburring lorry axles*



*Polishing sink bowls*