



**GENERAL SAFETY RECOMMENDATIONS FOR THE
INSTALLATION AND USE OF BENCH, PEDESTAL AND SEMI
AUTOMATIC ABRASIVE MACHINES FOR GRINDING,
DEBURRING AND POLISHING SUPPLIED BY SURTECH.**



Disclaimer

This is not a definitive or legally binding document. Instead it is meant to highlight Health and Safety issues relating to SURTECH supplied grinding, deburring and polishing machines, dust extractors, accessories and consumables.

Customers should interrogate the Internet, contact the Health and Safety authorities, seek advice from consultants or get a written and binding recommendation from SURTECH. Such advice is charged for at hourly rates tba.

10/12

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INTRODUCTION

The information in this manual can affect personal safety, product guarantees, and your legal rights. Read it before installing or using any machine, tool, or abrasive material supplied by SURTECH.

Whereas all information in this manual is believed to be correct and up-to-date at the time of compilation (Oct 2012) regulations, recommendations, legal requirements and bye-laws are subject to constant amendment, revision and replacement.

We at SURTECH do our best to stay ahead of developments. We also consult with our partners in Europe. We welcome comments and in particular ask our customers to let us know of any mistakes in this document or updates which we may have missed,

It is the user's responsibility to ensure that equipment and working practices comply with the latest directives in force. See page 48-50 for a selection from current Health and Safety recommendations

SCOPE OF SAFETY RECOMMENDATIONS IN THIS MANUAL

SURTECH's technology is based on COATED ABRASIVES, NON-WOVEN ABRASIVES and POLISHING BUFFS. SURTECH believe that, in many cases, Coated Abrasives offer the best and safest solution for grinding, deburring, sanding, denibbing, finishing and polishing operations.

As far as Bonded Abrasives are concerned our know how is limited to cutting discs and grinding wheels for our range of cut-off machines and grinding machines for the foundry industry, but even for these products we rely on manufacturers for information.

The hazards described in this manual are of a general nature and applicable to most machines sold by SURTECH.

This manual complements, but does not replace, individual machine operating manuals.

Recommendations refer to NEW grinding, deburring and polishing machines supplied by SURTECH and using Coated Abrasives and Polishing Buffs only.

Extension of responsibilities for machine suppliers and employers.

Latest EU directives for the elimination of risks of accidents now extend to taking account of any reasonably foreseeable misuse.

This is an important extension of the responsibilities of the supplier and user of machine tools inasmuch as they are now responsible for operator's accidental and deliberate misuse.. As far as we are concerned this simply leaves you at the mercy of the legal system and their interpretation of proper use, misuse, vandalism, deliberate ..., etc, etc.

If this kind of legislation is enforced we can see the need for a CCTV for every machine operator and/or a legal professional as supervisor.

INTERNATIONAL STANDARDS

SURTECH's tools, machines and materials represent the latest international abrasive technology. Where components from outside the EU are used we insist that the supplier provides CE certificates.

Unfortunately there are sometimes language problems. Not all of our suppliers are perfect in English.

If you are ever unsure with any description contact SURTECH on 0121 359 4322 for a clarification

CUSTOMERS' IN HOUSE COMPANY STANDARDS

Some of our UK customers have their own in house standards which often supersede the EU standards.

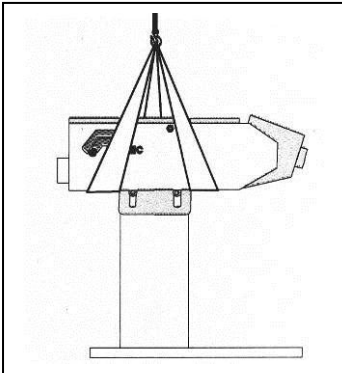
These Companies are advised to make their standards known to SURTECH in writing, at the latest with their order.

We will do our utmost to comply with such standards, however, customers must be aware that it may add considerably to the cost of the machine.

We cannot accept responsibility for non-compliance if advised after receipt of the order.

1.RECEIVING

Terms and Conditions of Sale can vary or can be negotiated. According to which terms are agreed goods can travel at the seller's or the buyer's risk, no matter who pays the carriage or chooses the transport Company.



An example of how to attach slings to an abrasive belt grinder.

The unloading of machines is the responsibility of the buyer. Always lift machine using proper tackle, and make secure prior to lifting. Make sure that your crane or forklift has the capacity to lift the machines. Where fitted, machines must be lifted by eyebolts, after checking that they are securely tightened.

1.1 UNPACKING AND CHECKING

You must check that the goods have been delivered undamaged and with no parts missing. Report any damage or losses to the carrier and your own insurance company and sign the advice note accordingly.

Report also to SURTECH within 48 hours of the receipt of goods as otherwise your claim cannot be accepted. Keep any proof and take photos. The more information we have the better our chances of winning a claim with the carrier or insurance Company. After unloading also check that the machine's specification is as ordered.



Observe rules for operating forklift trucks

1.2 SIGNING THE CARRIERS NOTE

If you sign the carrier note without checking and without noting damage, insurance will be void and you will have to pay for the repair. It is not always possible to spot damage, unless the packing is entirely removed and the machine thoroughly investigated.

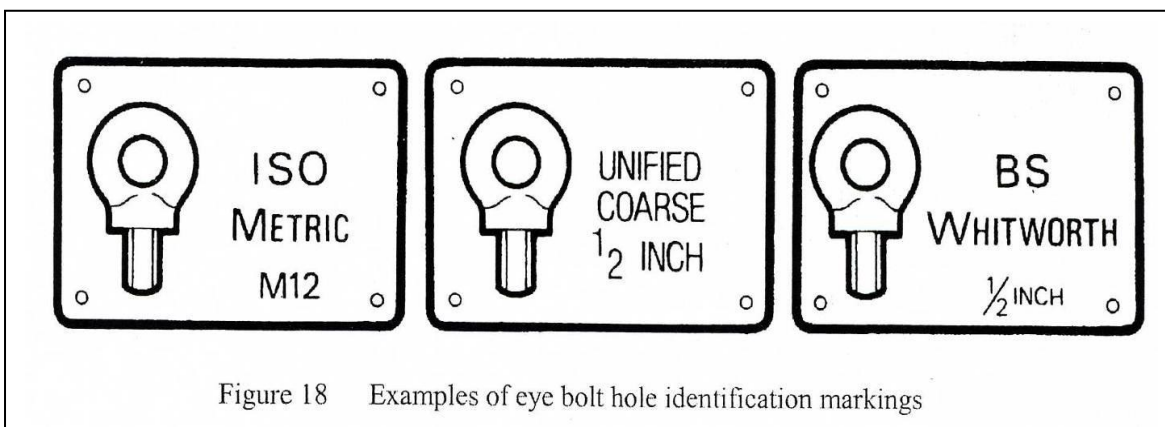


Figure 18 Examples of eye bolt hole identification markings

1.3 TYPICAL PACKAGING OF MACHINES DESPATCHED VIA PALLET SERVICE



This is how most of our bench and pedestal machines are despatched bolted to a pallet and protected with cardboard and/or shrinkwrap. They should be lifted by the pallet only. If you must lift by other means, make sure that you do not attach ropes on sliding parts.

Supplying machines on pallets wrapped only in cardboard is the cheapest but not the best method for avoiding damage.

Unfortunately customer pressure on prices does not allow crating. Crates would also delay delivery. Many of our competitors supply machines IKEA style. Dismantled to save space for packaging. These machines have not been checked and the customer can spend considerable time assembling them. All our machines are run for several hours, checked and assembled. At most guards or spindles will have to be fitted by the customer.

1.4 LIFTING

Observe recommendations on lifting, max weights and instruct personnel in safe lifting to avoid back problems and injury. Check that the machine is supplied with all manuals, drawings and Health & Safety Recommendations etc and report any missing documents to SURTECH on 0121 359 4322.

1.5 Language of Manuals

The Machinery Directive requires that manuals are supplied in the language of use and of origin.

2. POSITIONING

Correct positioning reduces the risk of accidents

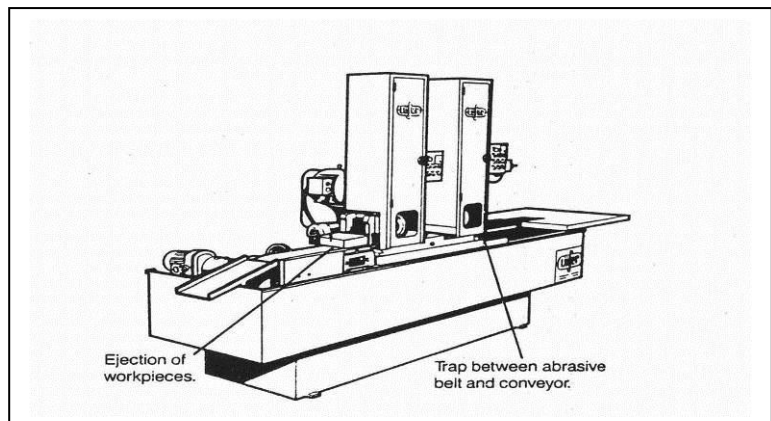
It is particularly important when handling equipment is added to the machine and when dust extraction is connected.

2.1 MECHANICAL HAZARDS :

1. Injury from the ejection of parts or machinery, work pieces or abrasive materials.
2. Trapping in machinery or between machinery and other structures.
3. Contact or entanglement with machinery parts.

These hazards can be eliminated or reduced by proper guarding, safe positioning of machines, wearing of protective equipment, training of operators and restricting access.

2.1.1 Ejection



The above line drawing shows an abrasive belt flatbed grinding machine with conveyor. Most of the previously mentioned mechanical hazards apply to this machine. In addition, the conveyor creates the new hazard of workpieces being ejected at high speed and with considerable force.

Normally the abrasive belt runs in the same direction as the conveyor. The workpiece can therefore be ejected in the direction of the exit side. For some operations, however, the abrasive belt does run against the direction of the conveyor and in that case the workpiece can be ejected in the direction of the entry side.

Please remember that the abrasive belt is always more powerful and considerably faster than the conveyor and the direction of ejection therefore depends on the direction of the abrasive belt.

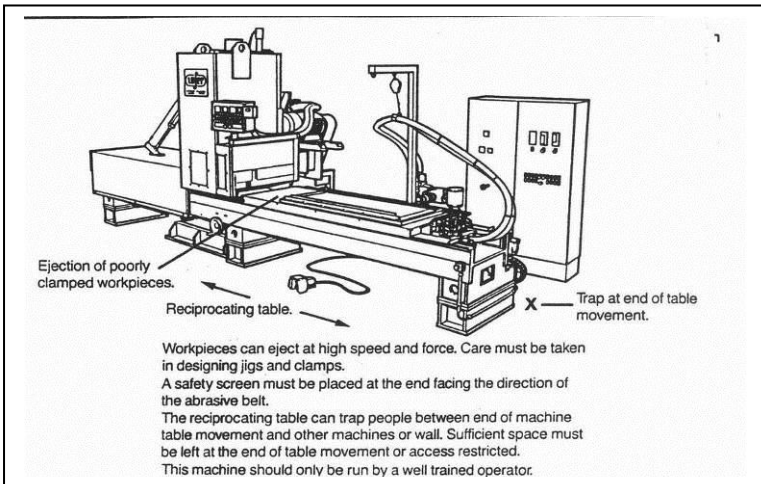
A steel safety screen must be placed both at the appropriate side and at the end facing the direction of the abrasive belt, and personnel must be kept away from the areas ejected parts can fly to. Only trained operators must be allowed to use the machine.

2.1.2 Trapping

Apart from the previously-explained mechanical hazards, fingers or hands can get trapped by pneumatically-operated jigs.

A two-handed starter button arrangement is therefore essential. Because of the very high (up to 25 hp) drive motor power, great care must be taken in the design of jigs and clamps to prevent them from being pulled free or parts pulled off.

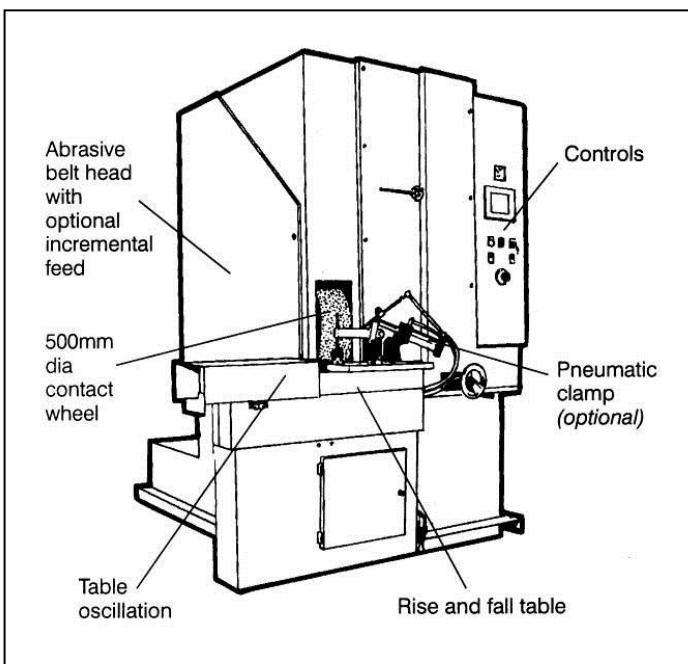
Guard doors have electric interlocks and doors must not be opened until the motor has come to a standstill.



The line drawing on the left is an abrasive belt flatbed grinding machine with reciprocating table showing some of the hazards
 Workpieces can eject at high speed and force. Care must be taken to design jigs and clamps.
 A safety screen must be placed at the end facing the direction of the belt.

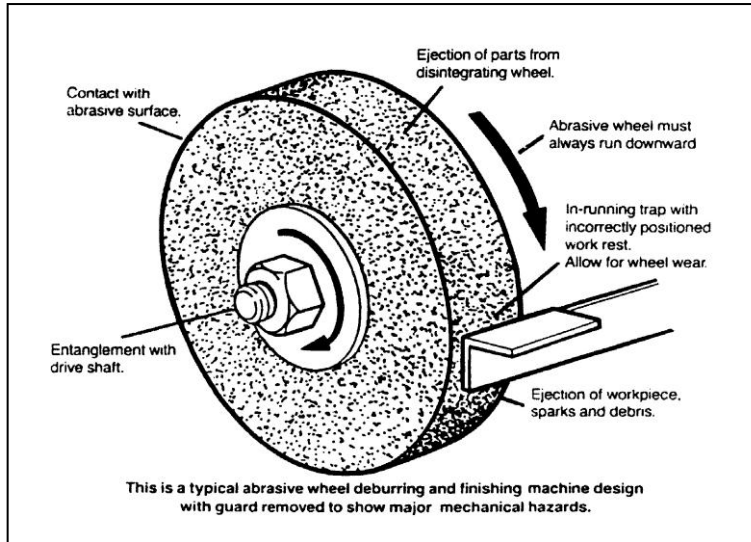
The reciprocating table can trap people between the end of the machine table movement and other machines or a wall .Sufficient space must be left at the end of the table movement . Alternatively, access must be restricted..

This machine must only be run by a trained operator.



The line drawing on the left shows an abrasive belt power grinder with automatic operation cycle. Because of many moving parts fingers or hands can easily be trapped. Two hand operation is essential. Motors can be from 25hp to 50hp. Great care must be taken in the design of fixtures to prevent them from being pulled out and even more for parts not being pulled out. Ideally this machine should have a perimeter guard and should only be used by trained operators.

2.1.3 Entanglement



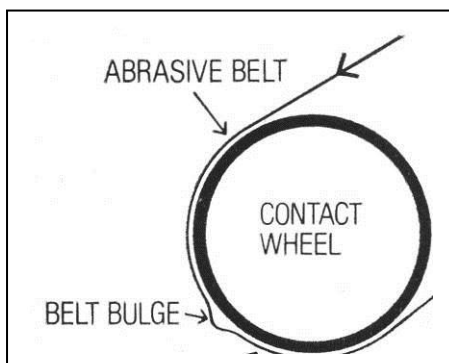
All our machines have wheels. Polishing machines usually have one wheel only, abrasive belt machines up to 4 wheels.

Our machines also have shafts which rotate from around 500 rpm to around 5000 rpm. Obviously any rotating shaft, wheel, mop or buff present a risk of entanglement.

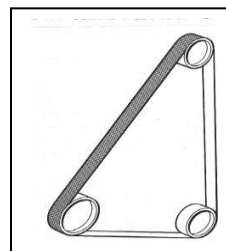
It is therefore essential that these rotating parts are adequately guarded and that the operator does not wear loose fitting clothing, jewellery, ties, etc.

Entanglement can also be caused by a “nip”. A “nip” is the space where an abrasive belt meets the contact wheel or the idler wheel. A “nip” is also the space where a wheel meets a support table or stop.

Once a “nip” gets hold of the operator’s finger, hand, loose clothing, tie, etc. it will drag it around the wheels and its power is such that the operator cannot free himself until the motor is jammed or stopped. By that time some serious injury can have been inflicted.



The “nip” is on top of the contact wheel where the abrasive belt meets the wheel.



A 3 wheel belt system. The nips are at each point Where the belts meets a wheel

2.2 POSITIONING OF DUST EXTRACTORS

(duplicated under ancillaries)

2.2.1 For efficiency

Position dust extractors as close to the machine as possible. We recommend max. 2 m.

The further you position the extractor from the machine the less efficient it will be. If close proximity is not possible choose a larger capacity extractor.

2.2.2 For access

Extractors need regular maintenance and cleaning. Make sure the manual shaker remains easily accessible and access panels can be removed.

2.2.3 For ducts

Extractors need room for inlet spigots and ducts.

Inlet spigots can be on any of 3 sides of the extractor, depending on the model

Ducting fitted to the inlet spigots also needs space, particularly if flexible ducting is used and it needs to be bent.

Both inlet spigot and ducting could take up an extra 600 mm

2.2.4 For disposal of dust and sludge

Both dry and wet extractor need extra space for either removing a dust collection tray or for removing of sludge.

Make sure you allow for this extra space and you position the extractor to give easy access.

Where extractors are installed in workshops with low ceilings check that there is some distance between the top of the extractor and the ceiling.

If the extractor is too close to the ceiling you could have the exhaust air blowing down and/or noise from the exhaust being reflected.

2.2.5 For explosion panels and spark arresters

Make sure the explosion panel is not close to a wall or close to persons working in the area..

In an explosion the blast could be thrown back and although the explosion panel must be on a chain or wire it could fly off injuring people nearby.

3 INSTALLING

This section deals with the assembly of the various parts of the machine and any ancillary equipment and the connection of power and other services to the machine and its ancillary equipment.

Most machines are supplied fully assembled but some are despatched partly assembled, particularly when they also include optional extras and ancillaries or when dimensions demand it. Dust extractors may have to be connected. Conveyor systems and guards may have to be fitted.

The job of installation usually stops after the machine is fully assembled, checked for compliance with order specification and after power connections are checked and working. Before starting with the installation check the machine is to ordered specification and all parts are present, incl. manual, Health and Safety Recommendation booklet and CE certificate.

If anything is missing call SURTECH on 0121 359 4322

The position has already been decided with the help and guidance of the POSITIONING section.

For more detailed information on the individual machines follow the installation instructions in the manual.

After installation machines are to be commissioned before being handed over to production for operating.

Commissioning is mainly to do with setting up for production.

Commissioning and operating are described in the next sections.

Instructions in this booklet are meant as general guide lines and an indication that the machine is equipped to comply with basic Health and Safety Recommendations and is fitted with all the ordered optional extras.

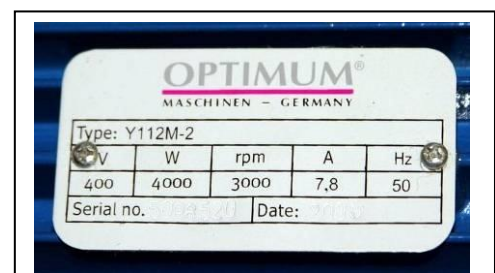
More detailed general explanations and guidance how to check that all controls work properly and safely are given in the next section COMMISSIONING

For individual machine installation instructions see the machine manual.

All machines have a label stating the Model and the main specifications.

This label is in addition to the label on the motor which only shows motor details.

A typical machine label.



3.1 MECHANICAL INSTALLATION

Check again that all parts are present and that the specification is as ordered.

Make sure that the machine is accurately positioned in accordance with instructions in the previous POSITIONING paragraph and recommendations in the ,manual. Either bolt to the floor or glue to the floor, using proprietary pads. In any case, insert insulation pads between the floor and the machine base to reduce vibration and noise

3.1.1 Guards

Guarding is often a compromise between the ideals of safety and the practicalities of use.

For this reason, many guards on abrasive machines are adjustable and it is therefore important to have only trained operators who will know how best to adjust the guarding for each operation.

All SURTECH machines are supplied with guards. However as suppliers we do not always know precise details of all the operations likely to be performed on our machines and users are therefore advised to carefully check the required range of guard adjustment for all potential operations and, if necessary, to modify their guards to suit.

It is the user's responsibility to ensure that their guards are adequate for all their operations and are always in place and kept in proper repair.

Part of the machine installation is also the fitting of guards. Often they are already fitted by Surtech but sometimes they are supplied separately to be fitted by the customer, ie if too large or prone to damage during transport. Most guards incorporate spigots for dust extraction

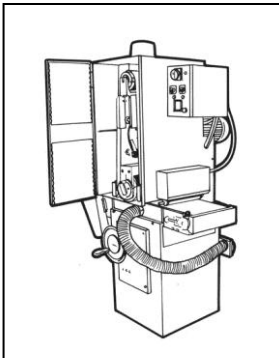
3.1.2 Guard access doors

It must not be possible to open guard doors without a tool, even if that tool is, for example, only an allen key.

Some machine manufacturers fit screws to access doors which can take a long time to remove and which can be lost. With this system the door has to be removed.

The traditional more convenient hinged access door is used only on higher priced machines.

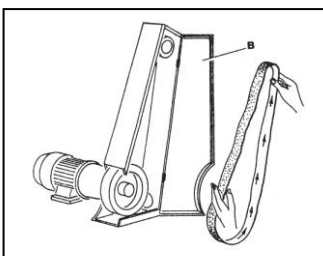
Operators are ingenious in finding ways to get around the rules on access doors design . You are advised to make up your own safety rules and to enforce them.



Access doors on this flatbed conveyor machine are necessary for changing belts and for setting some controls, ie tracking.

On larger machines, i.e. of approximately 7.5 hp or more, doors are usually electrically interlocked with the motor switch.

This means that the main motor is automatically switched off when the door of the guard is opened.



When changing a belt, do not open the access door until the motor has come to a complete standstill.

3.1.3 Types of guards

FIXED GUARDS



A single ended polishing machine with a simple fixed guard which can be rotated.

Fixed guards have no moving parts. Once installed they must remain in position and must not be removed. It must not be possible to open this guard without the use of tools.

MOVABLE GUARDS

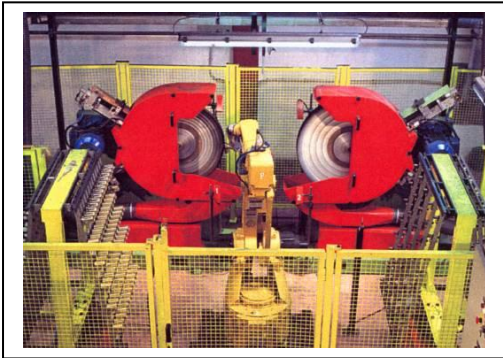
This type of guard is securely attached to the machine by hinges, tracks or slides. Preferably, movable guards should be interlocked. The guard should also be marked with the hazard it is guarding. Movable guards should only be fitted if regular access is needed.

ADJUSTABLE GUARDS



A double ended polishing machine with adjustable guards. The guards rotate. Top and bottom panels can be adjusted to the size of the buff. The access door is hinged. These guards are fixed to the machine but include adjustable elements which make it possible to adjust them to varying circumstances, i.e. the wearing down of tools, the use of varying size workpieces or a change in the operational sequence.

PERIMETER GUARDS



A polishing cell secured by a perimeter mesh guard with interlocked access door robot cell inside a total enclosure (container).

Fixed barriers or fences are securely mounted around the machine at a distance that eliminates the hazard you want to guard against. These must be of a height to prevent easy climbing. (considered to be at least 1500 mm high)

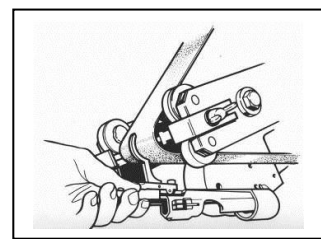
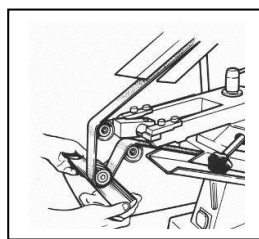
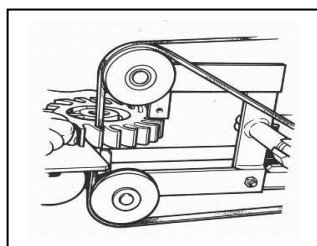
Perimeter guards usually have at least one interlocked access door for maintenance, repair, tool changes, etc. Access is restricted to specially trained personnel

SPECIAL AND DEDICATED GUARDS



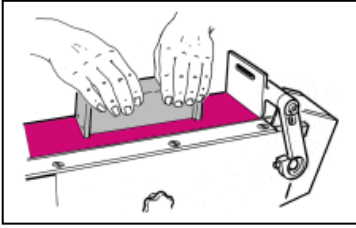
A dedicated guard on a single ended polishing machine. The workpiece was of such awkward shape and size that no other solution was possible. For some operations standards guards just are not suitable.

For these we will design special guards. In most cases the guard design must not interfere with the manipulation of the workpiece. This can mean that the guard design does not conform to normal recommendations. In these cases we recommend that the machine is restricted to be used by properly trained personnel only.



The above line drawings show examples of abrasive belt grinding operations which are difficult or impossible to guard. without interfering with workpieces which have to be manipulated in front of the abrasive belt.

In these cases safety can only be achieved by restricting the use of the machine to trained and skilled operators.



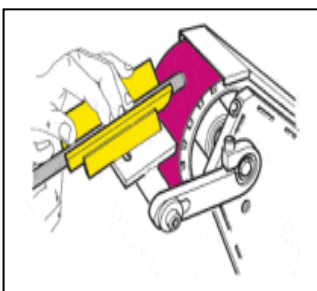
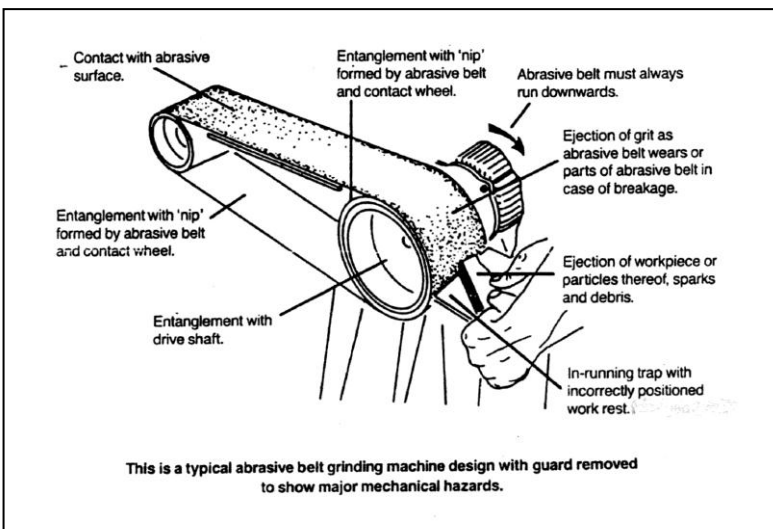
On this manual lisher all parts of the machine are guarded but the working area has to stay exposed to allow grinding, deburring and sanding operations to be carried out.

Trained operators will know how to use the machine without exposing themselves to hazards. Untrained operators could be at risk of personal injury.

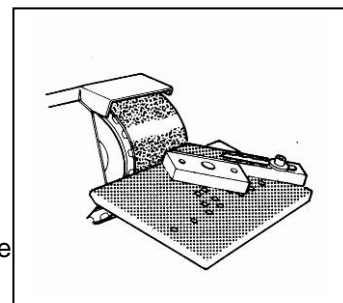
3.1.4 SUPPORT TABLES, STOPS, WORK RESTS

Support tables, stops and work rests improve safe handling but can also make guarding difficult. All these attachments must be firmly fixed to the machine and once set must not move.

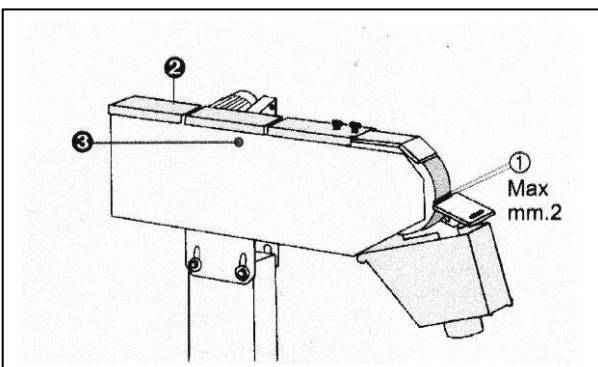
The distance between the abrasive belt and the support table, stop or work rest must not be more than 2 mm, otherwise parts can be drawn into the gap and cause accidents.



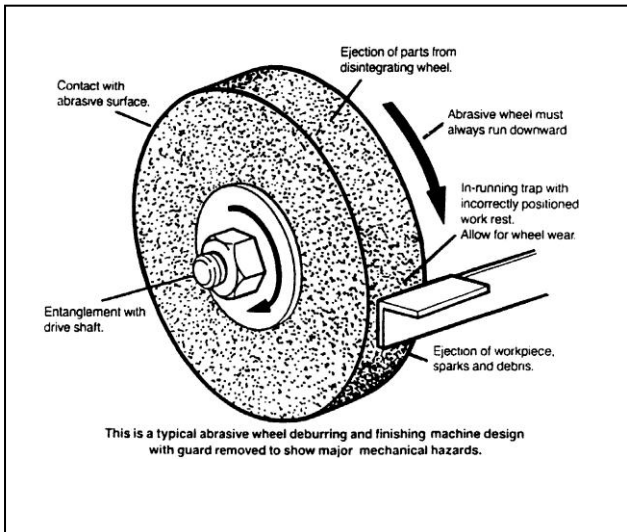
A V-shaped attachment for deburring of tube ends. This must be set with a max. gap of 2 mm between the abrasive belt and the support.



A large adjustable support table with guides for grinding at various angles. This must be set with a max. gap of 2 mm between the support and the abrasive



A support table on an abrasive belt grinder. Support table to be set to a gap of max. 2mm. Guard required for top platen and access door for belt change.



Surtech contact wheels have a standard 65mm diameter bore into which fit a pair of flanges, bored to the diameter of the shaft on the abrasive belt grinding machine. (Flanges can be re-used indefinitely and do not have to be returned with Part-Exchange wheels).

When mounting Surtech contact wheels, make sure that the flat sides of the flanges face outward and the recessed side fits snugly in to the bore of the contact wheel. One of the flanges is then pushed against the shoulder of the shaft and a nut is tightened hard against the other flange.

Make sure that there is sufficient thread on the shaft to tighten the nut – loose contact wheels will spin, damaging both the wheel and shaft, and preventing accurate belt tracking as well as precipitating accidents.

Fit a spacer if the thread on the shaft is too short

3.2 ELECTRICAL INSTALLATION

For more information see under “OPTIONAL EXTRAS” (Page) and “ELECTRICAL COMMISSIONING” The Electricity At Work Regulations

Copies of the regulations are available from HSE

Duties under this regulation are in addition to those under HASAWA (Health & Safety at Work Act 1974).

All companies using electric power must be aware of these regulations.

Duty holders must have the electrical engineering knowledge which allows them to conform to these regulations.

All companies should have electricity safety rules included in their Safety Policies and Safety Manuals and make sure that they are regularly updated.

Make sure that testing equipment is in working order and test records are kept.

The regulations call for all reasonable and practical steps to be taken to make electrical equipment safe.

Electrical equipment which is safe in one environment may be dangerous in another, e.g. In a plant with no particular explosion hazards, standard electrical lighting will be perfectly safe, BUT, the same lighting in a petrochemical plant will be extremely dangerous and can cause serious explosions.

3.2.1 Voltage selection

Check that the power supply plate on the machine corresponds to the power supply available.

Check that the mains supply is working properly. We have had many problems with phases being down. And/or neutral not being available when the machine needs it.

Make sure the mains supply can be isolated.

The vast majority of our machines are supplied with 3 phase 50Hz motors for voltage of 400v AC.

400 V is the European voltage suitable for motors from 380v to 415v.

Some of our machines are supplied with 230v AC motors These are mainly found on smaller bench, transportable or portable machines.

110v single phase motors are also sometimes specified.

We can supply our machines with most motors as long as it is technically possible and within the capabilities of voltage supply. As an example, 110v draws considerably more current (amps) for the same motor size than 420v. Consequently the cables must be heavier. Up to certain motor sizes the heavier cables are still acceptable, however, the larger the motor the heavier the cable, until the cable is so heavy and stiff it is no longer practicable. Ensure that circuit drawings are available and updated.

3.2.2 Design safety

Whilst the design of the electric circuits and components reflects, more than any other component, the different practices and standards employed in the countries from which our machines come, we have taken great care to specify the right electrical installations to ensure that they conform to UK rules.

However, since our machines are put to so many different uses in all environments, we are unable to guarantee having met all criteria for all machines and for all applications.

The chance of electric shock, fire or explosion can be greatly reduced by giving proper consideration to the use of earthing, overload protection and good maintenance procedures.

For more information on electrical installations see page 15

For more information on air installations see page 17

Test all machine functions. Check that the machine's rotation is correct, noting that abrasive belts or abrasive wheels must always run downwards when you stand in front facing them.

3.2.3 Min. electrical features

The min. requirements for electrical controls are fairly basic: on/off switch, e-stop and no volt control.

The no-volt control prevents the motor from automatically starting again after a power cut.

Any other controls are optional (at the time this booklet was written) Many Companies specify one or all the optional electrical controls. They are:

3,2,4 Motor brakes

We have been fitting motor brakes on request for many years

We expect motor brakes to become mandatory for our types of machines at some time in the future. Most of the motor brakes are electronically regulated.

You should be aware of hidden dangers with motor brakes. If they are set to brake too fast they can undo the screw holding the contact wheel or buff in place. Screw, contact wheel and/or buff can then fly of the drive shaft and hit whoever is in its way.

This risk applies particularly to tapered spindles. Great care must be taken in mounting wheels on the drive shaft and the brake must be set to stop the motor fast but not abruptly.

A motor brake does not prevent an accident. Accidents on our machines from entanglement, flying debris, etc happen too fast. Motor brakes will however stop the machine faster after an accident than the normal off switch.

Motor brakes should always be connected via an easily reached large mushroom button that can be activated by hand, body or foot and conforms to the requirements of an e-stop. (See below)

See page xxx for more details on motor brakes

3.2.5 Interlocks

Electrical guard interlocks are not normally fitted to the smaller budget machines unless specifically requested. but they come as standard on large machines. There are significant quality differences for interlocks. The cheaper ones can easily be overridden, the more expensive ones are difficult or impossible to override.

!!! On some machines unbraked wheels can run on for minutes after the motor is switched off.

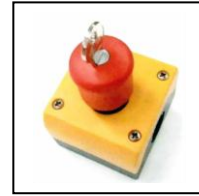
Having an interlock on the guard does therefore not guarantee that the wheel has stopped when the guard is opened. In these cases you must fit a brake or a mechanical method (i.e. a long bolt that takes minutes to unscrew) that prevents the guard being opened with the wheel still rotating.

3.2.6 Footswitches

Because most manual grinding, deburring and polishing operations are used with both hands engaged, a footswitch in addition to a standard manual switch can improve safety.

e-stop = emergency stop device

Left and right e-stops conform to the minimum requirement, red button and yellow background.



e-stop conforms to minimum requirements of red button and yellow background and has additional feature of legend.
 Top right: This switch is not recognized as an e-stop. Red button complies but there is no yellow background.

The red mushroom button must never be used for any other reason than to stop the machine in an emergency. Once the red mushroom button is activated you must immediately turn the rotary switch to zero. Failure to follow these instructions can lead to serious personal injuries.

3.2.7 Types of emergency stop devices:

- Standard red button
- Mushroom type push button
- Wires
- Bars
- Handles

Check that the machine supplied to you has all standard and all requested additional electrical controls fitted. For checking how to make sure that standard and optional electrical controls are working properly see under COMMISSIONING.

3.2.8 Starting current limiter, soft start, star delta switch

When machines with high nominal output are connected, there is a brief rush of high starting current, which can often cause fuses to blow. To permit smooth work with such machines, they can be delivered with a starting current limiter. This can be a soft start system or a star delta switch. On some machines a soft start is essential to get the abrasive belt to track properly when started.

3.2.9 Electromagnetic compatibility

See ELECTROMAGNETIC COMPATIBILITY DIRECTIVE 2004/108/EC
 According to this legislation electrical and electronic products must be constructed to not cause excessive electromagnetic interference and to not being affected by electromagnetic interference.

3.3 CONSUMABLES INSTALLATION

There is little work to be done during installation which relates to consumables. Just check that tracking and tensioning controls function and that spindles, spacers, nuts, etc for mounting consumables are present. For safety reasons some machines are supplied with spindles removed. Most simply screw on to the motor shaft. With double ended machines the screw on spindles come with left and right hand thread. Connect to a suitable dust collector.

SAFETY LABELS

Many machines have safety labels attached.. These labels are supposed to convey their message even to operators who cannot read or understand English.



Commonly used safety labels, recommending the use of safety glasses, dust masks, gloves and ear defenders.

4. COMMISSIONING

Commissioning covers all the jobs necessary for setting up the machine for production See OPERATING in next paragraph) It is the last time that the machine specifications are checked.

4.1 ELECTRICAL COMMISSIONING

See also under “ELECTRICAL INSTALLATION” (Page) and “OPTIONAL EXTRAS” (Page)

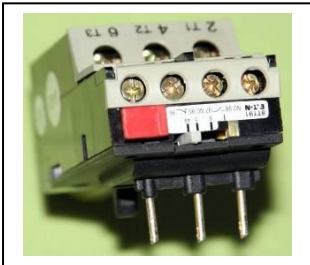
4.1.1 Overload controls

Grinding has to do with pressure applied to the abrasive tool. Increase this contact pressure beyond the capacity of the motor and you will stall it, resulting in overheating and eventual burning out.

An overload protection control can prevent this if properly set. Overloads react to thermal changes in the motor. As the stalled or overworked motor begins to overheat, the overload control switches off the current before any damage is done (provided it is set correctly). SURTECH sets overload controls to average, medium duty grinding work.

Proper setting should be carried out by a qualified electrician, having due regard to the contact pressures involved. Some of our machines have overload controls fitted as standard equipment, on others, overloads are available as optional extras. The following photo shows a typical overload control used by SURTECH,.

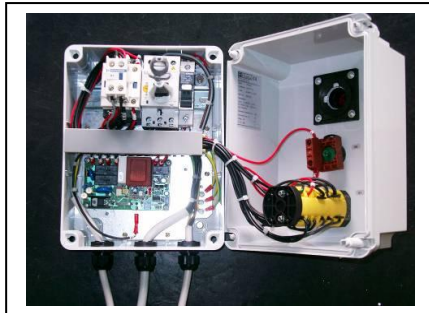
Other makes can also be fitted. You are advised to obtain the manufacturer’s operating manuals if you are not already familiar with them.



The overload unit from a DOL starter used by Surtech

There is no legal requirement to fit an overload. They do not add to safety. On the cheapest machines overloads are omitted but available as optional extras.

We do not guarantee motors that are not fitted with a thermal overload



Above, The inside of a typical top of the range abrasive belt grinder



The inside of a more sophisticated control panel with more functions than is normal. On/off push button switches for three motors. Rotary dials for two inverters. Rotary dials for two timers Mains on/off switches. Emergency stop button

A separate overload control must be fitted to every motor on a machine. Some twin-speed motors require two overloads, one for each speed. Check the ampere rating of the motor for both speeds, and make sure that the overload covers the range. If set too high, the motor can burn out, if set too low the motor will constantly trip out.

Where the amp settings for twin-speed motors are sufficiently close, one overload may be sufficient for both speeds. For some motors, however, the difference between amps drawn at low speed and amps drawn at high speed is so great that two controls are necessary.

Never use one overload unit to control more than one motor. Never use an overload control to start and stop motors by leaving the main switch on. Overloads should be checked regularly, preferably at the beginning of each shift.

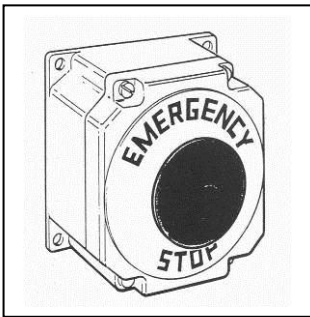
Some continental rotary switches have overload controls built in. This is not apparent on external inspection, the overload only being revealed when the plate behind the switch is removed.

4.1.2 No-Volt control

No-volt protection prevents the motor from starting if the power switch is left in the ON position when a power failure or similar occurs. Without the no-volt protection the machine would start-up when power is restored. With the no-volt protection, it is switched off and needs to be restarted deliberately.

4.1.3 Emergency Stop

Emergency stops bring a machine to rest when danger is recognised. Never use the emergency stop for normal stopping and do not rely on it for isolation. Once an emergency stop has been activated, it must not be possible for the machine to start automatically when the emergency stop is released.



Emergency stop buttons should be of the mushroom Head type and coloured red, with a yellow background

Generally, machines for manual operation are not supplied with emergency stops unless specifically requested. Machines for semi-automatic or automatic operation usually do have emergency stops fitted. You must check in each case whether your operation requires an emergency to improve safety.

Emergency stops do not bring machines to a halt immediately. some motors will run on for quite a while.

4.1.4 Emergency Brakes

Where motors need to be stopped immediately after the emergency stop is activated, motor brakes should be fitted.

Only wide abrasive belt machines supplied by SURTECH have motor brakes fitted as standard. On other machines they are available as optional extras.

4.1.5 Twin-Speed Machines

Many of our machines are equipped with twin-speed motors and these are mostly 1400 rev/min and 2800 rev/min. Twin speeds allow the user to select the best speed for his operation and for the abrasive material used. Twin speeds considerably increase the useful scope of our machines.

Speed selection is mostly via a three position rotary switch:

0 (Zero, in the centre position) for OFF

1 (To one side) for the low speed, and

2 (to the other side of 0) for the higher speed.

Motors should always be switched from one speed to the other via Zero and a pause. It is advisable to switch to the slower speed first to check machine functions before switching to the final higher speed.

Under no circumstance must motors be switched from the fast position to slow without a pause to allow the motor to slow down.

Immediately switching from high to low speed can damage the motor and lead to undue wear and even accidents. The shock can cause drive, idler or contact wheels to come undone and fly off. It will also upset the tracking of the abrasive belt.

4.1.6 Electrical Guard Interlocks

All our machines have guards with access doors for the changing of belts, wheels etc. On smaller machines, up to approx 7.5 hp, access doors are mechanically secured and need an spanner or Allen key for opening. This is to prevent access to dangerous parts. On larger machines of 7.5 hp and over, a time delay interlock should be fitted to prevent access to dangerous parts while the machine is running down.

4.1.7 Cabling

All cables which may be exposed to mechanical damage are reinforced with a wire sheath. This wire sheath must be connected to earth to prevent it becoming live if the cable is accidentally cut. All cable runs must be kept as short as possible and cables must be wired to the mains supply via a fused isolator box. Where cables are liable to mechanical damage and where long runs are unavoidable, a residual current circuit breaker should be installed.

4.2 COMPRESSED AIR

Pressure System Regulations 1989



Very few of our manually operated machines require an air supply. If one is necessary it is usually for the tensioning of the abrasive belt.

Follow the recommendations of the PRESSURE SYSTEMS SAFETY REGULATIONS and THE WORK IN COMPRESSED AIR REGULATIONS

4.2.1 PSSR – PRESSURE SYSTEM SAFETY REGULATIONS

All compressed air equipment must comply with, and be maintained within, the recommendations of the above regulation. It is not the purpose of this manual to give a comprehensive tutorial on all aspects of compressed air safety – it is mainly concerned with tool and machine safety. Compressed air users must therefore make sure that they are aware of, and comply with, current legislation. Hydraulic and pneumatic equipment should additionally be in accordance with the safety recommendations give in ISO 4413 & BS ISO 4413-1998

4.2.2 System Safety

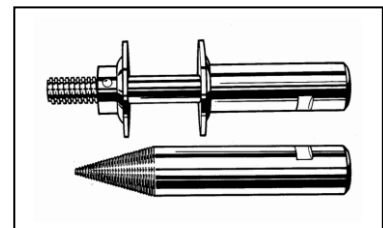
Compressed air can be lethal if improperly used. Never use it for dusting a person. Never direct it in the vicinity of the eyes, ears or back of the neck. Air pressures of less that 0.4 bar (under 6psi) directed on to the skin can cause air bubbles in the blood stream and when these reach the heart the result can be fatal in minutes. Any operator misusing air lines in such a way should be severely reprimanded.

4.2.3 Compressor Capacity

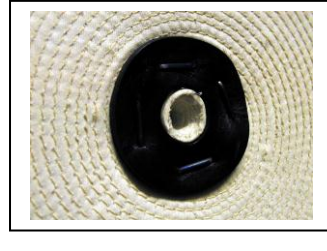
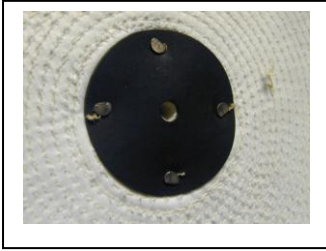
The compressor capacity must be sufficient to allow a regular, uninterrupted air flow of the correct rate and pressure recommended for the tool. Tool air pressure requirements vary little and most tools perform best around 80 psi. Airflow rates do, however, vary greatly for tool to tool – in the case of SURTECH – supplied tools, from around 15cfm to around 60 cfm. As a rule of thumb and 1hp compressor is good for 3.5 cfm. Tools running at pressures below 80 psi work less efficiently; tools running over 85 psi become hard to manage and may break down.

4.3 MECHANICAL COMMISSIONING

Photo of a Cannings machine:



Parallel and tapered spindle



Mops with tapered bore, one side larger than the other

In the UK virtually all manual polishing machines are based on the same 50 + year old design.

A 3hp or 5hp totally enclosed motor with threaded motor shaft on each end.

Most have a spindle speed of 2800 rev/min, some have 1400 rev/min and very few have twin speeds of 1400/2800 rpm. Whatever the speed make sure you work within the speed rating of the polishing tool It is unlikely that a diameter in excess of 300mm will be safe. The standard spindle which screws on to the threaded motor shaft has a tapered screw cut end. This spindle is called " tapered spindle".

You also have the choice of using a spindle with parallel ends but they are only used when the abrasive tool is not available in any other form.

If you use mops with tapered bores, make sure that the tapered spindle end goes right through the bore and is visible.

Do not use tapered bore mops wider than 50mm.

When you screw a mop with tapered bore on to a tapered spindle you will not always manage to get it running true.

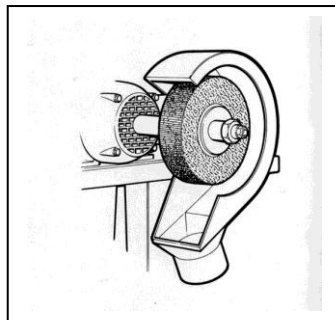
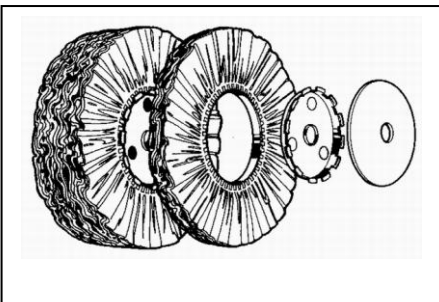
Adjustments may have to be made by knocking the mop in the right place until it runs true.



Mops can also run out of round. Professional, skilled polishers use a knife to trim the running mop until it runs perfectly.

With today's Health and Safety regulations such practice is no longer acceptable, although still practised by thousands of polishers all over the country. Your choice is to either change to parallel spindles or to force your mop supplier to trim and balance mops in such a way that they need no further setting up.

Bufs used on manual machines with parallel spindles must normally also not be larger than 300mm, however if properly mounted, they are safe to a maximum of 100mm.



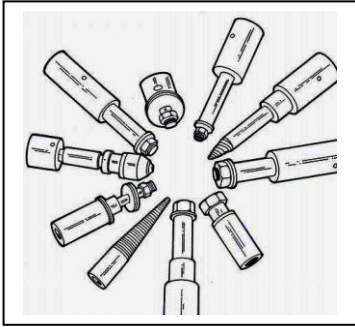
How buffs should be mounted. With Centre plate and clamping plate on Both sides



A selection of tapered spindle stitched mops



A tapered spindle loose leaf mop



A selection of interchangeable spindles



4.4 CONSUMABLES COMMISSIONING

4.4.1 Abrasive belt tensioning and tracking

Types and numbers of wheels on abrasive belt grinders



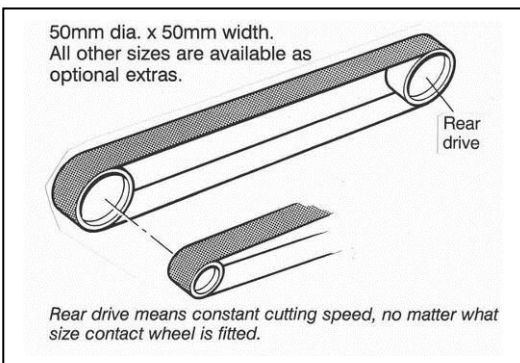
Contact, Drive and Idler Wheels

Abrasive belts or wheels must be mounted in accordance with the recommendations of *The Coated Abrasives Manufacturers Association*. For more information, see page 34
 Make sure that the abrasive belt tensioning and tracking controls function properly. For more information see page 21-24

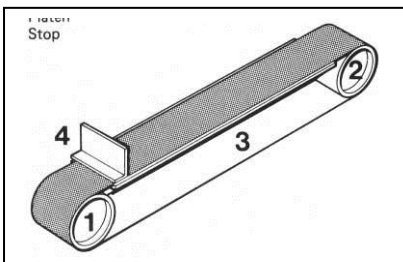
4.4.2 Two-wheel drive

The minimum number of wheels required to run an abrasive belt is two. There are two commonly-used arrangements of two-wheel designs. The first is by direct drive, which means that the contact wheel is also the drive wheel (and the other wheel is the idler wheel).

In the second design the drive is independent, which means that the idler wheel is also the drive wheel and the contact wheel, driven by the belt, acts as an idler wheel.



The drive wheel is at the rear. The contact wheel is at the front. As the cutting speed of abrasive belts is determined by the size of the drive wheel and the motor speed this design allows you to use contact wheels of any size without changing the cutting speed.

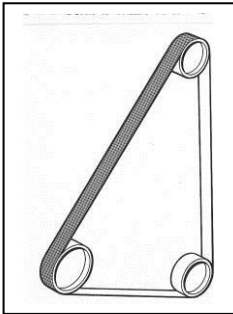


1. Contact wheel
2. Drive wheel
3. Abrasive belt
4. Support or stop

With this design the drive wheel at the front is also the contact wheel. Since the abrasive belt cutting speed is determined by the size of the drive wheel and the speed of the motor Any change in the size of the drive/contact wheel will change the cutting speed.

4.4.3 Three - wheel drive

3 wheel drives allow the use of longer abrasive belts without increasing the floor space the machine requires. They also improve abrasive belt tracking.



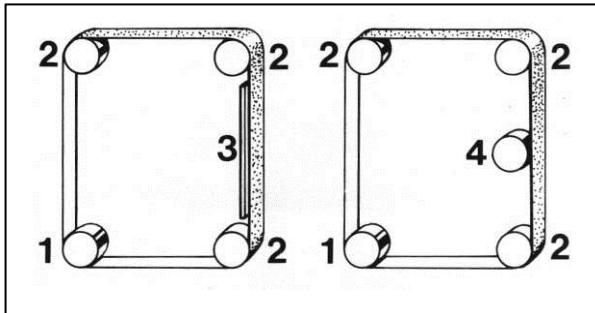
The bottom rear wheel is the drive wheel. The front wheel is the contact wheel. The top wheel is the idler wheel.

Since the abrasive belt cutting speed is determined by the size of the rear drive wheel and the motor speed, you can change the front contact wheel size without changing the cutting speed.

4.4.4 Four - wheel drive

4 wheel drives are even more compact than 3 wheel drives and further improve abrasive belt tracking. They allow the use of several working methods:

1. On slack of belt for great flexibility
2. On flat platen for accuracy
3. On contact wheel for high stock removal.



Drawing on left
 1 Drive wheel
 2 Idler wheels
 3 Contact platen

Drawing on right
 1 Drive wheel
 2 Idler wheels
 4 Contact wheel

The drive wheel is at the bottom rear. The other three wheels are all idler wheels to give the most perfect abrasive belt tracking. This machine is mostly used for slack of belt work. A contact wheel or a contact platen can be fitted.

Since the abrasive belt cutting speed is determined by the size and the speed of the drive wheel the contact wheel size can be changed without changing the cutting speed.

4.4.5 Contact Wheels

Contact wheels can be driven or independent

If they are driven then any change of size will change the abrasive belt cutting speed.

If independent the size can be changed without affecting the belt cutting speed.

Contact wheels should always be flat. They should have both edges very lightly radiused to aid abrasive belt tracking. (On very rare occasions and on dedicated machines shaped contact wheels can be used.)

4.4.6 Drive Wheels

Drive wheels can also be contact wheels.

If they are contact wheels any change of size will change the abrasive belt cutting speed.

4.4.7 Idler Wheels

Idler wheels, whether made of metal only, or rubber coated, must be lightly crowned to allow the abrasive belt to run smoothly.

An abrasive belt will always try to run centrally on the highest point of the idler wheel. If therefore the wheel is worn unevenly, and the highest point is towards the edge of the wheel instead of in the centre, the abrasive belt will run off-centre and it will be difficult to track it back

The crown on wheels can wear and if tracking problems arise you are advised to first check the crown of the wheel, and if necessary to replace or recrown it.

The abrasive belt, idler assembly and contact wheel should be enclosed within a sheet metal guard with flange for the dust extractor.

4.5 Mounting abrasive belts

Belts are usually supplied rolled up in packs of 10.

Release the tensioning device, mechanical or pneumatic.

Straighten the rolled up belt and place over the 2, 3 or 4 rollers of the machine.

Centre belts as best you can fit over all rollers.

Apply tension. Make sure tension is finger tight.

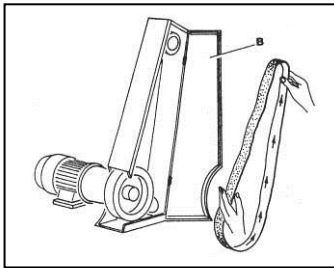
Pull belt in the direction it normally runs. This will make sure that the belt is centered.

If the belt runs off to either left or right, adjust tracking via the tracking control until it stays in the centre of the rolls.

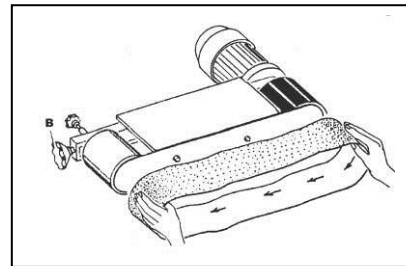
Switch on motor and immediately switch off again. Observe if belt is running in centre and does not wander off left or right. If necessary adjust tracking control.

Now switch motor on and make any necessary fine tracking adjustments.

If the machine has a locking device on the tracking control turn it on.



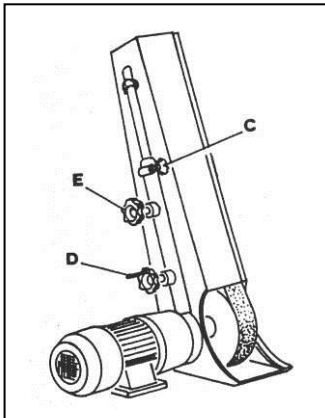
Left: A standard backstand type abrasive belt machine with the drive/contact wheel at the bottom and the idler wheel at the top.



Right: An abrasive belt linisher (flatbed/platen abrasive belt machine with drive wheel and idler wheel.

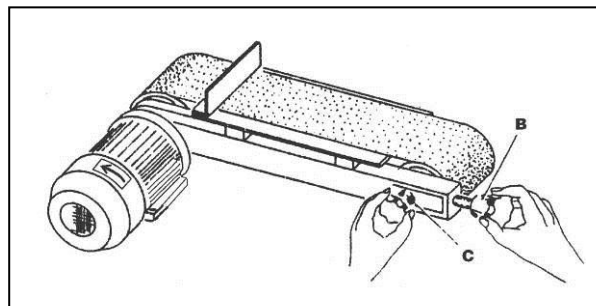
This type of machine is normally for use on the flatbed platen.

There are also machines of this type which have a contact wheel.



Left: The controls on a typical backstand type abrasive belt grinder:

- C Locking knob
- D Tensioning hand wheel
- E Tracking wheel



Right: The controls of a typical flatbed linisher

- B Manual tensioning
- C Manual tracking

4.5.1 Abrasive Belt Tensioning

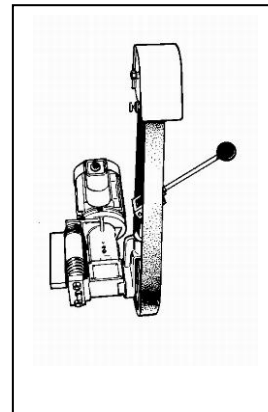
The abrasive belt backstand type grinder and the flatbed linisher above both have abrasive belt tensioning and tracking controls.

Correct tensioning aids tracking and accurate tracking stops the abrasive belt from “running off”.

The system varies from manufacturer to manufacturer and often also from model to model. See machine’s manual for full details.

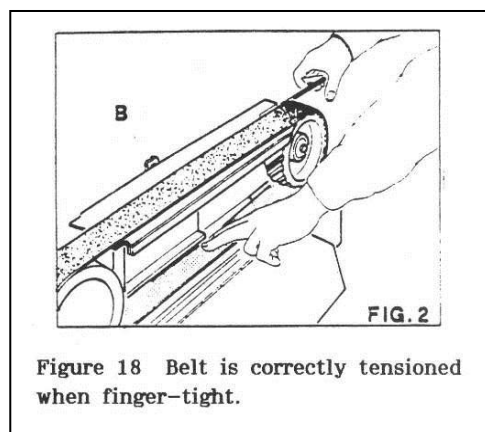
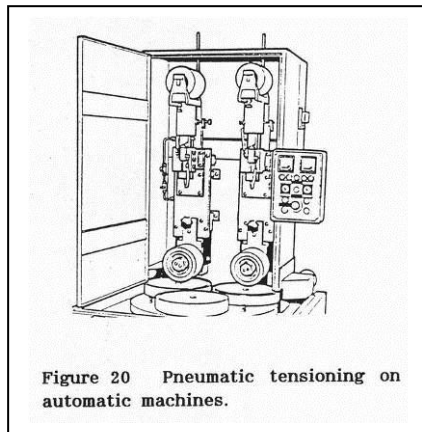
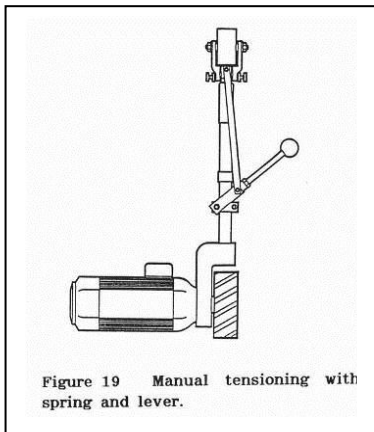
The abrasive belt tracking and tensioning controls should be checked regularly and any difficulties in accurately tracking abrasive belt

Line drawing on right
The tracking control is incorporated in the top idler wheel.
The tensioning is activated by the lever.



As with tracking, there are many ways of tensioning a belt. Tensioning is, of course, essential to tighten the belt onto the drive wheel, idler wheels and contact wheels, so that it has sufficient grip to run without slipping. A badly tensioned belt will not run true.

The traditional method of tensioning is to include a spring in the belt arm so that either the contact wheel or the idler wheel is spring mounted. The wheel can then be pulled down by a lever in order to fit the belt, and the lever released for tensioning.



On larger machines, the spring is replaced by an air piston. Sometimes an air-operated tensioning unit is fitted because it allows for considerably more take-up length and compensates for narrow belts stretching.



With modern abrasive belts, stretching is no longer the problem it once was and it is not always necessary to use spring or air-assisted tensioning. Many machines supplied by SURTECH work with telescopic belt tensioning arms, which have no springs or air pistons. The arm is telescopically shortened or extended by a handle or crank arrangement. This tensioning system works totally satisfactorily and has the advantage of being more direct-acting.

4.5.2 Belt Tracking

An abrasive belt can be tracked across the face of the contact wheel by turning the tracking control knob, moving either the wheel only or the whole contact wheel assembly.

The tracking control, allows each belt to be perfectly centred even if it is not perfectly joined. Turning the tracking control knob should move the belt gently from one side to the other. If at some point the belt suddenly leaps across, then this is a sure sign of a faulty contact wheel or idler wheel.

Check that the idler wheel is sufficiently crowned and that the contact wheel is flat or evenly-worn. Also check that the contact arm assembly is not slack, or the contact wheel shaft faulty

To achieve better belt tracking or for certain applications, machines are available with more than two wheels. Two and four wheel machine designs also allow the use of longer belts. Generally, the more wheels the better the tracking, although three wheels are usually sufficient to track the narrowest and longest belt.

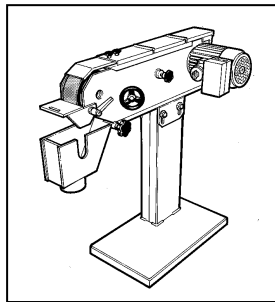
Wide belt machines are available with belts up to 1500mm wide and 2500mm long, presenting particular problems with tracking belts. Generally, belts over 250 mm wide cannot be tracked by conventional methods, employing instead a constantly moving idler wheel.

The controls are air operated and end switches activate the frequency of the idler wheel movement. In effect, the abrasive belt constantly tries to run off one side of the idler wheel.

As soon as it hits the end switch it activates the idler to move in the other direction, forcing the belt to track off towards the other side and when it reaches the switch on the other side it is tracked back again.

The abrasive belt thus constantly moves back and forth without ever running off

Tracking Controls



Set guards, stops and tables etc in accordance with the recommendations in this manual and the machine's operating manual. For more information see section xxx

4.5.3 How To Check the Surface Speed of Abrasive Wheels

The abrasive wheel speed is determined by the speed of the motor drive and the diameter of the drive wheel.

1. Check the motor speed (rev/min).
2. Determine the wheel diameter.
3. Look up speed table and read off wheel surface speed.

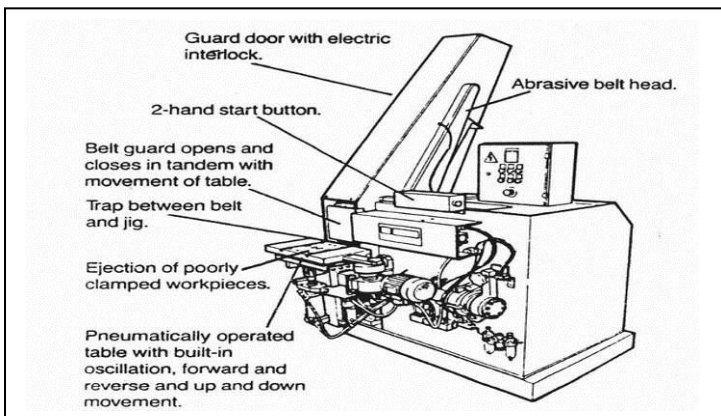
Example: Motor speed 1400 rev/min: Wheel diameter 300mm: + Wheel surface speed of 22 m/sec.

CHECK SURFACE SPEED IN Figure 29. DO NOT USE SPEEDS IN EXCESS OF 45 M/Traditional flatbed linishers have only a drive wheel and an idler wheel - there is no contact wheel.

Some modern flatbed linishers have rubber coated drive wheels which can be used as contact wheels

5.Mechanical commissioning of some semi automatic machines by SURTECH

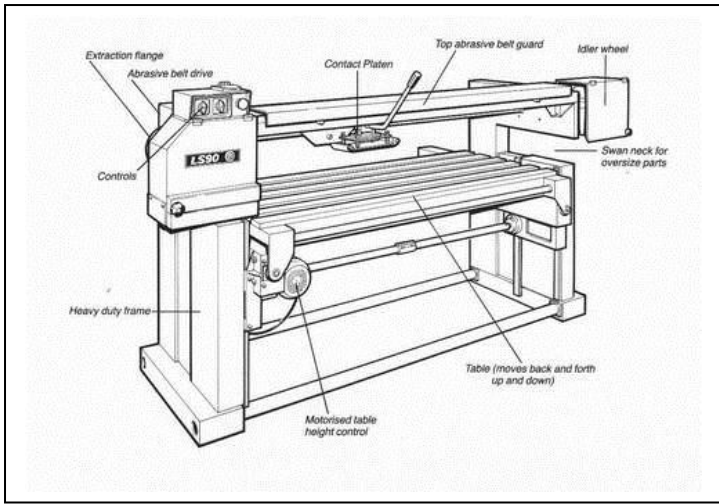
**With short general explanations of Health and Safety matters
(For detailed information see individual machine's manual)**



This is a heavy duty abrasive belt grinding machine with automatic cycle. Also called Power Grinder. Apart from the previously explained mechanical hazards, fingers or hands can get trapped by a pneumatically or hydraulically operated jig. A 2-hand starter button is therefore essential

Because of the very high power motor of 25 KW and up to 50 KW, great care must be taken in the design of jigs and fixtures, Guard doors have electric interlocks and doors must not be opened until the main motor has come to a complete standstill.

This type of machine must only be used by a well trained operator. Other personnel should be kept at a safe distance or better still behind a fence.



The machine on the left is a long belt pad sander For grinding, deburring and polishing of sheet metal parts

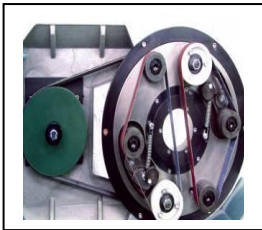


Model 844 sheet edge deburrer.

Sheet material is placed on the conveyor and run past an abrasive belt head with top and bottom belt. The top and bottom edge of the sheet material is deburred. It is necessary to run a sheet through the machine four times to deburr all 4 edges.



Model 142 straight and bent tube finishing machine. Two abrasive belts rotate around the tube to finish it. Manual or automatic operation.

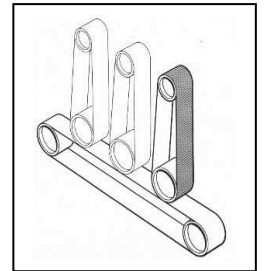


The photo on the left shows the two abrasive belts mounted on a common disc. As the disc rotates the 2 abrasive belts move around the tube to finish it.

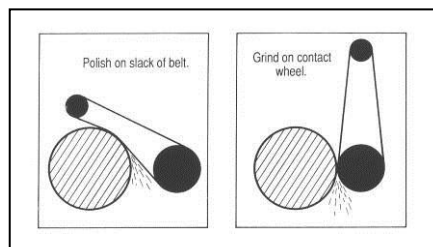


Model SG

Two abrasive belt heads and one brush head. Flat parts are placed on the conveyor to pass under the belt and brush heads for finishing. This type of machines is available from 150 mm to 1500 mm wide and with one head or up to 5 heads.

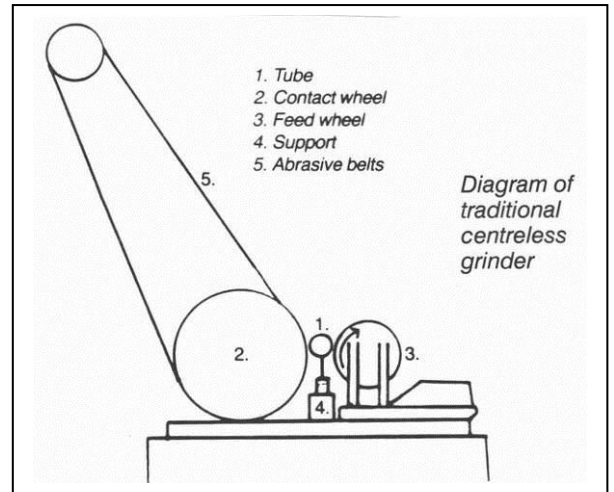
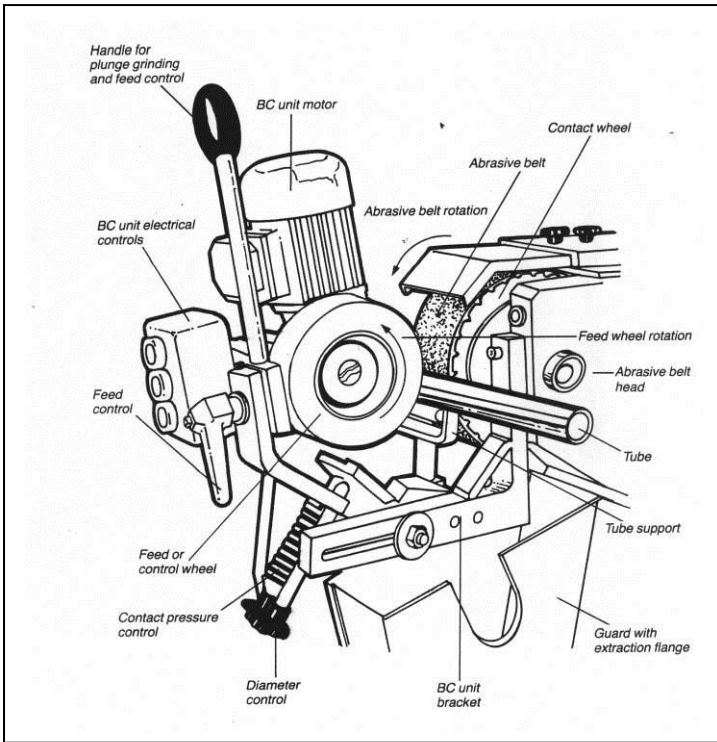


On the left: an abrasive belt Centreless tube polishing machine



On the right: a tool post grinder which can be mounted in the tool post of a lathe to turn it into a roll grinder. Works on slack of belt or contact wheel

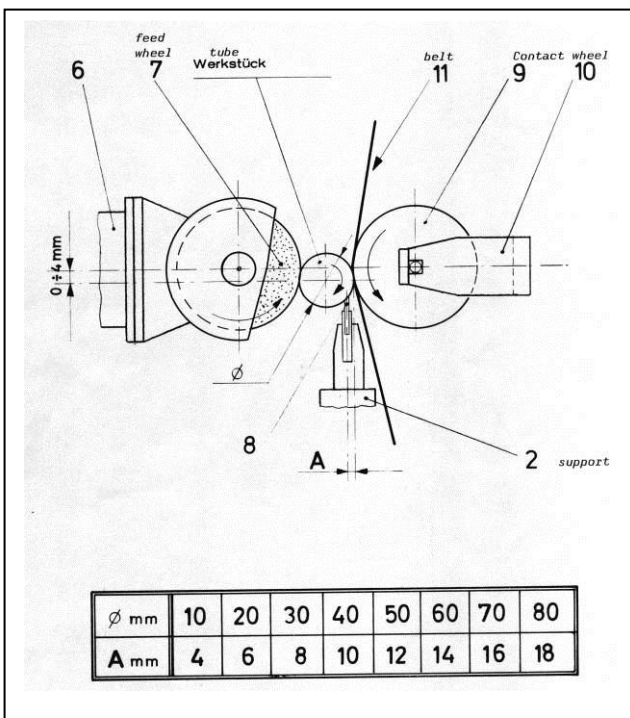
How a centreless machine works



The parts of the feed unit of the budget centreless tube polishing machine

With the centreless system the tube is loosely guided between the abrasive belt and the feed wheel.(also called regulating wheel or control wheel)

The tube support prevents the tube from falling between the belt and the feed wheel. It also acts as a brake, without it the tube would spin very fast and shoot out of the machine. The setting of the support is therefore important. See drawing below. As a rough guide the centre of the tube should be below the line between the centre of the feed wheel and the centre of the contact wheel. If the tube is too far below it will not feed properly through the machine. If it is too high it will jump out. Make sure the support is positioned as closely to the belt as possible. The support can be a roller or a blade (knife). The support roller must always be smaller in diameter than the tube.



Parts of abrasive belts and wheels must be kept exposed for work. Since these are extremely fast and sharp cutting tools, surface of a belt or wheel must never be touched when it is in motion.

Work pieces must be held firmly and , where possible, be supported by a table or a stop, as the rotational force could easily eject them from the machine, causing personal injury.

Support tables and stops are usually adjustable. Operators must be instructed not to use machines without first adjusting these supports and stops to within a maximum of 3.5mm from the belt and wheel. Both belts and wheels will wear, and supports and stops may have to be adjusted regularly to compensate for wear rate. See figure 11

Train and instruct the operator. Provide the operator with personal protection equipment . See page 28-30. Make all personal and machine safety recommendations available to the operator and make sure that the operator follow safe working practices. Restrict the use of the machine to trained operators only.

Commence operation of the machine as described in this manual and the machine's operating manual.

6.TROUBLESHOOTING

TRUBLE	CAUSE	REMEDY
Motor will not start	Power not connected	Check connection, switch, overload and emergency button where fitted.
	Open line	Check power source.
	Fuse blown	Check fuse rating and replace.
	Drive pulley blocked.....	Test motor. Check motor fan. Check for obstructions.
Motor Vibrates	Loose motor mounting	Tighten motor mounting bolts.
	Loose drive pulley	Tighten pulley mounting.
	Defective rubber covering on drive wheel.	Replace drive wheel.
	Dirt in drive wheel	Clean wheel.
Motor overheats	Excessive pressure stalls motor	Reduce contact pressure Check overload setting (where fitted) Check phases of motor.
Belt does not track	Low belt tension	Increase tension.
	Defective drive wheel, Worn crown	Replace drive wheel or recrown
	Belt faulty	Try new belt.
Belt "thump" during grinding	Loose contact arm or Contact wheel	Tighten.
	Defective belt joint	Change belt or specify different joint.

7. OPERATING

We have deliberately listed some operational items under **COMMISSIONING**.

This is because we believe that operators should make themselves conversant with all machine operations before the machine goes into production.

The **COMMISSIONING** section and this **OPERATING** section must be read together. Many of the recommendations are valid for both.

7.1 Speed:

Check that the proposed abrasive consumable's speed rating is within the safe limits of the machine's speed. For more information, see page 42, 43

7.2 Safety Switches:

Check the safety switch on the machine for correct operation.

7.3 Mechanical Hazards:

Ensure that your proposed method of working will not expose you to the hazards of entanglement, trappings, or the ejection or debris from the work piece. For further information, see section

7.4 Noise:

For information on noise see page 28

7.5 Dust: Assess your grinding operation for dust protection and take precautions to prevent it from becoming a health or safety hazard. For further information, see separate booklet on Dust H&S

7.6 Abrasives Belts, Discs and Wheels: Before mounting abrasive consumables, check for damage. Discard all damaged abrasives.

7.7. Polishing Compounds: Some polishing compounds can be hazardous to health, assess compounds to be used for toxicity and follow safety procedures. Learn to know what to do on contact with eyes and skin, or when inhaled or swallowed. Check all COSHH assessments for all products used

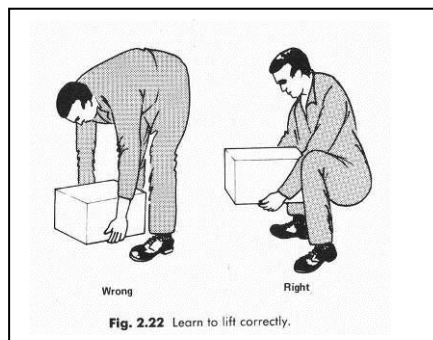
7.8 Read about polishing compound and mops in our separate EASY GUIDE POLISHING

7.9 Air supply

Very few of our bench and pedestal machines require an air supply. If one is necessary it is usually for the tensioning of the belt. Follow the recommendations of the Pressure System Regulations.

For information on compressed air see page 17, 18

7.10 PERSONAL SAFETY



How to lift

7.11 PROTECTIVE CLOTHING

Bench and pedestal abrasive belt machines present hazards against which you can protect yourself personally: - (Larger machines and automatic machines also present the some or all of these hazards but they are usually dealt with in a different way.)

7.12 ENTANGLEMENT

All our machines have wheels, some only one, some up to four.

All machines have motor shafts, or spindles, or mandrels, rotating at up to 1400 rpm, 2800 rpm, 5000 rpm and in extreme cases up to 15 000 rpm.

Operators must not wear loose fitting clothing, ties, jewellery or any other item that could get entangled.

7.13 TRAPPING

Some machines have moving parts which present the risk of trapping of fingers, hands or other parts of the body. A way to reduce the risk is to fit a motor break and a footswitch to stop the machines in the event of trapping.

7.14 EJECTION

Owing to the high rotational speed of our machines, parts of the consumables, parts or whole work pieces and debris can be ejected. The wearing of protective clothing is therefore essential.

7.15 NOISE

Noise levels for most of our machines are well within the safe levels prescribed by Health and Safety. The CONTROL OF NOISE AT WORK REGULATIONS 2005 came into force on 6 April 2006. They require employers to carry out risk assessments and to provide employees with who are exposed to noise with protection. When carrying out risk assessments consider that often the highest noise level does not come from the machine itself but from the part that is being ground.

The lower exposure action level is 80 dB(A)

The upper exposure action level is 85 dB(A)

At the lower level protection must be made available to people who request it.

At the upper level action must be taken to reduce noise and the ear protection is mandatory if the level cannot be reduced to below 85 dB(A)

Further reading:

NOISE IN ENGINEERING

HAZARDS ASSOCIATED WITH FOUNDRY PROCESSES

Abrasive machines create noise which cannot always be kept to a recommended safe level. You may have to wear ear defenders. Again, ask for advice about the recommended maximum noise levels from your supervisor

Noise level standards can be difficult to interpret and it is even more difficult to measure noise levels in accordance with the various recommendations of the Health and Safety Executive and the EEC. SURTECH therefore recommends that ear protection be worn with all tools or machines exceeding 85 dB(A).

Please note that the noise may not always be generated by the abrasive tool or machine itself but may be set up by the abrasive material or even the workpiece and from other machines in the vicinity.

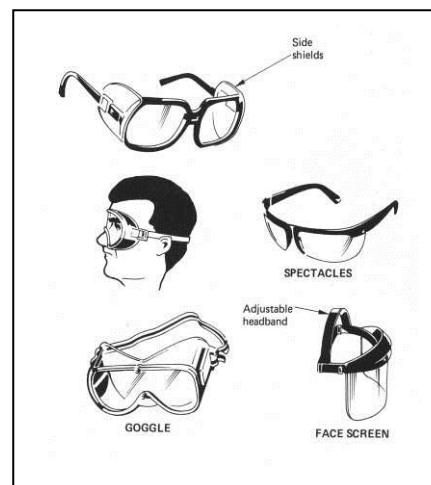
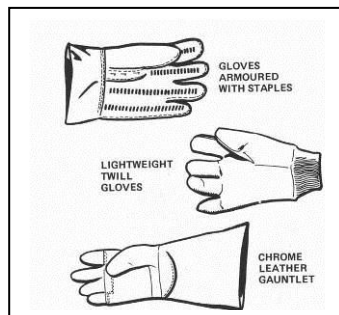
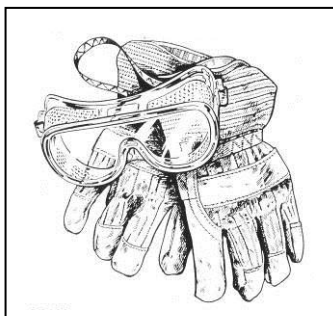
Noise levels for our machines are usually well within the max. allowed by Health and Safety Recommendations before ear protection must be worn.

7.16 DUST

All our machines create dust and must therefore be connected to a suitable dust extractor.

Some dusts are hazardous and create fire and explosion hazards. For these specially designed extractors are available.

7.17 GLOVES

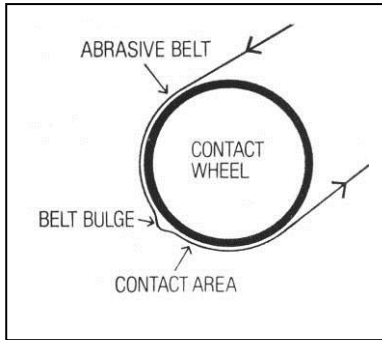
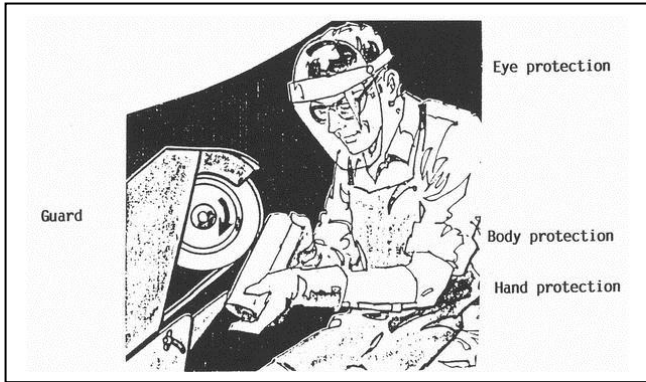


Wear gloves, safety glasses, ear defenders, body protection and dust masks.

7.18 Heat and Abrasion. Sparks

Abrasives cut aggressively and fast. Grinding produces heat and work pieces can get red hot. Protect yourself against both abrasion and heat by wearing safety gloves and body protection.

7.19 How to present the work piece to the abrasive belt or wheel.



 Two side-by-side diagrams showing a hand presenting a workpiece to a rotating abrasive belt. The left diagram shows the workpiece being presented above the horizontal center line of the contact wheel, with a dashed line indicating the center. The right diagram shows the workpiece being presented below the center line using an upward stroke.

Present the workpiece to the abrasive belt below the horizontal center line of the contact wheel. Above this line the workpiece will chatter and is difficult to hold, with the possibility that the workpiece could be pulled away and cause injury to the operator or to bystanders.

Always use an upward stroke to present the workpiece to the abrasive belt. This method both improves the cutting and increases safety by drawing hands away from the abrasive belt.

Figure 14 How to present the workpiece to the abrasive belt or wheel.

7.20 HAND ARM VIBRATION SYNDROME (HAVS) (previously called “white finger”

Perceived vibration on the operator’s hand and arm has become recognised as an industrial injury known as “white finger”.

Well maintained machines and portable tools using coated abrasives are not considered to cause this injury. Coated abrasives are flexible and the rubber contact wheels they are used on act as a cushion. Nevertheless the possibility of HAVS injury should not be excluded and guidelines followed as well as preventive action taken.

(Note: tools or machines that vibrate or produce unusual sounds should be checked and if necessary repaired immediately)

7.21 REPETITIVE STRAIN INJURY

Some operators experience strain symptoms in the elbow, wrist and hand after prolonged grinding operations on stationary machines or more often after prolonged use of portable tools.

The symptoms occur sooner and more frequently with poorly designed tools and when the tool temperature is reduced by cold air in pneumatic portable tools.

Symptoms can often be alleviated by changing to ergonomically designed tools or by insulating tool handles. A number of wrist and body braces are available for sufferers when other methods have failed.

7.22 EXPOSURE TO VIBRATIONS ON PORTABLE, BENCH AND PEDESTAL ABRASIVE MACHINES FOR GRINDING, DEBURRING AND POLISHING

Exposure to vibration can cause a number of disabling health complaints, collectively known as Hand Arm Vibration Syndrome (HAVS). Vibration induced white finger (VWF), carpal tunnel syndrome (CTS), Neurological disease, Musculo-skeletal disease, tennis elbow, etc. are all part of HAVS. Vibration white finger was discovered in 1911 and called Raynaud’s Phenomenon.

The Control of Vibration at Work Regulation 2005 regulates the amount of vibration to which a worker can be exposed. Choosing the correct power tool and maintaining it properly has a great influence on the vibration levels of the tool. Particular attention needs to be paid to drive and contact wheels. If they wear out of round vibration levels will increase. The same goes for abrasive wheels. Abrasive belts should have smooth joints, overthick joints will cause vibration. Employers are required to carry out risk assessments and to take suitable steps to control and reduce hazards below the values mentioned below. Failing to observe these regulations can lead to considerable compensation claims.



The max. daily exposure value over 8 hours is								5 m/s ²
The action value for daily exposure over 8 hours is								2.5 m/s ²
Average vibration level in m/s ²	2.0	2,3	2,8	4.0	5.6	8.0	11.2	
Max. daily exposure time in hours	16	12	8	4	2	1	0,5	

7.23 DIAGNOSING VIBRATION LEVELS

Vibration exposure is measured using accelerometers with probes attached to the operator's hands and averaging the figures over an 8 hour period. Vibration monitoring instruments cost between £ 3000 and £ 5000. In addition a person will have to be trained in the use of them.

7.24 CAUSES OF VIBRATIONS

1. Unbalanced wheels, wheels running out of round, unevenly worn wheels can be contact wheels, grinding wheels or idler wheels
2. Poor abrasive belt joints. Coarser belts tend to produce higher vibration levels than finer belts
3. Contact wheel size. Tests have shown that smaller contact wheels tend to produce higher vibration levels than larger wheels
4. Shafts running out, bent shafts, worn bearings, poor bearing seating.
5. High density and wrong contact wheel specification. 70 shore contact wheels have lower vibration levels than 90 shore contact wheels. but are usually less efficient in removing large amounts of material in a short time.
6. Machine not mounted correctly. Machine stand too light. Support table incorrectly fitted. Make sure anti vibration pads are fitted and where possible the support table is separate from the machine.
7. Operator not properly trained and using wrong technique.

7.25 PREVENTION AND ACTION - Anti vibration gloves

Experts and the authorities do not accept that anti-vibration gloves prevent vibration related diseases although the manufacturers market them as such and quote international test standards. Apparently gloves only help to keep hands warm and warm hands are less likely to be affected by vibration than cold hands.

7.26 Anti vibration machine designs

Machine manufacturers continue to work on mechanical designs to reduce vibrations. Machines with jigs, supports and other mechanical aids produce significantly lower levels. Many grinding machines are available with hands-off controls, reducing vibration exposure to zero. Unfortunately these machines are considerably more expensive than standard manual machines. They do not offer improved productivity and in many cases increase cycle time. They will only become economically viable when the potential cost of a claim is added.

7.27 Maintenance

Poorly maintained machines have higher vibration levels than properly maintained machines.

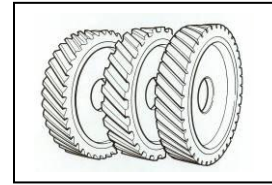
Correct abrasive belt machine specification as part of the maintenance regime.

1. Sufficient power

A power reservoir makes sure that the abrasive belt will always cut at the most efficient speed when high contact pressures are applied.

2. Contact wheels

A large 400 mm to 450 mm dia contact wheel with correct land to groove serration and density between 70 and 90 shore will facilitate operations and reduce vibrations



3. Speed

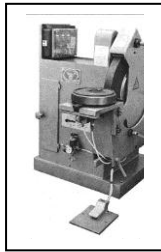
Where various material grades are ground, a machine with adjustable cutting speed control can dramatically improve performance. As a rule of thumb the harder the material the slower the cutting speed.

Abrasive belt machines run between 32 m/sec and 38 m/sec.

Grinding wheel machines are available between 30 m/sec and 80 m/sec

4. Hands off

Use machines with automatic operation where parts are jigged. Vibration problems are completely eliminated



Off -hand belt grinder on left / Off-hand wheel grinder on right

Some operators experience strain symptoms in the elbow, wrist and hand after prolonged grinding operations on stationary machines or more often after prolonged use of portable tools.

The symptoms occur sooner and more frequently with poorly designed tools and when the tool temperature is reduced by cold air in pneumatic portable tools.

Symptoms can often be alleviated by changing to ergonomically designed tools or by insulating tools handles.

A number of wrist and body braces are available for sufferers when other methods have failed.

MECHANICAL SAFETY

Guards

See also page 10

Most mechanical hazards can be reduced or eliminated by proper guarding. To be totally safe, a machine would need to have a guard placed all over it. However, with abrasive grinding, deburring and polishing machines that is hardly possible – abrasive belt or wheel has to be exposed for work; the machine must be accessible for adjustment of stops, tables and jigs. Abrasive belts and wheels need to be changed frequently and there must be quick and easy access to do this. Neither must guards be in the way or workpieces which need to be manipulated in front of the belt or wheel.

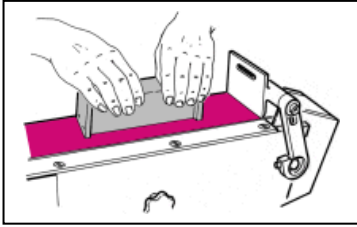
Guarding will therefore always be a compromise between the ideals of safety and the practicalities of use. For this reason, many guards on abrasive machines are adjustable and it is therefore important to have only trained operators using abrasive machines, who will know how best to adjust the guarding for each operation

Access Doors on Guards

Access doors on machine guards are necessary for belt and wheel changes. On all but the smallest machines, access doors are secured by a bolt which can only be released by an Allen key or spanner. On larger machines, i.e. of approximately 7.5 hp or more, doors are electrically interlocked with the locked with the motor switch.

This means that the main motor is automatically switched off when the door is opened.

When changing a belt, do not open the access door until the motor has come to a complete standstill.



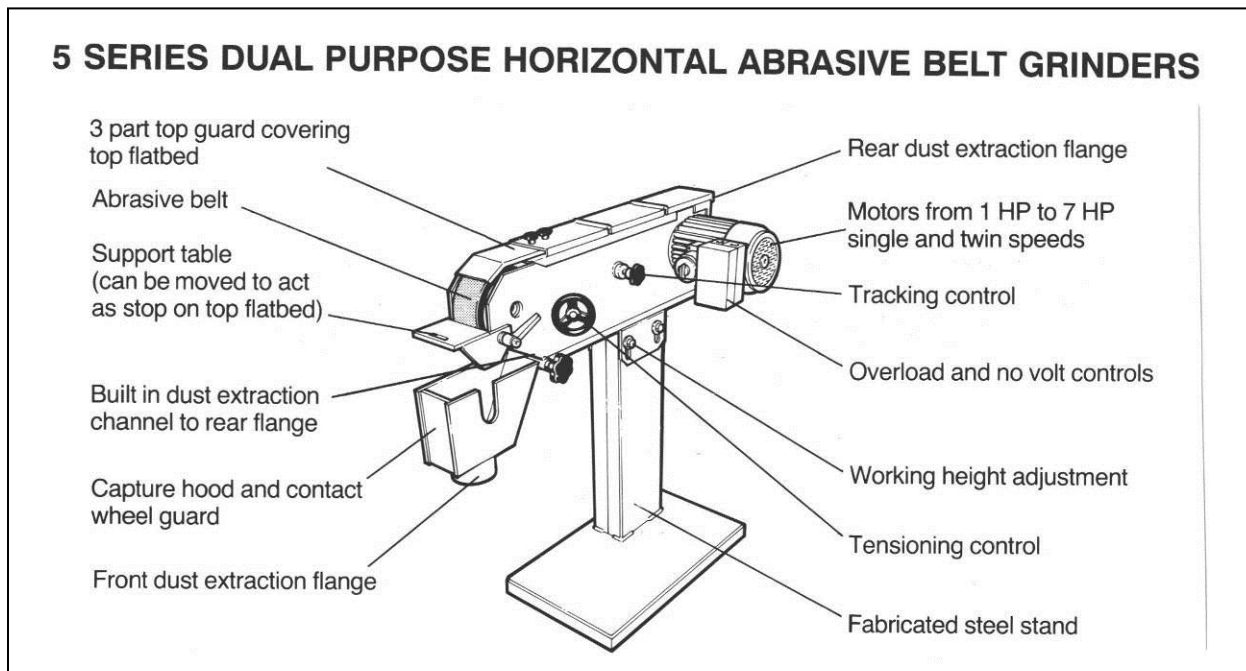
Adjustable work rests

For more information see page 7

STATIC ELECTRICITY

Some installations or operating conditions may encourage the retention of static electricity, particularly when running abrasive belts on nylon wheels. Susceptible operators can reduce the effect by wearing an earthed wrist band or by standing on a carbon mat.

The line drawing below shows the many parts that make up a typical belt grinder, including guards, capture hoods, support table and electrical controls which are relevant to safe operation



8. CONSUMABLES

Abrasive belts and Health & Safety. For more details on abrasive belts see out ABRASIVE BELT CATALOGUE or as for a copy

Abrasive belts are considered safer than most other grinding and polishing tools. There is some flying debris from the abrasive mineral as it wears and from metal particles as the parts are ground but by wearing eye, body and hand protection this flying debris cannot result in any serious personal injury. This is unlike bonded grinding wheels which can explode and release large chunks of minerals which can do quite severe damage.

Abrasive belts lose their kinetic energy when they break. The backing material of modern abrasive belts is tough enough not to break easily. It is more likely to split and then parts of the belt whip round and can hit any unprotected part of the body. Good guarding, protective clothing and a motor brake can reduce the risk of personal injury.

Like all cutting tools abrasive belts need to run at certain speeds to perform efficiently and economically. Recommended speeds range from 10 m/sec to 45 m/sec.

Operators must be aware of the dangers of even slow running abrasive belts.

They still cut very fast, particularly if of coarse grit. They can also snatch parts out of hands or trap hands.

Abrasive belts are the most efficient and most economical cutting and finishing tools. Use them wherever you can and use other abrasives only in areas abrasive belts cannot reach.

There are dozens of belt grades in dozens of grit sizes and hundreds of sizes. Somewhere there is the perfect belt for you. If you have problems finding it call SURTECH on 0121 359 4322 for advice and a copy of our ABRASIVE BELT EASY GUIDE..

Always switch off the main machine switch when changing a belt.. See page 21-24 for how to mount a belt.

If the machine is fitted with a coolant system, use only belts designed for wet operations. Check the belt for damage, discarding any damaged belts.

Run belts only in the direction indicated by the manufacturer. Check that the machine platen, contact wheel, stops and support tables are in good order and properly adjusted. Do not use otherwise.

The *Coated Abrasives Manufacturers Association, part of The British Abrasives Federation* www.thebaf.org.uk Po Box 58, Manchester, M17 1JD has published a leaflet entitled Safety in the Use of Coated Abrasive Products.(HSG 17). If you use abrasive belts, wheels, discs, etc., you must follow the recommendations in this leaflet. You can obtain a copy from the Association or your supplier of abrasives. The leaflet also gives safety recommendations for spirally wound bands and sleeves, orbital/dual action sheets, hand-use sheets and cloth, paper and combination discs.

When coated abrasive materials are used on machines, the user must follow the recommendations in the machine's operating manual and all the relevant sections of the Health and Safety at Work Act 1974, Factories Act 1961 and related regulations.

The user is responsible for the proper guarding of machines and for operators wearing recommended protective clothing, in particular the mandatory requirements for the provision and use of suitable eye protection under the PERSONAL PROTECTING EQUIPMENT REGULATIONS:1992

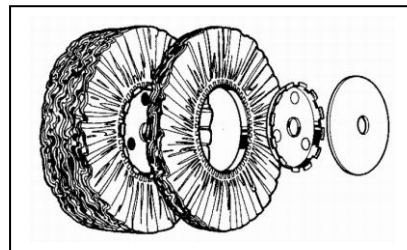
Local exhaust ventilation (LEV) fitted to abrasive machines to control exposure to dust must be examined by a competent person at regular intervals. This is a COSHH requirement

POLISHING BUFFS & MOPS

How automatic polishing buffs are mounted.

Centreplates with bores to fit spindle of machine.

Left and right hand clamping plates to hold everything together.



DEFINITIONS OF BUFFS AND MOPS

BUFFS



A selection of Continental automatic buffs, sisal and cotton, sadly not available from a UK manufacturer.

Buffers are circular polishing tools primarily used on automatic polishing machines.

They have round bores and are mounted on parallel machine spindles.

Buffers are available from approx. 100 mm diameter to 960 mm diameter.

MOPS

See **EASY GUIDE POLISHING**. Ask for a copy



A selection of cotton polishing mops
With tapered bore.

All polishing mops and buffs are used with polishing compounds, either bar compound or liquid compound. When applying compound observe instructions on how to apply. Never manually apply bar compound to buffs on an automatic machine. The mop or buff is the carrier for the polishing compound. The required finish is produced by the grade of compound used. A hard carrier like a sisal mop makes the compound appear more aggressive. A soft carrier like a cotton mop makes the compound appear finer.

Mops with tapered bores are a UK oddity, based on the type of polishing machine available. These polishing machines, made by Cannings, Morrisflex, Hockleychem, etc. run at 2800 rpm. Very rarely at 1400 rpm and even rarer at twin speeds of 1400/2800 rpm. 300 mm diameter is the max. safe size to run at 2800 rpm..

Other countries use buffs for manual polishing, mounted on parallel spindles and with up to 3 speeds. Mops with tapered bores must never be used on automatic machines. This definition is a general one, there are numerous exceptions.

Before mounting buffs and mops check that they are undamaged and free from distortion. When mounting new buffs or mops, switch the machine on for a short time and switch off again, checking that buffs or mops run true and without vibration. Do not use buffs or mops which do not run true.

Like all abrasive tools polishing buffs also have to run at efficient and economical speeds.

These speeds vary with the type of buff, the material to be polished and the shape of the workpiece.

Manual Polishing Machines

Most of these machines have a spindle speed of 2800 rev/min, some have 1400 rev/min and some have twin speeds. Whatever the speed make sure you work within the speed rating of the buff or mop.

A larger than 300 mm OD mop running at 2800 is unsafe. If you use mops with tapered bores, make sure that the tapered spindle end goes right through the bore and is visible. Do not use tapered bore mops wider than 50mm.

How to work out cutting speeds:

The following are some recommended speeds

Buffers used on manual machines with parallel spindles must not be used at speeds higher than the MOS (Max operating speed) of 45 m/sec. Since there are no UK built manual polishing machines available with speeds other than 1400 or 2800 the max.mops diameter is 300 mm.

If a Continental polishing machine with up to 3 speeds or even variable speed is used the buff diameter can be up to 500 mm There are also Continental manual polishing machines with variable speed drives which are run with buffs of up to 960 mm.normally also not be larger than 300 mm, however, if properly mounted they are safe to a max. of 500 mm, subject to the motor speed being within the recommended safety limits.



The photo on the left shows a Continental polishing machine with a 960 mm dia. buff

FIRE HAZARD

Automatic polishing machines work with automatic liquid polishing compound application systems. If this system fails, buffs can run dry, get hot and eventually start to smoulder and burn. Regularly check that automatic compound application is working. If buffs are not properly mounted on automatic polishing machines they can turn on the shaft, creating heat from friction and eventually start to burn.

Fire in polishing shops is not rare. Beware, and follow safe working practices.

SAFETY RECOMMENDATIONS FOR THE USE OF ABRASIVE PRODUCTS

SURTECH's technology is based on Coated Abrasives. This safety book concentrates on the many forms of Coated Abrasives. Abrasives used improperly can be dangerous, therefore always follow the instructions given with the individual abrasive product, examine the abrasive product for damage and follow correct procedures for storage.

Hazards arise from contact, breakage, flying debris, sparks and fumes, noise and vibration. Use only abrasives conforming to EN 12413 : 2007 & a1:2011 for Bonded Abrasives and EN 13236:2010 for Superabrasives and EN 13743:2009 for Coated Abrasives.

Contact with abrasive products

Wear protective clothing, gloves. Secure anything that could get entangled with the abrasive product: long hair, jewellery, ties, etc. Make sure machine guards are in place and secure.

Breakage

Handle abrasives with care and check for damage prior to use. Do not use damaged abrasive products. Store abrasives at 18-22 degree C and 45-65% relative humidity. Observe shelf life. Follow safe mounting instructions. Do not apply excessive contact pressure. Run abrasives at safe operating speed.

Flying debris

Do not use abrasives on machines without adequate dust extraction. Wear a suitable dust mask. Make sure guards are in place and secure. Wear eye protection

Noise

For information on noise see page 28

Vibration

All abrasive machines are prone to vibration. Make sure the machine is in good working order. See separate report on vibration.

Disposal

Dispose used or defective abrasives in accordance with your local regulations.

You can obtain a Material Safety Data Sheet (MSDS) published by the European Abrasives Federation from your abrasives supplier.

POLISHING COMPOUNDS AND COOLANTS **For a copy**

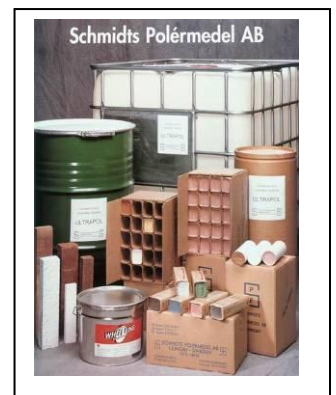
See EASY GUIDE POLISHING. Ask

If you buy a chemical you must by law request a MSDS document.

MSDS stands for Material Safety Data Sheet. The MSDS is supplied by the manufacturer or supplier of the chemical, You must read the MSDS, act on all recommendations it contains and file it away for safe keeping.

MSDS are essential for completing a COSSH assessment.

If ever you lose a MSDS ask your supplier for a copy. Your supplier may make a small charge.



1. Bar compounds.

Bar compounds are solid sticks of varying sizes, colours and grades. They are applied manually to mops. Care must be taken to hold the bar firmly and to apply it below the centre-line of the buff to avoid it being snatched out of the hand and ejected at high force.

Bar compounds must only be applied manually to machines designed for manual polishing and never to machines designed for automatic polishing.

Automatic polishing machines must be equipped with either an automatic bar compound feed system or better still with an automatic liquid compound feeding system

HAZARDS

Generally **Bar Compounds** and **Liquid Compounds** contain no harmful ingredients and are safe to handle. Nevertheless the manufacturers recommend wearing protective clothing. Wash affected areas with soapy water if compounds come into contact with skin. Rinse eyes under running water if compounds are accidentally splashed into eyes. If symptoms continue, seek medical advice.

SCHMIDT BRAND BAR POLISHING COMPOUND.

Eye Contact. - Flush eyes thoroughly with water. If irritation persists, call a doctor

Ingestion - Induce vomiting. If symptoms persist, call a doctor.

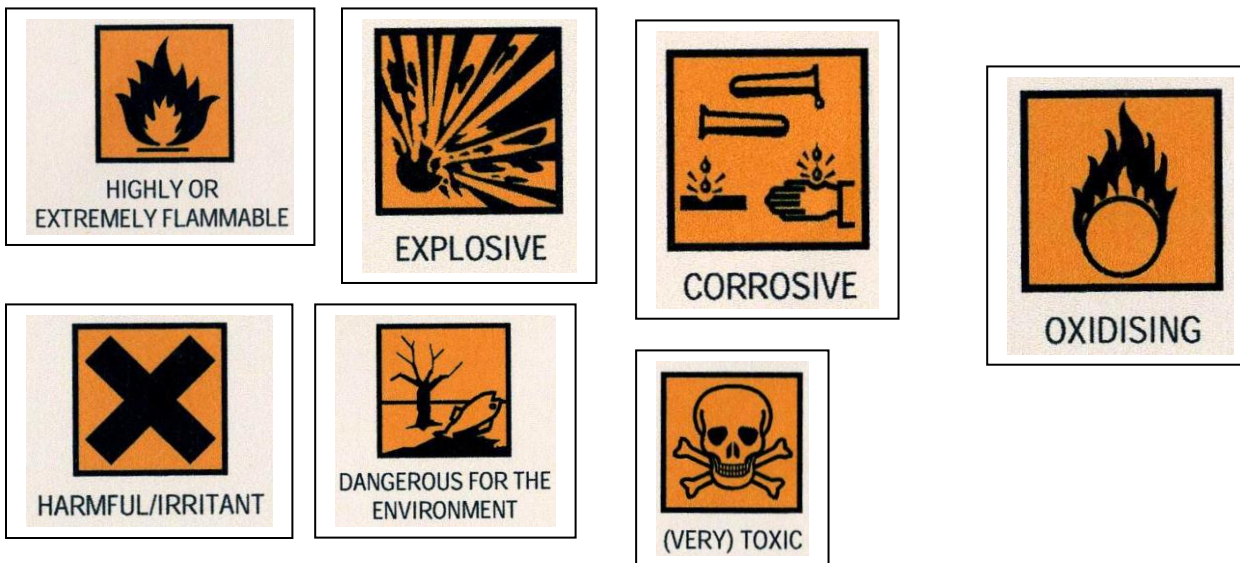
Skin Contact. - Wash affected area with soap and water.

Fire. - Product will melt and not ignite unless in direct contact with naked flame.

Inhalation of Dust. - Non toxic, but wearing of dust masks recommended.

CHIP

Chemicals hazard information and packaging for supply) Chemicals are used in every Company. Not all chemicals are dangerous but you must identify the ones that are. Cleaning products, paints, glue oils, etc. all are chemicals



Hazard labels allow the user to identify dangerous chemicals and to undertake risk assessments.

For more information see COSHH regulations or try www.coshh-essentials.org.uk

CHIP also stipulates safe packaging of hazardous substances.

DESCRIPTION AND APPLICATION OF POLISHING COMPOUNDS AND COOLANTS

A DATA SHEET WITH FULL HEALTH AND SAFETY RECOMMENDATIONS AND INFORMATION IS AVAILABLE ON REQUEST.. IF THIS DATA SHEET IS MISSING, CONTACT YOUR SUPPLIER IMMEDIATELY.

COOLANTS

ULTRALIN COOLANT. One of the coolants/abrasive belt lubricants recommended by SURTECH engineers and used in our Abrasive Test Centre. A DATA SHEET WITH FULL HEALTH AND SAFETY RECOMMENDATIONS AND

INFORMATION IS AVAILABLE ON REQUEST AND SHOULD ALSO BE SUPPLIED WITH EVERY SHIPMENT. IF THIS DATA SHEET IS MISSING, CONTACT YOUR SUPPLIER IMMEDIATELY.

Application: Water-soluble synthetic coolant for mechanical use.

How to use: Dilute 2-5% in water.

PH Concentrated: 9.5-9.6

PH Diluted: at 3%, 9.4-9.5

Ingredients: Lubricating oils, amino compounds, non-organic salts, non-organic acids, anti-corrosive agents, anti foaming agents, water.

Incompatible with strong acids.

Storage: 6 months.

Spillage: Wipe with a cloth or cover with sawdust.

Special Protection: Use gloves, apron, and eye protection.

Flashpoint. Non-inflammable

Disposal Wash away

Eye Contact. Immediately flush eyes with plenty of water.

Ingestion. If swallowed, do not induce vomiting. Call a doctor immediately.

Skin contact. Wash with soap and water after prolonged skin contact.



Chemicals for cleaning and protecting



DISPOSAL

Grinding, deburring and polishing operations leave waste, debris and dust, which must be disposed of in a safe and environmentally-friendly manner.

Businesses are responsible for the disposal of their own waste. Additionally, The Environmental Protection Act imposes duties on anyone who has responsibility for hazardous waste.

The Department of the Environment has produced an explanatory leaflet, entitled The duty of care on waste. Polishing mops and buffs are made from natural materials like cotton, tampico or sisal, sometimes impregnated to extend their life. Buffs and mops supplied by SURTECH contain no hazardous ingredients and can be disposed of with other non-hazardous waste.

Dust disposal

It is highly unlikely that you will be allowed to dispose of industrial dust in the same way as other waste. Since regulations vary, you are advised to consult your local authority. Dusts of a specially hazardous nature, eg. aluminium, titanium, magnesium, etc. must be disposed of in accordance with statutory requirements.

Old abrasive belts, discs, wheels, etc

Ask your supplier for advice.

Old polishing buffs and mops

Polishing mops and buffs are made from natural materials like cotton, tampico or sisal, sometimes impregnated to extend their life. Buffs and mops supplied by SURTECH contain no hazardous ingredients and can be disposed of with other non-hazardous waste.

Bufs may, however, have been used with polishing compounds, or for polishing metals, which may be classified as hazardous, in which case they will require special disposal arrangements.

Polishing compound waste

Ask your supplier for advice

Coolants and lubricants

Ask your supplier for advice

9. ANCILLARIES

SAFETY RECOMMENDATIONS FOR THE USE OF CONTACT

WHEELS IN ABRASIVE BELT GRINDING

Contact Wheels

- Operators should wear a protective apron, safety shoes, leather gloves and safety goggles.
- The abrasive belt, idler assembly and contact wheel should be enclosed within a sheet metal guard with extraction flange.
- The abrasive belt tracking and tensioning facilities should be checked regularly and any difficulties in accurately tracking abrasive belts should be corrected.
- Faulty tracking can be caused by faulty bearings in either the contact wheel assembly or the idler wheel assembly, worn contact or idler wheels or the mechanism for adjustment to tracking and tensioning. It is rare that the abrasive belt itself causes tracking problems. Check by trying several belts, preferably from different batches.
- Idler wheels should be slightly crowned and with a smooth surface. Contact wheels should be square with slightly radiused corners. The machine tensioning adjustment must be sufficiently powerful to keep the abrasive belt taut. The abrasive belt must fully cover the width of the contact wheel. Belts narrower than the contact wheel can be dangerous.

How to mount SURTECH contact wheels

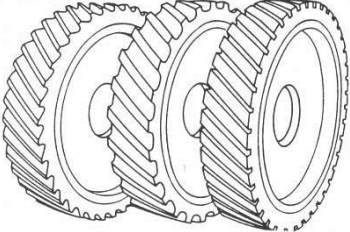
Contact wheels have a standard 65mm diameter bore into which fit a pair of flanges, bored to the diameter of the shaft on the abrasive belt grinding machine. (Flanges can be re-used indefinitely and do not have to be returned with Part-Exchange wheels).

When mounting contact wheels, make sure that the flat sides of the flanges face outward and the recessed side fits snugly in to the bore of the contact wheel. One of the flanges is then pushed against the shoulder of the shaft and a nut is tightened hard against the other flange.

Make sure that there is sufficient thread on the shaft to tighten the nut – loose contact wheels with spin, damaging both the wheel and shaft, and preventing accurate belt tracking as well as precipitating accidents.


Fit a spacer if the thread on the shaft is too short.

CHOICE OF CONTACT WHEELS




Hard, Medium, Soft

IMPORTANCE OF CONTACT WHEEL SELECTION
 Next to the abrasive belt, correct choice of Contact Wheel is the most important factor affecting performance in Abrasive Belt applications. SURTECH Contact Wheels are designed to maximise abrasive belt performance. Worn contact wheels reduce abrasive belt efficiency and affect abrasive belt tracking.




2:1 serrations for 45 shore wheels

FINISHING
 A soft, 45 shore contact wheel with 2:1 land to groove ratios and rectangular tapered lands. For J and Flex weight abrasive belts in grits from 120 to 400. For finishing with little stock removal.



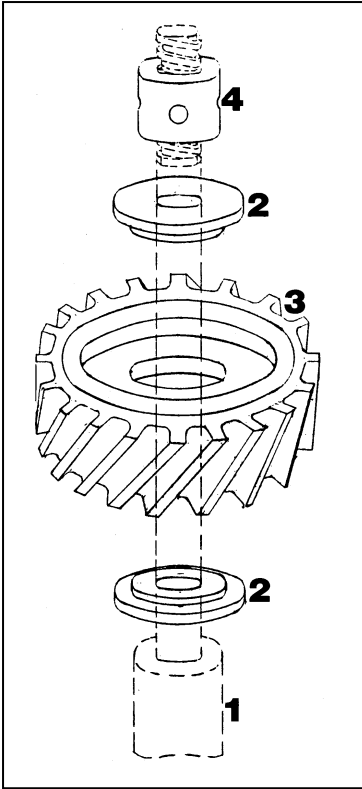
1:2 serrations for 75 shore wheels

GENERAL PURPOSE GRINDING AND FINISHING
 A medium hard, 75 shore contact wheel with 1:2 land to groove ratios and rectangular square lands. For all grades of abrasive belts and all operations requiring aggressive cutting action and even finish.



1:2 serrations for 85 shore wheels

HIGH STOCK REMOVAL
 A hard, 85 shore contact wheel, with buttressed lands. (1:2 land to groove ratio). For X and Y weight abrasive belts in coarse grits from 36 to 80. For high stock removal and maximum aggression. For grinding to close tolerances. This wheel is run in one direction only.



Contact wheel assembly

1.Spindle

2.Contact wheel flanges to fit 65mm bore. The two contact wheel flanges are bored out to suit the diameter of the spindle.

3.Contact wheels with standard 65mm bore.

4.Locking nut

Note: The spindle in the above drawing is shown extended to clearly show the various parts. Normally the spindle is shorter and with sufficiently long thread to allow tight locking of all parts. Use spacers if thread is too short.

If the wheel vibrates after mounting, check that you have followed the instructions correctly: if vibrations persist, do not use until you have found and remedied the cause.

The following table allows you to calculate the surface speed of most machines.



TABLE OF SURFACE SPEEDS

Diameter of contact wheel in mm	150	200	250	300	350
at 900 rpm	7	9	12	14	16 m/sec
1200 rpm	9	13	16	19	22 m/sec
1400 rpm	11	15	18	22	26 m/sec
1800 rpm	14	19	24	28	33 m/sec
2400 rpm	19	25	31	38	44 m/sec
2800 rpm	22	29	37	44	51 m/sec

Example; A typical drive spindle running at 2800 rpm and fitted with a contact wheel of 250mm diameter is 37 m/sec

Contact wheels must not be run at a surface speed in excess of 45 m/sec. The surface speed is determined by the drive wheel. There are two possibilities:

A. The contact wheel is also the drive wheel

Check the RPM of the drive spindle. Read off surface speed corresponding to drive spindle RPM under the diameter of the contact wheel. Results in a surface speed of 36.6 m/sec, acceptable for most grinding operations.

A drive spindle running at 1400 rpm and fitted with a 200mm diameter contact wheel results in a surface speed of 14.7 m/sec, too slow for most grinding operations.

A drive spindle running at 2800 rpm and fitted with a 350mm diameter contact wheel results in a surface speed of 51.3 m/sec, well above the recommended speed and dangerous.

B. The drive wheel is not the contact wheel

Follow above recommendations but use the diameter of the drive wheel not the contact wheel for calculating surface speed.

The above recommendations concern safe operating speeds only. Remember that speeds in excess of 45 m/sec are unsafe and not recommended.

Our contact wheels are tested to 45 m/sec and under no circumstance must they be used in excess of this speed.

Within this upper limit of 45 m/sec there are numerous recommended economical cutting speeds which are determined by the type of abrasive belt and the material ground. The next table lists most of the common materials and their recommended cutting speeds. (Cutting speed = surface speed)

Present the workpiece to the abrasive belt below the horizontal centre line of the contact wheel. Above this line the workpiece will chatter and is difficult to hold, with the possibility that the workpiece could be pulled away and cause injury to the operator or to bystanders.

Contact wheels must not be run at a surface speed in excess of 45 m/sec. The surface speed is determined by the drive wheel

How To Check The Surface Speed Of Abrasive Wheels

The abrasive wheel speed is determined by the speed of the motor drive and the diameter of the wheel. Unlike abrasive belt machines, the drive on wheel machines is almost direct and we will therefore omit instructions for pulley drives:

- 1 Check the motor speed (rev/min).
- 2 Determine the wheel diameter.
- 3 Look up speed table and read off wheel surface speed.

Example: Motor speed 1400 rev/min: Wheel diameter 30mm: = Wheel surface speed of 22m/sec.



OTHER CHEMICALS

The only other area to watch in our industry is where chemicals are used to clean, protect, passivate, lubricate. Mainly stainless steel.

Make sure you have the MSDS for all chemicals used in your factory and follow recommendations concerning fire and explosion risks.

MACHINE CONVERSIONS AND MODIFICATIONS

SPECIAL MACHINES

DEDICATED MACHINES

UPGRADING USED MACHINES

We can modify standard machines to suit your particular circumstances.

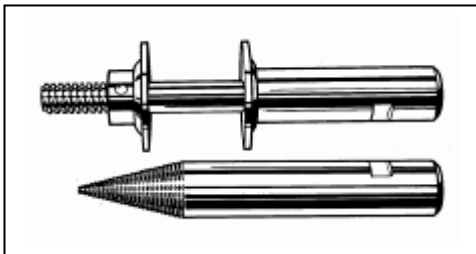
We can convert and upgrade existing machines.

We can design and build dedicated machines.

Send us your requirements and we will let you have our proposals usually within 48 hours.

OPTIONAL EXTRAS

SHAFTS, COLLETS, ADAPTORS, MANDRELS, EXPANDING RUBBER WHEELS, PNEUMATIC WHEELS SHAFTS, SPINDLES



Top: long parallel spindle

Bottom: long tapered spindle

These spindles come in many sizes and threaded bores to suit the threaded motor shafts. They are mainly used on traditional polishing machines like Cannings, Morrisflex, etc.

We have a range of standard spindles in stock and we can make spindles to suit all machines.

Suitable for buffs and wheels up to 300 mm diameter.



2. Short tapered spindle with internal thread. Standard M14.

Mainly used to fit on the M14 motor shaft of portable power tools.

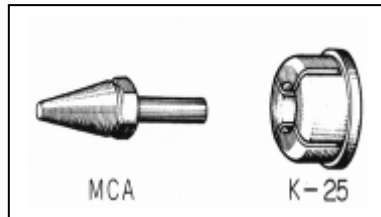
Suitable for buffs and wheels up to 150 mm diameter



- i. Tapered spindle with shaft. To fit into the collet or chuck of portable power tools. Suitable for buffs and wheels up to approx. 100 mm diameter



4. Tapered spindle with shaft. To fit into the collet or chuck of portable power tools. Available in various lengths. Suitable for buffs and wheels up to approx. 50 mm diameter.



Above: Left.: How the special tapered spindle system works
 Right: The two parts of the special tapered spindle system. Tapered spindle with shank and expanding insert



6. A special design shaft for speeds up to 12000 rpm. Only 16 mm diameter and up to 250 mm long. Shaft runs true even at the highest speed. With a collet on the end into which can be fitted any shaft mounted abrasive.

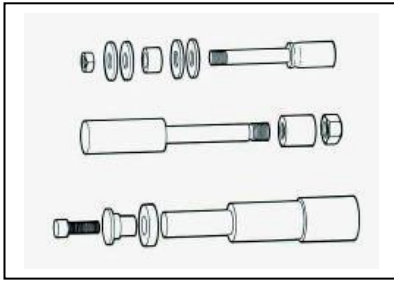


6. Flexible shafts come in many sizes and lengths. Flexible shafts with inner shafts of 7mm dia are about the smallest and most flexible for industrial purposes. 12 mm are medium to heavy duty and 15 mm extra heavy duty. Lengths vary from around 1 m to 3 m.

We can supply all sizes, lengths and all connection systems.



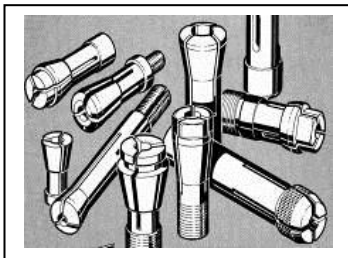
Above: A typical flexible shaft handpiece with Morse taper tapered spindle for heavy duty polishing.



Various spindles with threaded bores. Mainly for use with AE models

Mandrels allow you to mount buffs, discs and wheels With straight bores to be mounted on any machine with a collet or a chuck.

Make sure the shaft is the correct size for the collet. You cannot fit metric sizes to imperial collets and vice versa. Obviously the mandrel has to be the same diameter as the bore of the abrasive tool. The side plates keep m the abrasive tool running straight.



On the left: Line drawings showing a small selection of collets

Collets consist of the collet holder and the collet insert. Collets are screwed to the end of drive shafts. Shank mounted tools are then inserted and clamped. Collets are mostly used for tools with 3 to 10 mm dia shanks. Collet inserts have to be matched to the shank diameter. There are dozens of different sizes in both imperial and metric. We can supply any type and any size collet. For abrasive tools with shaft diameters from 3 mm to 12 mm.

We can also supply collets in imperial sizes.

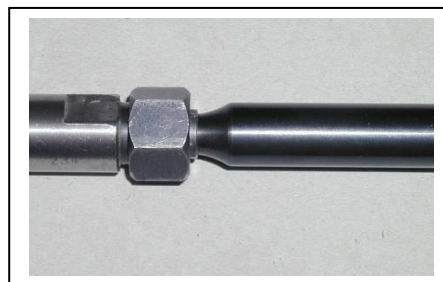
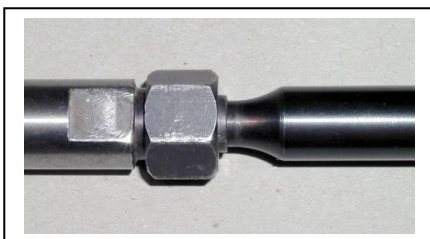
Our collets are mainly used with portable power tools. In some cases they are also used with bench machines. The max. diameter buffs and wheels that can be used with collets depends on the size of the collet.

There is no industry standard but we recommend max. 25 mm dia for 3 mm collets, max. 100 mm for 6 mm collets and max. 150 mm for 12 mm collets.



On the left: Collet extensions. Fit into standard collets

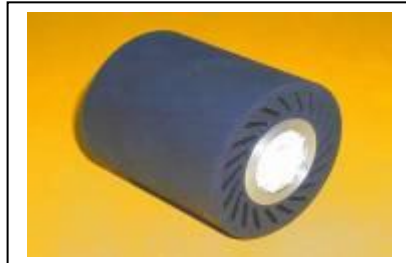
HOW TO FIT EXTENSION SHAFT TO COLLET



Do not push all the way, Make sure end of collet sits on parallel part of shaft. Correct left photo. Wrong right photo End of collet sits on radiused part of the shaft. Cannot grip properly and can cause damage to shaft, unbalanced running.



EXPANDING RUBBER WHEELS AND MANDRELS



Expanding wheel sizes and matching abrasive belt sizes

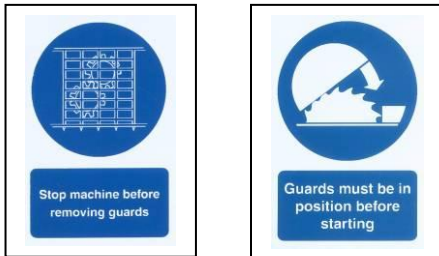
Expanding wheel size Dia x width in mm	Abrasive belt size in mm
100 x 50 mm	318 mm x 50 mm
100 x 100 mm	318 mm x 100 mm
(For use on ROTO-SAT portable tool)	
150 x 25 mm	385 mm x 25 mm
150 x 40 mm	385 mm x 40 mm
(For use with ROTO-BUFFER portable tool)	
150 x 50 mm	385 mm x 50 mm
150 x 75 mm	385 mm x 75 mm
200 x 50 mm	632 mm x 50 mm
200 x 75 mm	632 mm x 75 mm

H&s publications are available from www.hsebooks.co.uk

	Not permitted for hand-held or manually-guided grinding	-	Only permitted for use on totally enclosed machines
	Not permitted for wet grinding		Read the instructions
	Not permitted for face grinding		Wear eye protection
	Do not use if damaged		Wear hearing protection
	Only permitted with a back-up pad		Wear gloves
-	Only permitted for wet cutting		Wear a respirator



These are just some of the many labels stuck on abrasive machines to warn users of



COSHH, ATEX, DSEAR AND CHIP health and safety regulations

COSHH REGULATIONS

COSHH is an acronym standing for The Control Of Substances Hazardous To Health Regulations 2002. COSHH introduces a legal framework for the control of substances hazardous to the health of employees. Dust and fumes are health hazards and must be reduced, suppressed or extracted to assure a safe and healthy atmosphere.

COSHH requires employers to assess the risks from hazardous solids, liquids, dusts, fumes, vapours, gases and micro-organisms, and then to introduce measures to control those risks.

In the case of abrasive machines, dust is the main hazard to assess and to control. In some cases there may also be fumes given off by the grinding process. When wet grinding operations are employed, coolants, and additives fall under the substances that have to be COSHH tested.

COSHH lays down max. exposure levels (MEL) for all materials. LEV (local exhaust ventilation) tests have to be carried out at least every 14 months to assess the performance of the extraction plant and to check that MELs are not exceeded

The HSE has published a number of information sheets setting out guide lines

ATEX (From the French Atmosphere Explosive)

ATEX 137 Directive 99/92/EC makes the employer responsible for taking measures to ensure the health and safety of workers by preventing the formation of explosive atmospheres or to remove sources of ignition and to mitigate the effects of an explosion.

The mandatory requirement of ATEX 137 is the production of an Explosion Protection Document. It confirms that explosion risks have been determined and assessed. Adequate steps have been taken to comply with the aims of the directive Hazardous areas have been classified and accordingly signposted. Work equipment is designed with due regard to safety

Since 1.7.2003 it has been illegal to sell or to put into use equipment for use in a potentially explosive atmosphere unless a declaration of conformity is supplied..

ATEX and electric motors

ATEX requires Companies to make sure that motors used in potentially explosive areas conform to ATEX.

For the first time motors used in areas with potentially explosive dust are included in the regulation, before it was mainly for motors operating in explosive vapours and gases.

Risk areas must be identified, with the type of hazard present and the duration that machinery is exposed.



Atmospheric dust is the most dangerous. Motors working in this environment require a higher level of enclosure sealing of IP65 and a controlled max. surface temperature of 125 C

Motors must have full certification paperwork available from the manufacturer and must carry correct identifying labels, including a re-assessed CE mark.

WHY

Explosive atmospheres can be caused by flammable gases, vapours or combustible dusts. Explosions can cause loss of life and serious injuries and substantial damage to buildings and equipment. It should therefore be in the interest of everybody to eliminate the risk of explosions

SCOPE

Everything supplied after 1.7.2003

Any equipment working in a potentially explosive atmosphere
 The equipment must have an ignition source (electrical sparks, mechanical sparks, static electricity, etc.)
 If the equipment is used as a protective system (explosion vent panels)
 Must have a conformity assessment for equipment in a zoned area to see if ATEX applies

ZONES

- Safe area no hazard
- Zone 22 occasional hazard
 Atex category 3
 ATEX approved motors (EExn) and solenoids. All suitable for zone 22
- Zone 21 frequent hazard
 Atex category 2
 Atex approved motors and solenoids for zone 21
- Zone 20 permanent hazard
 Atex category 1
 ATEX approved motors and solenoids for zone 20

DSEAR - Dangerous substances and explosive atmospheres regulations

WHY - Dangerous substances can put people's safety and lives; at risk.

Type of dust	Ignition temp Of dust cloud In deg C	Min. explosion concentration 1000 cu ft	Min expl. concentr,	Max. expl. pressure psi
Aluminium Atomized	640	40	30	90
Aluminium Milled	550	45		70
Magnesium Milled	520	20	30	95
Titanium	330	45	45	80
Chromium	580		230	



Iron	510		200	
Zinc	630		400	
Plastics	320 -	15 – 70		85-110
	450			
Epoxy	490		10	
Wood flour	430	40		110

The above figures are a rough guide and meant to show how much they can vary between the various materials. The figures have been taken from various sources.

Please do not use them in your risk assessment. Get accurate figures from the internet or industry associations.

We would be grateful if you could point out any mistakes in our list The user directive is implemented by HSE under the **Dangerous Substance Atmosphere Regulation (DSEAR)** which came into force in 2002.

For a list of dusts that are explosive see database of dusts on the HSE website.

An explosive atmosphere is an accumulation of gas, mist, dust or vapour, mixed with air, which has the potential to catch fire or explode.

Dangerous substances are all substances used at work that could cause harm to people as a result of fire or explosion.

To start understanding ATEX and DSEAR we recommend you study the website www.hse.gov.uk/fireandexplosion.

Although mixtures of dust and air within the flammable range are capable of explosion, they will not explode unless they are ignited..

During the build up to an explosion the pressure rises. Whilst all explosions are highly dangerous and must be avoided at all cost some are more severe than others.

Aluminium, titanium and magnesium have some of the highest pressure rises measured in psi per second

How to calculate dust extraction capacity

Grinding with abrasive belts

Belt width in mm	Spigot dia in mm	Recommended dust extractor capacity for medium amounts of dust
up to 40	50 - 75	250 - 400 cfm
up to 50	75 - 100	400 - 500 cfm
up to 75	75 - 100	500 - 650 cfm
up to 100	100 - 125	650 - 750 cfm
up to 125	100 - 125	750 - 1000 cfm
up to 150	100 - 150	1000 - 1250 cfm

Buffing

Buff diameter in mm	Spigot dia in mm	Recommended dust extractor capacity for medium amounts of dust
200	75 - 100	350 - 500 cfm
300	75 - 100	500 - 750 cfm
400	100 - 150	750 - 1000 cfm

The figures given above are intended as a guide only. Actual figures are governed by the type and amount of dust, the material, the capture hoods and the distance between the machine and the extractor.

For small amounts of dust choose the next figure below, for large amounts of dust choose the next figure above.



USEFUL INFORMATION, TABLES, CONVERSIONS

EXTRACTION

1 cubic metre equals 35 cubic feet

Cubic metre figures are normally given per hour, i.e. 500 cbm/hr

Cubic feet figures are normally given per minute, i.e. 500 cfm

1 cbm/hr equals 0,55 cfm

Conversions	
1 inch = 25,4 mm = 2,54 cm	1 square metre = 10,76 square feet
1 ft = 304,8 mm = 30,48 cm	1 ounce = 28,35 g
1 yd = 914,4 mm = 91,44 cm	1 kg = 35,274 ounces = 2,2 lbs
1 mile = 1609 m = 1,6 km	
1 m = 39,37 in = 3,281 ft = 1,094 yd	1 KW = 1,34 hp
	1 hp = 0,746 KW
1 mm = 0,03937 in	
1 m = 39,37 in = 3,281 ft = 1,094 yds	1 psi = 0,069 bar
1 km = 1093,6 yds	1 bar = 14,5 psi

Diameter of contact wheel in mm	speed)				
	150	200	250	300	350
at 900 rpm	7	9	12	14	16 m/sec
1200 rpm	9	13	16	19	22 m/sec
1400 rpm	11	15	18	22	26 m/sec
1800 rpm	14	19	24	28	33 m/sec
2400 rpm	19	25	31	38	44 m/sec
2800 rpm	22	29	37	44	- m/sec

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1 hp = 0,746 KW	
1 psi = 0,069 bar	
1 bar = 14,5 psi	



WHO ARE SURTECH?

Surface Technology Products Ltd (SURTECH) was formed in 1973 to supply the UK market with the latest grinding, deburring, finishing and polishing equipment from around the world

SURTECH's Abrasive Test Centre is the largest demonstration facility for abrasive systems in the UK. Customers can visit with their own parts to test machines and materials prior to purchasing.



GROUP TERMS AND CONDITIONS OF SALE

Version 3/12 Replaces versions 10/06, Aug/6 and Sep/1

1. GENERAL

- (a) In these conditions-
 - (i) The "Seller" means Surface Technology Products Ltd. (Surtech and Surtx are the seller's trade names).
 - (ii) The "Buyer" means the other party with whom the seller contracts.
- (b) Any quotation made by the Seller, for sale of goods or for work whether in writing or orally is an invitation only to make an offer and no order in pursuance of any quotation shall be binding upon the Seller unless and until such order is accepted by the Seller in writing.
- (c) Where there have been no previous dealings with the Buyer the Seller requires the Buyer to complete a Credit Application Form and to return it for its acceptance. Surtech reserve the right to change its Terms and Conditions of Sale at any time and to ask the Buyer to complete a new Credit Application Form based on the new terms.
- (d) The terms agreed with Surtech's Credit Application Form are valid for a max. of 3 years.
- (e) Unless otherwise agreed these conditions shall override any terms and conditions stipulated by the Buyer.
- (f) Most terms and conditions apply to both new and used products, **The main differences are for used products classifications, guarantees and payment terms. Separate terms and conditions for used products are available on request**
- (g) All our price lists and quotations are supplied with current Terms and Conditions of Sale attached. Additional copies are available on request or can be viewed on our website www.surtech.co.uk
- (h) We only accept written orders. Verbal orders must be confirmed in writing before despatch.

2. CATALOGUES

- (a) Any figures, statements, descriptions, illustrations or any other matters contained in the Seller's catalogues, price lists or other advertising literature are not guaranteed to be accurate and shall not form part of any contract between the Seller and the Buyer.
- (b) The Seller reserves the right to amend the specification of its products and services from time to time so that the descriptions thereof as set out in its catalogues price lists and other advertising literature may not be identical with those set out in the Seller's quotation and the Buyer is advised to check the specification set out in the Seller's quotation before placing an order.

3. DESIGNS

- (a) Where goods are made or materials supplied to the Buyer's own specification the Buyer warrants and undertakes full responsibility not only for the suitability and fitness of the specification but also that such specification does not infringe any patent, trade mark, registered design, copyright or other proprietary right

4. QUOTATIONS



- (a) The Seller's quotations are provisional in so far as they are subject to alteration to any changes in the price of raw materials, wages, exchange rates other costs of production and any other circumstances beyond the Seller's control taking place between the date of the quotation and the Seller's acceptance of the order. In the absence of any other figure in the quotation the validity period is 30 days

5. PRICES, PRICE CHANGES, VAT, COST OF CARRIAGE

- (a) The Seller shall be entitled to adjust the Contract price of the work and materials whether before or after the making of the contract in the event of any variation in the cost to the Seller.
- (b) The Contract price does not include the cost of packaging of the goods.
- (c) All prices quoted in price lists, quotations and on the internet are exclusive of VAT. Value Added Tax will be charged at the rate applicable at the date of invoice.
- (d) The Contract price does not include the cost of carriage nor the cost of offloading of goods or materials, which should be arranged by the Buyer at its sole risk and expense. The Seller will use its best endeavours to expedite delivery if requested so to do by the Buyer who must specify the means of transport to be used and pay any additional costs.
- (e) The contract price does not include installation, commissioning and training.
- (f) All prices are subject to change without prior notice. We reserve the right to adjust prices in accordance with exchange rate fluctuations, even in cases where a validity period is given.

6. DELIVERY TIMES, DELIVERY TERMS and COLLECTIONS

Delivery times vary considerably product by product and by time of order. Quoted delivery times are estimates only and do not form part of our contractual terms, unless specifically agreed in writing.

Where prices are quoted as "delivered free" they include carriage by standard service which is normally between 2 to 4 days. "Delivered free" prices do not include packaging and offloading.

Express delivery terms are available at extra costs, depending on location and time. Where available there are premiums for delivery next day, delivery next day before 10 o'clock and delivery next day before 12 o'clock. Orders for express delivery must be placed in writing before 12 o'clock prior to the day of delivery.

Goods which are ready for collections or available from stock can be collected from SURTECH but we require at least 24 hours notice. Goods which require modifications are usually ready within 3 to 5 days, but please ask for confirmation. We do not operate a trade counter.

7. DELIVERY RISK AND INSURANCE

- (a) Delivery shall be deemed to be effected by the Seller at the following times.
When goods or materials are sold f.o.b. delivery shall be complete when they are placed on board ship.
When goods or materials are delivered by the Company then on delivery prior to unloading at the Buyer's premises (or the premises of a nominated third party).
Notwithstanding paragraph 5(d) of these conditions where the Contract provides that goods or materials shall be delivered by an independent carrier delivery of the goods or materials in question by the Seller to the Buyer shall be deemed to be at the time of collection by or delivery to the carrier.
In the event of goods or materials being collected by or on behalf of the Buyer collection will constitute delivery to the Buyer.
- (b) The Seller's failure to deliver or complete by the due dates or dates shall not constitute a breach of contract and the Seller shall not be responsible for any direct or consequential loss resulting.
- (c) The risk in the goods and materials shall pass to the Buyer at the time of delivery as provided in this paragraph. The reservation of title contained in paragraph 11 of these conditions shall not effect the Buyer's responsibility to effect insurance cover.
- (d) Where the goods or materials are not manufactured by the Seller and are delivered direct to the Buyer or collected by the Buyer from the manufacturer or other third party the Seller shall not be liable for any loss or damage to the goods whatsoever or whensoever occurring.
- (e) **The buyer must check the goods for damage on delivery to his premises. Any damage must be documented on the carriers delivery note and reported to the seller within 24 hours. To support any claim the buyer should take photos of the damage.. If the buyer signs a carrier note stating "received in good" order then no claim can be brought against the seller.**

8. TERMS OF PAYMENT. FOR CONSUMABLES. FOR CAPITAL GOODS.

- (a) Unless otherwise agreed payment for consumables of any value and **capital goods up to a value of £ 700.00.** shall be made by the Buyer 30 days from the date of the VAT invoice subject to Credit Limits agreed in The Credit Application form. Payments for standard specification capital goods up to the value of £ 5000.00 will be Pro-Forma. Capital equipment orders in excess of £ 5000.00 for standard and special items will require a down payment and stage payments as set out in the quotation. Should the Buyer fail to comply with the Terms of Payment the Seller shall be entitled to interest on any amount outstanding after the due date for payment at the rate of 4% above the base rate of NatWest Bank Plc from time to time which shall accrue on a daily basis.
- (b) In the event of the contract providing that goods or materials shall be delivered or work shall be completed by instalments each instalment shall be considered to be a separate Contract and construed as such in accordance with these conditions. In particular failure by the Buyer to make payment by the due date for any one instalment for whatever reason entitles the Seller to suspend deliveries or work upon this or any other Contract between the Seller and the Buyer but without prejudice to any other right the Seller may have under the provisions of this Contract.
- (c) In case of shortage or alleged defects in the goods work and materials (which the Seller undertakes to correct under the terms of its warranty), any amount retained by the Buyer will not exceed an appropriate proportion of the outstanding payment

9. INTERRUPTION OF SUPPLIES AND PROFORMA INVOICES

Payments overdue on the **7th day** of each month automatically trigger a DELIVERY STOP. Payments overdue on the **14th day** of each month will be sent for collection. Companies whose payments in arrears have triggered the seller's debt recovery service will be asked to pay against pro-forma invoices for future supplies.

10. CREDIT TERMS AND CREDIT LIMITS

All first time customers are asked to complete and return SURTECH's Credit Application Form prior to trading. Until Credit Terms are agreed all transactions will be on Pro-Forma invoice basis only.



The seller applies an agreed credit limit to all accounts. This limit reflects the seller's finance ability and his credit insurance terms and not the customer's credit worthiness.

11. SETTLEMENT DISCOUNTS

The seller does not offer settlement discounts

12. MINIMUM ORDER QUANTITIES

SURTECH operate a minimum order value or minimum order quantity policy. For full details see price lists or quotations. All orders with a value below £ 50.00 are subject to a surcharge of £ 5.00

13. SUSPENSION AND CANCELLATION

- (a) If the Buyer fails:
- (i) to give delivery instructions or take delivery; or
 - (ii) make any payment when it becomes due; or
 - (iii) shall commit any other breach of contract and fail to remedy the same within seven days of receiving the Seller's request in writing so to do; or
 - (iv) shall enter into any composition or arrangement with its creditors or if any distress or execution is levied upon any goods or property of the Buyer or if the Buyer commits any act of bankruptcy or if being an incorporated company shall have a receiver appointed of the whole or any part of its undertaking or assets or shall pass a resolution for winding up (except solely for the purpose of amalgamation or reconstruction) or a court shall make an order to that effect or if not being an incorporated company shall have a receiving order made against it the Seller may defer or cancel any deliveries or work and treat the Contract of which these conditions form part and any other Contract between the Seller and the Buyer as determined but without prejudice to its right to any unpaid price for goods delivered or cost of work done under this or any other Contract and to damages for loss suffered in consequence.
- (b) If the Buyer requires cancellation of the Contract this will only be accepted at the sole discretion of the Seller and upon the payment of a 20% cancellation charge.

14. CLAIMS FOR SHORT OR NON-DELIVERY

- (f) The Seller will send the Buyer an invoice, which specifies the goods or materials and the date of their delivery. In the event of the Buyer alleging that the Seller has failed to deliver the goods or materials or some of them the Buyer shall give verbal notice to the seller immediately, confirmed in writing within 48 hours, with full particulars of such failure, failing which it will be deemed to have confirmed that the delivery was properly effected upon the date referred to in the invoice. The Seller undertakes to replace free of charge any such goods or materials omitted in transit to the contracted place of delivery in which event the time for the delivery of such goods or materials shall be extended for such period as the Seller may reasonably require.

15. CLAIMS FOR DAMAGE IN TRANSPORT

For most transaction clause 7 is valid, which stipulates that the risk in the goods passes to the buyer on delivery and that delivery is deemed to have been effected when goods have been handed over to the carrier.

In cases where this clause has been re-negotiated and the risk remains with the seller until delivery is made to the buyer's premises SURTECH will only accept a claim if the buyer can supply irrefutable proof that the damage occurred during transport.

It is the buyer's responsibility to open the packaging of all consignments and to check for damage. If damage is detected the carrier's delivery note has to be signed accordingly.

If the buyer signs the carrier's delivery note without registering the damage then there will be no redress against the carrier and SURTECH will not accept any claim for damages.

Claims for damage in transport must be reported to SURTECH in writing within 24 hours of receiving the goods.

16. WARRANTY FOR NEW GOODS. AFTER SALES SERVICE

- (a) The Seller's liability in respect of any defect in or failure of goods or materials supplied or work completed or for any loss injury or damage attributable thereto is limited to making good by replacement or repair at its option defects or failure which under proper use or conditions of storage appear therein and arise solely from faulty design materials or workmanship within a period of normally 12 calendar months, unless otherwise stated and based on single shift working and proper use and maintenance as described in the machine's manual and the Surtech Health and Safety Recommendation booklet after the goods have been despatched to the Buyer or its nominee or the work has been completed. It shall be a condition precedent to the Seller's liability under this warranty that the defective item is immediately returned to the Seller at the buyers cost upon being found defective or if that is not practicable immediate notice in writing of the defect is given to the Seller and the Buyer gives the Seller authority for its employees and agents to inspect the same. Thereafter the Seller shall be given a reasonable period in which to complete the necessary repair or deliver the replacement. The Buyer shall be responsible for the cost of removal of any defective item and refitting of the replacement.
- (b) The Seller's liability under this warranty shall automatically cease if:-
- (i) The Buyer shall not have paid for all goods and materials supplied and work done by the due date (whether under this or any other contract between the Seller and the Buyer) referred to in paragraph 7 of these conditions.
 - (ii) The Seller or its employees and agents are denied full or free right or access to the defective goods or materials or work done.
- (c) These conditions shall be in lieu of any warranties conditions or undertakings whether expressed or implied by statute common law or otherwise howsoever which warranties conditions and undertakings are (subject to section 6(1) of the Unfair Contract Terms Act 1977) hereby expressly excluded to the fullest extent permitted by law.
- (d) In any event, and notwithstanding anything contained in this warranty or in these conditions, in no circumstances shall the Seller be liable, in contract, tort (including negligence or breach of statutory duty) or otherwise howsoever, and whatever the cause thereof:
- (i) for any increased costs or expenses,
 - (ii) for any loss of profit, business, contracts, revenues, or anticipated savings, or
 - (iii) for any special indirect or consequential damage of any nature whatsoever.
- (e) Notwithstanding anything contained in these conditions, if the Seller is found liable in contract, (including negligence or breach of statutory duty) or otherwise howsoever, and whatever the cause thereof, arising by reason of or in connection with this contract (except in relation to



death or personal injury caused to any person by the wilful act or negligence of the Seller or its agent) any claim shall be limited to the price paid under the contract.

- (f) Notwithstanding the provisions of this warranty if the Contract is with a person who is a consumer as defined by Section 12 of the Unfair Contract Terms Act 1977 nothing herein contained shall operate to exclude or restrict any liability for breach of such obligations as are mentioned in section 6(2) of the said Act.
- (g) Service contracts are available

17. WARRANTY EXCLUSIONS

All electrical motors and controls are excluded from the seller's standard guarantee unless a report from a qualified independent electrical engineer confirms a material fault.

Some budget machines are supplied without thermal overload controls. Optional overload controls are available at additional cost, but if these are not chosen the seller will not accept any claims of motor failure.

Where overload controls are fitted but not set correctly during installation the warranty is invalidated.

All parts subject to normal wear are excluded from the warranty. These include contact wheels, idler wheels, bearings, bulbs, fuses, drive belts, brushes in portable tool motors, capacitors, etc.

18. WARRANTY CLAIMS

All warranty claims must be made in writing with full details of the machine model, date of purchase and detailed information relating to the claim.. A warranty claim form is available and can be faxed to the buyer immediately after a phone call. The seller cannot act until written and detailed information of the claim is received

19. WARRANTY FOR USED GOODS

The following limitations to the seller's warranty terms for new equipment apply to all used equipment and materials:

- (a) **Sold as seen**
No warranty at all. No CE certificate supplied. Manuals supplied only if an original manual exists. The buyer is responsible for putting machines in a safe working condition in compliance with current Health and Safety Regulations.
- (b) **Refurbished to working order**
1 month from date of invoice. Limited only to parts that have been replaced or repaired by Surtech, not to original parts. Supply of parts only, excluding labour. No CE certificate. Manuals only if original manuals exist. The buyer is responsible for putting the machine in safe working condition in compliance with current Health and Safety Regulations.
- (c) **Reconditioned to A1**
3 months from date of invoice. Covers all parts. Supply of parts only, excluding labour. No CE certificate supplied. Manuals supplied only if original manual exists. The buyer is responsible for putting the machine in safe working condition in compliance with current Health and Safety Regulations, unless agreed otherwise in writing.
Ask for detailed descriptions of Sold as seen, Refurbished to working order and Reconditioned to A1
For further details ask for our separate Terms and Conditions for used equipment

20. WARRANTY TERMS FOR SALES TO A DISTRIBUTOR OR AGENT

Above warranty terms are also valid for sale to distributors/resellers. All claims must be submitted via the distributor and it is the distributor's responsibility to supply accurate information for Surtech to deal with the claim by filling in a Warranty Claims Form.

It is also the distributor's responsibility to assist the claimant, based on advice obtained from Surtech.

Under the Sales of Goods Legislation distributors are obliged to resolve customers' claims and complaints. The distributor's supplier can only act on the direction of the distributor and cannot take over claims directly with the distributor's customer

21. TITLE TO GOODS

- (a) Until payment in full has been received for all goods works and materials comprised in this or any other Contract between the Seller and the Buyer full legal and beneficial ownership of the goods and materials comprised in this Contract shall be retained by the Seller notwithstanding that the risk in the same shall pass to the Buyer at the time of delivery.
- (b) Subject to paragraphs 11(d) and 11(e) of these conditions the Buyer shall be at liberty to sell the goods and materials comprised in this Contract and/or any products made therefrom in the ordinary course of business but shall hold the proceeds of the sale in trust to pay the Seller such sums to which it is entitled under the provisions of this Contract or any other Contract between the Seller and the Buyer. Notwithstanding the provisions of this paragraph the Buyer may retain from the proceeds of such sale any sum in excess of the sum or sums to which the Seller is entitled under this or any other Contract between the Seller and the Buyer.
- (c) The Buyer's power of sale as provided in paragraph 11(b) of these conditions shall automatically cease if a receiver is appointed over the whole or any part of the assets or the undertaking of the Buyer or a winding up order is made against the Buyer or the Buyer goes into voluntary liquidation (except solely for the purpose of reconstruction or amalgamation) or calls a meeting or makes any arrangement with his or its creditors or commits any act of bankruptcy.
- (d) Until payment in full for the goods and materials comprised in this Contract has been made the Buyer shall hold the same and/or any product or products made wholly or partly therefrom as Bailee of and in trust for the Seller and shall at all times take proper care of the goods and keep them in such manner that they may be clearly identified as belonging to the Seller. The Buyer will return the goods and materials and/or any products made wholly or partly belonging to the Seller if it receives a written request so to do prior to payment in full having been made.
- (e)
 - (i) On determination of the Buyer's power of sale under paragraph 11(c) and/or 11(d) the Buyer shall place those goods and materials and any product or products made wholly or in part therefrom in the Buyer's possession at the Seller's disposal and the Seller shall be entitled to enter upon the premises of the Buyer for the purpose of removing the same.
 - (ii) **If at the time of determination of the Buyer's power of sale under paragraph 11(c) and/or 11(d) any goods and materials and/or products made wholly or in part therefrom are in the custody or control of any individual firm or company other than the Buyer he or it shall immediately provide the Seller with an authority in writing to collect the same and they shall then be at the Seller's disposal.**
 - (iii) **The Seller shall hold those goods materials and products collected in accordance with the provisions of this paragraph upon trust to sell the same and retain from the proceeds of the sale thereof any sum whatsoever due to the Seller from the Buyer and shall pay any balance remaining to the Buyer or its duly appointed representative.**



22. ERRORS

The Seller reserves the right to correct any clerical or typographical errors made by its employees or agents at any time and will accept no responsibility for such errors.

23. HEALTH AND SAFETY AT WORK ACT 1974

The attention of the Buyer is drawn to the provisions of section 6 of the Health and Safety at Work Act 1974 (as amended). The Seller will provide to the Buyer information on the design, construction and installation of its products to ensure that as far as is reasonably practical they are safe and without risk to health when properly used. It is the responsibility of the Buyer to take such steps as are necessary to ensure that such information relevant to the goods is made available to all persons who will use, set, clean or maintain the goods and will also take all steps recommended by the Seller to ensure that the goods are safe and without risk to health when properly used. Even when manuals and a CE certificate are supplied it is the buyer's responsibility to make sure the goods comply with current Health and Safety regulations. The seller's recommendations are meant to be general advice but not the legal correct interpretation of the rules.

Our Terms and Conditions of Sale include our Health and Safety Recommendations, detailed in our 50 page booklet. The booklet is sent with every machine order. Copies are available on request.

24. CE CERTIFICATE

All new machines supplied by the seller are supplied with a CE certificate, either issued by the original manufacturer or by SURTECH. Used machines built before the introduction of CE are supplied without CE certificate. Used machines built after the introduction of CE are only supplied with a CE certificate if one is available. To produce a new CE certificate can cost between £ 500 and £ 2000.

25. INSTALLATION, TRAINING

Our prices do not include installation, commissioning of machines and training, unless otherwise specified in writing. Ask for current prices for installation, commissioning and training.

26. AFTER SALES SERVICE, AVAILABILITY OF SPARES

SURTECH offer in house servicing and repair facilities for all their machines. Service contracts and Machine Checks are available.

SURTECH keep most spares of standard machines most of the time, based on historical demand. SURTECH do not keep spares for dedicated machines unless agreed. Delivery times for spares can be from 4 to 10 weeks.

The buyer is therefore advised to discuss spares requirements with SURTECH when ordering a machine.

SURTECH will then carry the agreed spares for the buyer to call off if and when required. Surtech encourage their customers to order parts liable to rapid wear with the machine, particularly if the machine is a vital part of his production.

27. SEVERANCE

If at any time any one or more of the provisions of these conditions become invalid illegal or unenforceable in any respect under any law or is held by a court to be invalid illegal or unenforceable the validity and enforceability of the remaining provisions hereof shall not in any way be effected or impaired thereby.

28. WAIVER

Any time or indulgence granted by the Seller to the Buyer or any waiver by the Seller of its rights in respect of any breach by the Buyer of any terms or conditions shall not be deemed to grant time or indulgence in respect of any other matters or as a waiver by the Seller of its rights in respect of any other such breach.

29. THIRD PARTY RIGHTS

Nothing in this Deed is intended to confer on any person any right to enforce any term of this Deed which that person would not have had but for the Contracts (Rights of Third Parties) Act 1999.

30. JURISDICTION

These conditions and each and every Contract made pursuant thereto shall be governed by and construed in all respects in accordance with the laws of England.

31. CHANGE OF TERMS AND CONDITIONS

The seller reserves the right to change any of the above Terms and Conditions. The new Terms and Conditions will be sent to customers with the next quotation, invoice or statement.

Because it is not possible to re-print all invoices, price lists, etc. immediately after new Terms and Conditions have been issued the Terms and Conditions in this document take precedence over those printed on other documents.

Registered Office: 244 Heneage Street, Birmingham, B7 4LY
Surface Technology Products Ltd.
Midpex Ltd.
HB Abrasives Ltd.

Registered in England No. 1009612
Registered in England No. 977735
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HEALTH&SAFETYBOOK