

How to grind, deburr  
and polish tubes, pipes,  
bars, rolls and other  
cylindrical parts







# How to grind, deburr and polish tubes, pipes, bars, rolls and other cylindrical parts

## CONTENTS

### THE SYSTEMS

Centreless grinding and polishing	3 - 5
Multihead tube grinding and polishing	4 - 5
Longitudinal grinding	6
Accessories for centreless machines. Handling, loading, unloading, magazines	6 - 7
Between centres finishing, roll grinders with bogeys	7
Toolpost grinding	8
Planetary tube finishing	8
Orbital tube finishing	9
Microfinishing	9
Tube weld blending	9
Manual tube finishing	10
Notching	10
Internal tube finishing	10
Tube end deburring	10
Automatic tube and bar cutting	11
Manual tube and bar cutting	11
Alloy bar grinding	11

### THE MACHINES

Small centreless tube polishing machines	12 - 15
Medium size centreless tube polishing machines	16 - 17
Orbital machines	17 - 18
Longitudinal centreless tube finishing machines	18
Roll grinders, roll grinders with bogeys, longitudinal tube polishing machines	18
Centreless grinding	19
Large centreless tube polishing machines	20 - 21

Toolpost grinders	20 - 21
Centreless buffing machines	21
Rod sanders	22
Planetary tube polishing machines	22 - 25
Longitudinal tube polishing machines	26
Notchers	26 - 29
Microfinishing machines	29 - 30
Weld blending machines	30
Portable tube polishing machines	31 - 32
Internal tube finishing machines	33
Tube end deburring machines	34
Manual tube cutting machines	34
Bar stock cutting machines	35 - 36
Alloy bar grinders	37

### THE APPLICATIONS

Polishing bright steel bar	38
Grinding and cleaning tube ends	38
Finishing plated bar	38
Finishing lamp posts and sailing masts	39
Finishing tubes for sporting goods	39
Grinding nuclear tubes	39
Deburring and polishing machined parts	40
Welded stainless steel tube	40

### THE CONSUMABLES

Abrasive belts	41
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# THE SYSTEMS

Centreless grinding, finishing and polishing of tubes, round bar and other cylindrical parts

## INTRODUCTION

Centreless machines can grind and polish tube from approx. 3mm diameter to approximately 300mm diameter and from approx. 5mm to 30m long.

Centreless machines can remove several mm of material from the diameter of a tube or polish it to surface finishes below 4 CLA.

Sizes and finishes outside the above mentioned values may be possible but only with dedicated special design machines.



### Gritty says . . .

*SURTECH has the largest Abrasive Test Centre in the UK. Here you can carry out practical tests with your own parts. Call 0121 359 4322 to arrange a visit.*



### Gritty says . . .

*No single machine can handle the full diameter range or produce all the finishes.*

## Finishing Limits

Centreless grinding and polishing can achieve CLA values of 8 - 10 quite easily, even in a production environment. With correct machine settings and suitable consumables, 6 CLA is possible. With expert knowledge and good preparation work, 4 CLA is achievable. Finishes below 4 CLA require special abrasives.

Super-finishing machines and micro abrasives can produce finishes around 1 CLA.

## TUBE SIZES

Typical machine specifications are: From 3mm dia to 25mm. From 15mm dia to 50mm. From 25 mm to 150 mm. From 50mm to 200mm. From 75mm to 300mm. Draw up a list of requirements and ask for advice !

## MATERIALS

There are machines for most materials: steel, stainless, non-ferrous, titanium, aluminium, plastics, laminates, cardboard, wood, carbon fibre, hard chrome and many more.

Diamond belts can grind and polish materials previously too hard for traditional abrasive belts.

## SPEEDS

Large multihead installations can finish at a rate of up to 20m/min on some tubes. 3m/min to 7m/min is normal for standard machines.

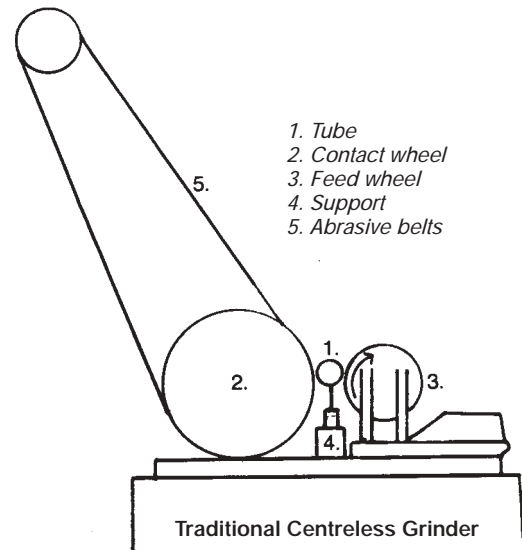
Centreless machines can be simple and manually operated or sophisticated, fully automated and PLC controlled.

## THE SYSTEMS

### TRADITIONAL CENTRELESS MACHINES WITH VERTICAL HEADS

For machine details see page 16

In Traditional Centreless Grinding machines the tube is loosely guided along a support between the contact wheel and the feed wheel. Contact pressure is applied on the side of the tube.



The components that make up a centreless machine with vertical abrasive belt heads.

### Centreless grinding explained

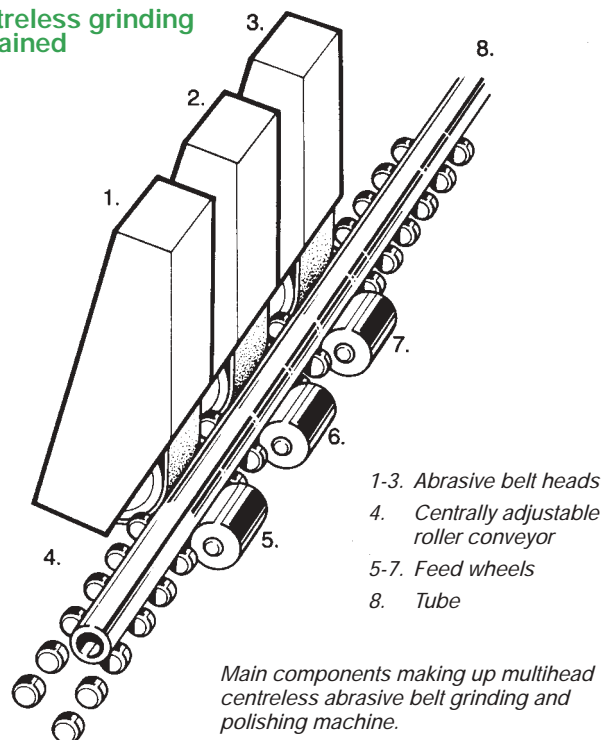
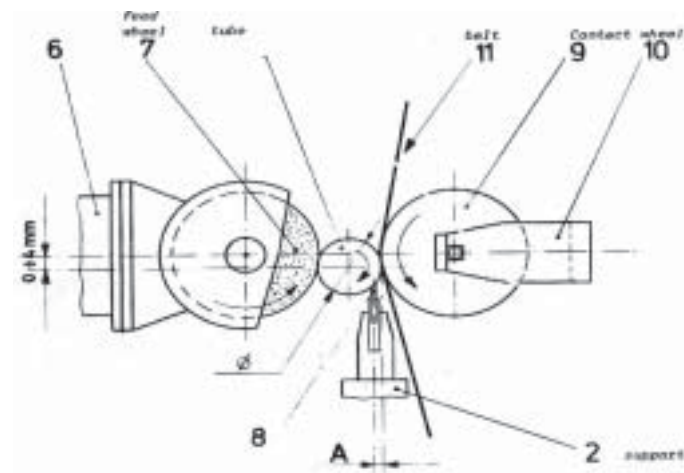


Diagram of a centreless machine with 3 vertical heads. The contact wheel always runs down. The feed wheel always runs up.



Ø mm	10	20	30	40	50	60	70	80
A mm	4	6	8	10	12	14	16	18

Diagram showing the configuration of contact wheel, support and feed wheel on a centreless machine with vertical head.

The support prevents the tube being pushed down between contact and feed wheel. It also acts as a brake to stop the tube spinning out of control. The figures at the bottom are the recommended settings for various tube diameters.

### Supports for centreless machines with vertical abrasive belt heads



#### Gritty says . . .

The support can be made of cast iron, leather or plastic. On smaller centreless machines the support is often a roll.

The support not only stops the tube from falling between the two wheels, but also acts as a brake, preventing the tube from spinning out of control.



Left: A tube support on a heavy duty centreless machine. With plastic blade and height setting via a handle at the front of machine.

Above: A tube support on a lightweight centreless machine. With plastic blade and manual height setting.

Setting the height and proximity of the support is crucial to a smooth centreless operation. The support must always be set as close as possible to the contact wheel to prevent the tube being dragged between the support and the contact wheel. The height of the support should be set so that an imaginary line from the centre of the contact wheel to the centre of the feed wheel passes through the top three-quarter of the tube diameter. In other words, the tube centre should always be below this line. Tubes which sit too low will be subject to excessive pressure, tubes which sit too high will jump out.

## THE SYSTEMS

### MODERN CENTRELESS MACHINES WITH HORIZONTAL HEADS

For machine details see page 17

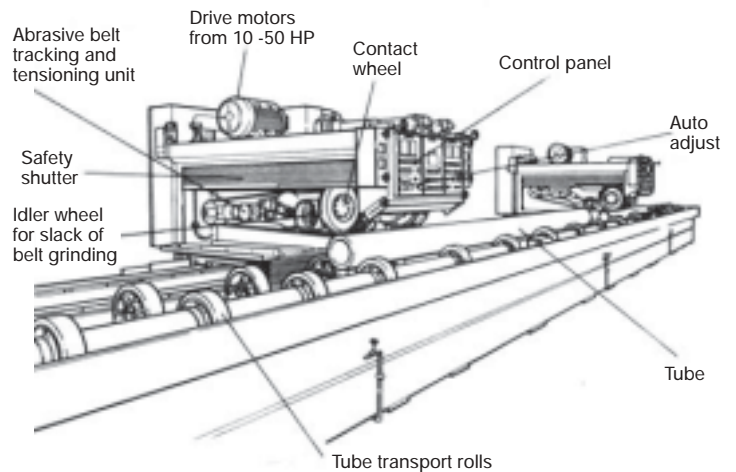


Diagram of a Modern Centreless machine with horizontal heads. There is no support as on Traditional vertical head machines. The tube sits on a roller conveyor and is driven by pinch rolls.

Contact pressure is applied to the top of the tube.

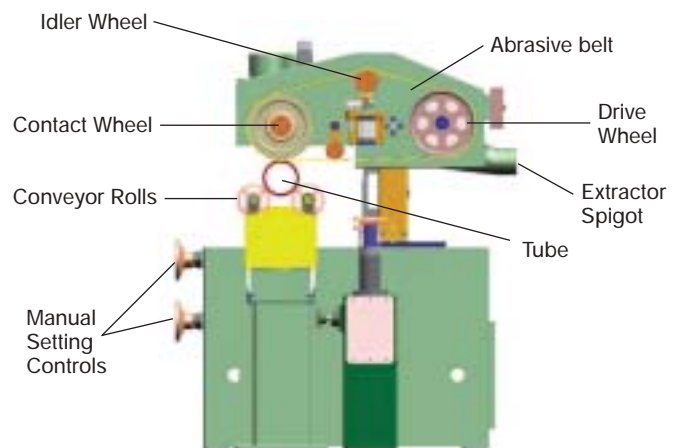


Diagram showing side view of a centreless machine with horizontal head. The tube sits on a roller conveyor and the contact pressure is applied to the top of the tube.

## THE SYSTEMS

### WHY MULTIHEAD?

Multihead machines increase capacity and reduce handling costs. Instead of having to feed tubes through a single head machine several times, changing the abrasive belt grit for each pass, you can feed tubes through the machine once only. In most cases, faster feed rates are possible.



A horizontal centreless machine with 4 abrasive belt heads, roller conveyor with pinch rolls and automatic loading and unloading.

Abrasive belt grinding and polishing is a series of step-by-step operations, each one finer than the previous until the required finish is achieved. How many passes are necessary depends on the surface condition of the tube before the finish required after polishing.

High stock removal rates are achieved with belt grits 40 to 60, medium stock removal rates with grits 80 to 120. Polishing buffs can start after abrasive belts 400. Plating quality from grit 360 and finer.



## Gritty says . . .

*It is not advisable to skip more than two belt grits. The stock removal rates necessary to remove weld beads and surface imperfections and then to end up with a mirror polished finish will typically need the following sequence:*

*Abrasive belt grit 60,  
Abrasive belt grit 120,  
Abrasive belt grit 180,  
Abrasive belt grit 240,  
Abrasive belt grit 320,  
Buffing with sisal and cutting compound  
Buffing with cotton and mirror polishing compound*

Similarly, to reduce rough ground bar for hydraulic rod, having a finish of approx 30 CLA, to the 8 – 10 CLA required for chrome plating would need at least three operations:

Abrasive belt grit 280 or 320,  
Abrasive belt grit 400 or 500,  
Abrasive belt grit 600 or cork belt.

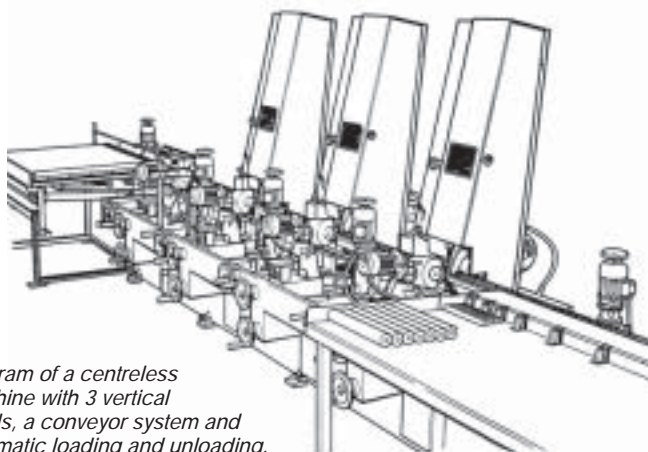
Because handling costs are a large part of total centreless polishing costs multihead installations with roller conveyors and automatic loading and unloading systems are strongly recommended.



*A single head centreless machine with vertical head and without a conveyor system.*



*A 6 head centreless machine with vertical heads and without a conveyor system.*



*Diagram of a centreless machine with 3 vertical heads, a conveyor system and automatic loading and unloading.*

## THE SYSTEMS

### WHY WET OPERATION?



## Gritty says . . .

*Wet operation abrasive belt grinding offers many advantages and should always be chosen wherever there are no compelling reasons against it.*

Wet operation helps the cutting action of the abrasive belt, reduces temperature and the danger of tube distortion, prolongs abrasive belt life, reduces noise, and takes care of dust. It also produces more consistent and finer finishes.

Dry operation grinding can increase stock removal rates, but in many cases this advantage cannot be exploited since the temperature produced causes tube distortion, preventing the use of full contact pressures. Dry operation also requires a dust extraction system and shortens the life of abrasive belts by premature clogging and by generating excessive heat.

Wet operation is even more important with multihead machines. The temperatures developed in traversing two or three heads are high enough to distort most tubes and their smooth and even transport becomes a problem.

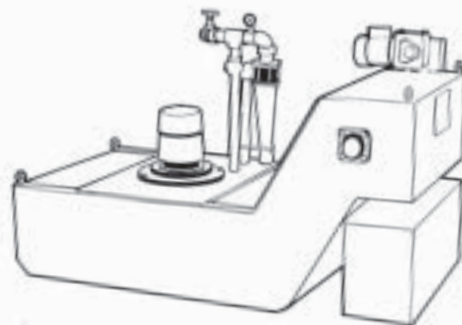
*Several coolant systems are available:*

### Sediment tank

This is simply a tank with three compartments. The water flows over dividing weirs, leaving heavier deposits behind which sink to the bottom. The tank has to be cleaned regularly. It is the simplest system, recommended for rough grinding but not for fine grinding since particles can be recirculated and cause marks on the tube.

### Hydrocyclone

In this system, dirty water is cleaned centrifugally. The heavier metal filings are extracted and the clean water recirculated. This method is considerably more efficient than using sediment tanks and is more suitable for fine grinding.



### Hydrocyclone coupled with paper filter

This is the ultimate system for very fine grinding. Water is first cleaned by the hydrocyclone and then again by passing through a paper filter. The paper filter, which comes as a roll, slowly advances, continuously replacing the media as it becomes clogged.



# THE SYSTEMS

## Longitudinal Polishing of tubes between centres

For machine details see page 18

### INTRODUCTION

Tubes are clamped between centres and rotate. One or several polishing heads with sisal or cotton buffs then travel up and down the length of the tubes and polish until the required finish is achieved.



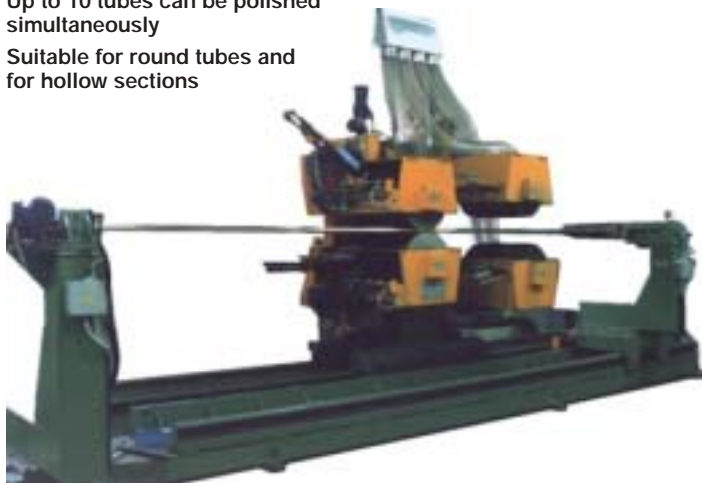
### Gritty says . . .

Longitudinal tube polishers are part of our dedicated machine range.

Before we can supply further details and prices we need to agree your requirements and a specification.

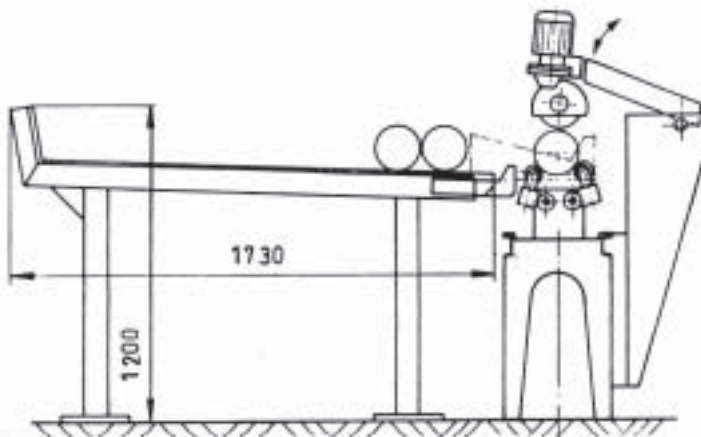
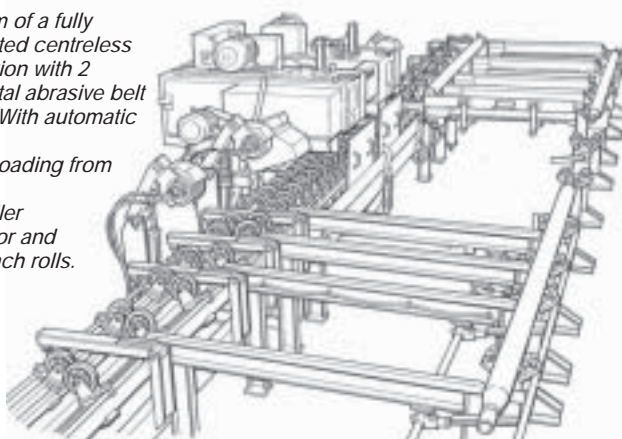
Up to 10 tubes can be polished simultaneously

Suitable for round tubes and for hollow sections

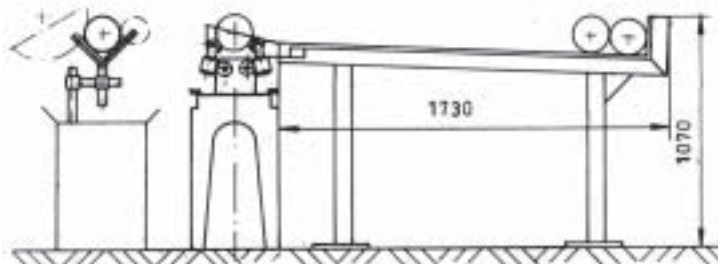


When it comes to mirror polishing the longitudinal system produces polishes far superior than those on centreless machines.

Diagram of a fully automated centreless installation with 2 horizontal abrasive belt heads. With automatic loading and unloading from tables. With roller conveyor and with pinch rolls.



Loading table



Unloading table

Diagram of an automatic loading table and an automatic unloading table.

Tubes are placed on the loading table. Tubes are separated and one tube at a time is lifted on to the roller conveyor. On the output side the polished tubes are lifted off the roller conveyor and on to the unloading table. Tube handling is as important as the grinding operation itself.

### THE SYSTEMS

### MAGAZINES

## THE SYSTEMS

### Accessories for Centreless Machines

### Automatic Handling for centreless machines with vertical and horizontal heads

Multihead abrasive belt machines of the type described above are operated on an automatic cycle. Bundles of tube are loaded into a magazine, separated along a loading table, automatically loaded onto the machine conveyor rollers, fed through the heads by pinch rolls, and automatically unloaded at the end.

The whole machine can be adjusted centrally from one diameter to another in minutes.

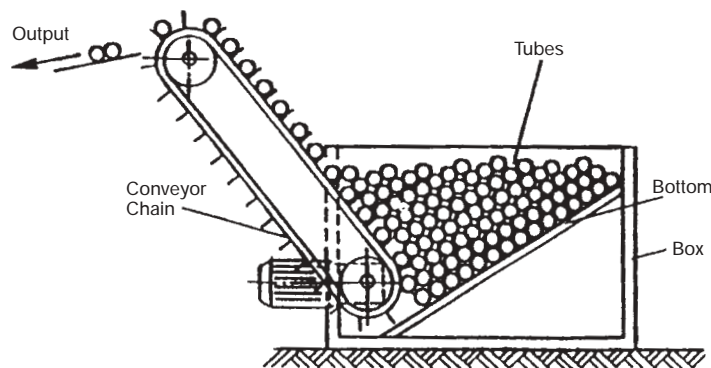


Diagram of an elevator magazine. Tubes are placed in a box connected to an elevator. The elevator has slots which will pick up the tubes and move them on the conveyor for transport through the machine.

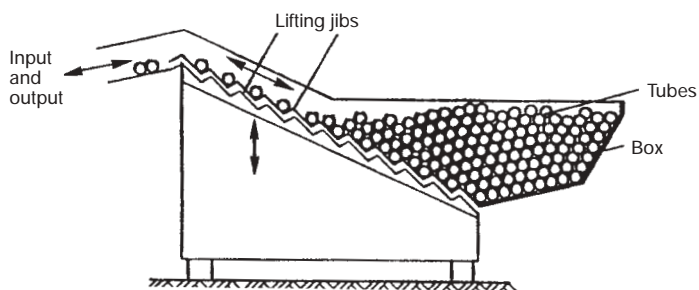


Diagram showing a variation on the elevator magazine design.

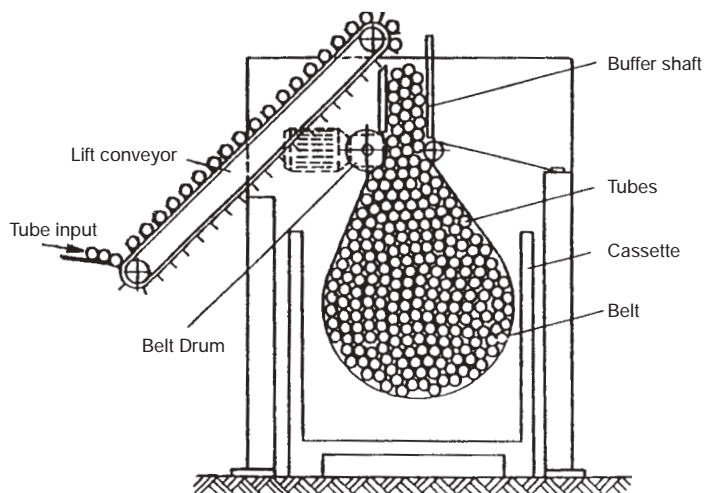


Diagram of a belt magazine. Tubes are lifted into position with belts. The belts are then tightened and the tubes moved on to the conveyor.

## THE SYSTEMS

### THE CONVEYOR

The conveyor is an important, but often underestimated, part of a centreless system. In it's most primitive form it consists of a V-shaped trough. More sophisticated conveyors have transport rollers.



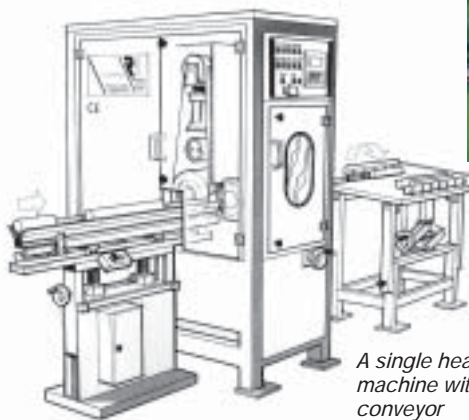
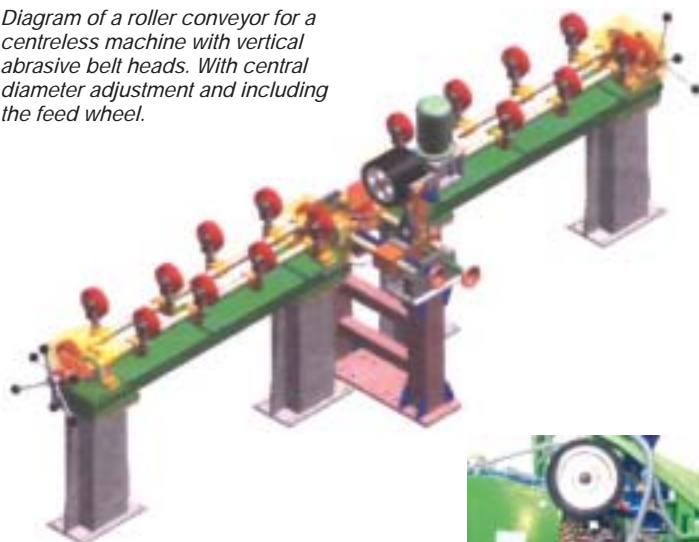
The purpose of the conveyor is to transport the tube through the abrasive head at a steady speed and in a straight line.

Whilst single head machines can run reasonably well with simple conveyors, multihead installations require more complicated systems - a series of opposing rollers, with a tyre of hard-wearing polyurethane, an automatic clamping and diameter adjustment system and a number of pinch rolls.

A conveyor with free running rollers is preferable to one with driven rollers because it reduces roller wear considerably and simplifies diameter adjustments. Modern conveyor systems allow fully-automated centreless grinding and polishing operations with automatic diameter adjustment.

Lighter and shorter tubes can be transported by a vibratory conveyor. It consists of a V-shaped channel lined with nylon brush material and a vibrator unit. By changing the frequency of the vibrator unit the feed rate can be slowed or increased.

Diagram of a roller conveyor for a centreless machine with vertical abrasive belt heads. With central diameter adjustment and including the feed wheel.



A tube roller conveyor with large rollers designed for tubes over 100mm dia and for heavy tubes.

A single head Centreless machine with vibratory conveyor

## THE SYSTEMS

### Polishing of tubes and rolls between centres and on bogeys

For machine details see page 18

Cylindrical parts, mostly rolls, which cannot be finished with the centreless system are ground and polished either between centres or on bogeys or on a combination of the two.

The difference of a dedicated roll grinder and an abrasive belt roll grinding machine is that with the dedicated roll grinder the roll reciprocates in front of the stationary grinding head and with the abrasive belt roll grinder the abrasive belt head traverses along the length of the stationary roll.

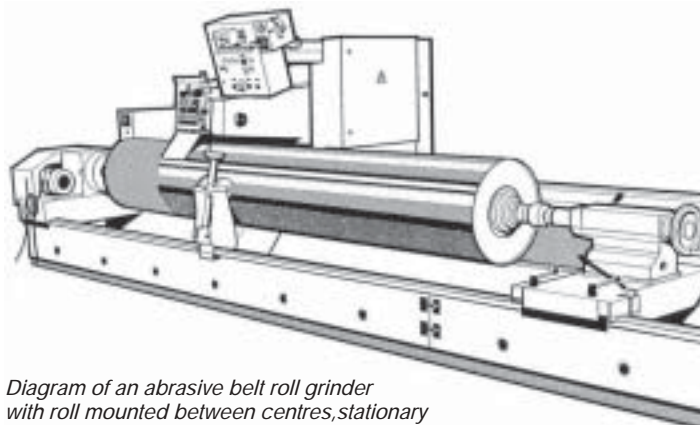
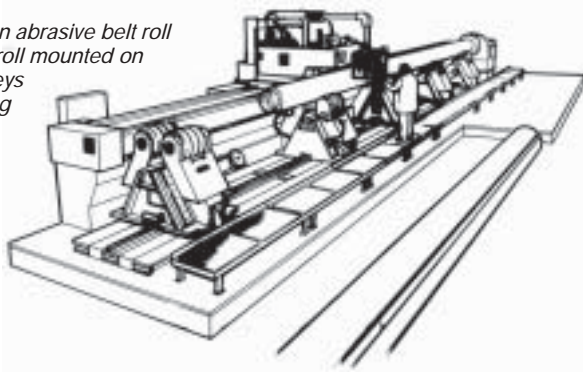


Diagram of an abrasive belt roll grinder with roll mounted between centres, stationary rotating roll and traversing abrasive belt head.



Diagram of an abrasive belt roll grinder with roll mounted on rotating bogeys and traversing abrasive belt head.



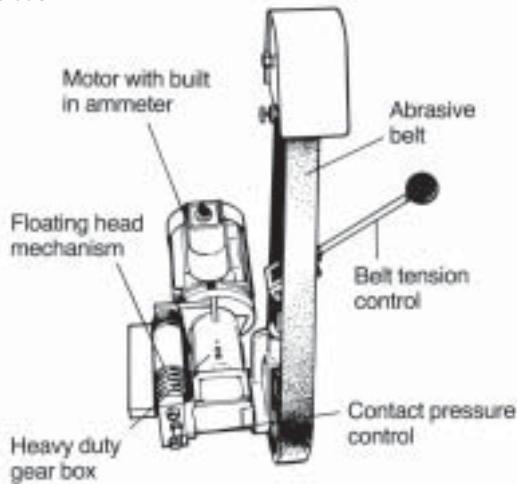
## THE SYSTEMS

### Toolpost Grinders

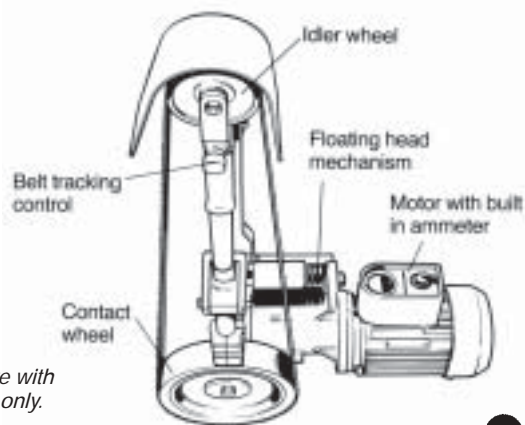
For machine details see pages 20 - 21

Abrasive belt tool post grinders can turn lathes into roll grinders by being mounted in the tool holder. There are models from 3 hp to 15 hp and abrasive belt widths from 50mm to 100mm.

Abrasive belt tool post grinders are available with fixed or floating heads. The floating head models will apply constant contact pressures even to out of round rolls. All models are optionally available for dry or wet operation.



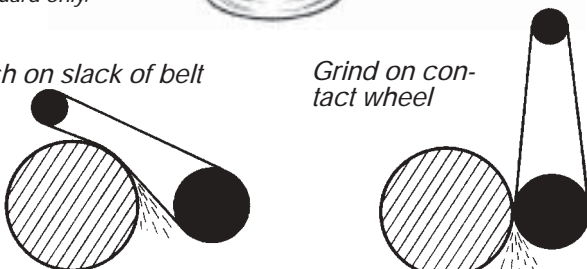
Front view. Shown here with part guard only.



Side view.  
Shown here with  
part guard only.

Polish on slack of belt

Grind on contact wheel



Abrasive belt tool post grinders can be used on the contact wheel for aggressive stock removal or the slack of belt for fine finishing.

## THE SYSTEMS

### Planetary tube finishing Orbital tube finishing

#### INTRODUCTION

With both planetary and orbital tube finishing machines, the tube does not rotate. Both have two opposing abrasive belt heads which rotate around the tube.

Planetary machines are available with abrasive belt heads only, orbital machines are available with belts or brushes.

Planetary machines can finish straight and bent tube, orbital machines can only finish straight tube.

Planetary machines are small and designed for use by fabricators, tube manipulators, balustrade manufacturers, etc.

Orbital machines are large and designed for use by tube mills and large stockholders.

#### THE SYSTEMS

#### PLANETARY TUBE FINISHING

For machine details see pages 22 - 25

See pages .....

Bent tubes are manually fed through the machine in both directions.

For straight tubes an optional motorised feed unit can be mounted on the machine. It consists of a motor and two feed pressure rollers on the input and on the output side.

These feed units can be connected to a limit switch and a timer for fully automated operation.

The feed units can be moved out of the way when bent tubes are polished.

With the planetary system the tube does not rotate. It only moves in a straight line through the abrasive belt head which consists of two abrasive belts which rotate around the tube.

Planetary machines can polish straight tubes but are particularly well suited for bent tube.



Close up of the automatic feed unit

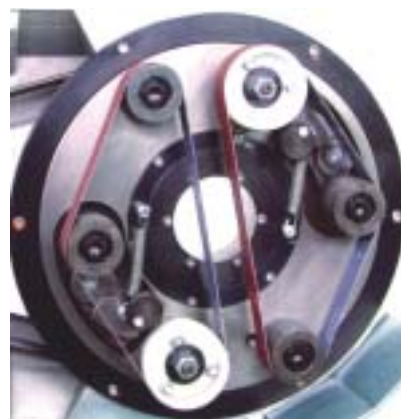


Photo showing the two abrasive belts mounted on a disc with the hole for the tube.



## THE SYSTEMS

### ORBITAL TUBE FINISHING

*For machine details see pages 17 - 18*

With orbital machines tubes and bars do not rotate. Instead two abrasive belts rotate around the tubes and bars which are fed through the machine in a straight line.

Orbital machines are typically installed in line with tube and bar manufacturing machines.



*An abrasive belt orbital tube finishing line*



*A brush orbital tube finishing machine, including extractor*



### Gritty says . . .

*Orbital tube finishing machines are part of our dedicated machine range.*

*Before we can supply further details and prices we need to agree your requirements and a specification.*

## THE SYSTEMS

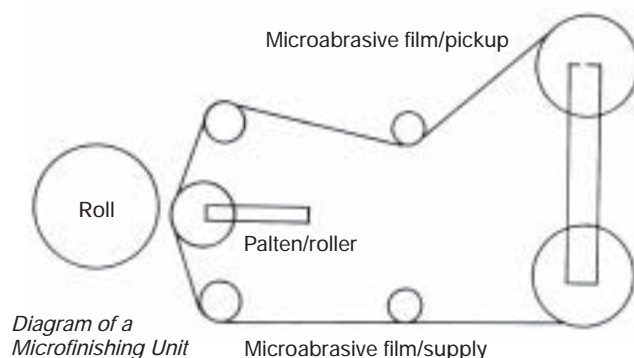
### Microfinishing

*For machine details see page 19*



### Gritty says . . .

*Microfinishing units are mounted on tool posts of lathes to turn them into microfinishing roll grinders.*

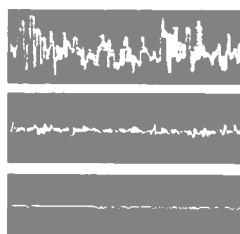


It works roughly like a traditional typewriter. A new roll of microfinishing film is mounted on the top roller. The film then runs via idler rolls over a contact platen and on to the bottom roller.

A pneumatic cylinder controls the contact pressure and an eccentric drive controls the oscillation with variable amplitude.



*Rolls of Microfinishing film.*



**UNIFORM  
REPEATABLE  
PREDICTABLE  
FINISHES FROM  
60 CLA TO 0.5 CLA**

## THE SYSTEMS

### Blending of weld beads

*For machine details see page 30*



*This abrasive belt head blends welds on welded tube by oscillating across the weld. The tube does not rotate.*

## THE SYSTEMS

### Manual finishing of tubes with portable abrasive power tools

For machine details see pages 31 - 33



A simple manual electric tube polishing tool with a drive wheel and an idler wheel. It works on the slack of belt. The tube wrap around is minimal but still very effective.



A dedicated manual electric tube polishing tool with a drive wheel and two spring loaded arms with idler wheels.

This tool also works on the slack of belt but the wrap around is around 50% of the tube diameter.

## THE SYSTEMS

### Tube Notching

For machine details see pages 26 - 28



The working end of a tube notcher.

The tube is held in the vice.

The cutting angle and the depth of cut are set.

The notching angle and depth are then controlled by the handle on the front of the machine.

The vice can be moved across the width of the abrasive belt to make sure of using the full width of the belt.

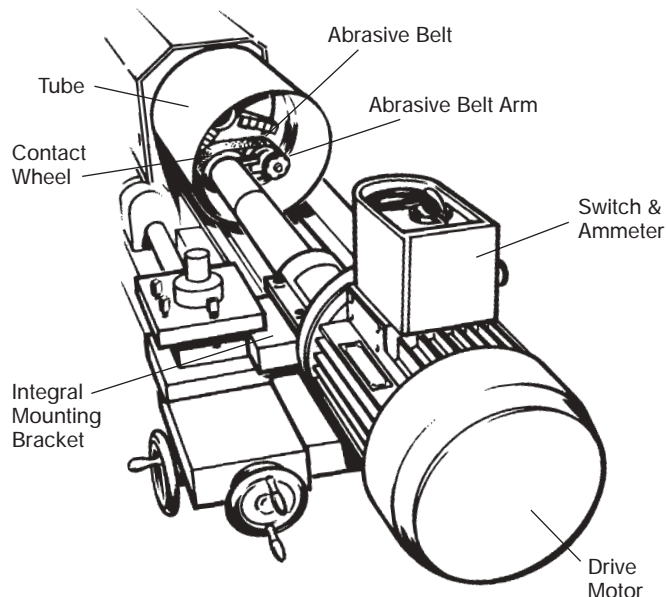


## THE SYSTEMS

### Internal tube grinding and polishing

#### Convert your Lathe to an INTERNAL GRINDER

For machine details see page 33



#### LEH INTERNAL GRINDING HEADS

Abrasive belt head fits into most tool posts of lathes and can be used for internal grinding, deburring and polishing.

Gear motor, 420 V, 3 phase • Extension shaft • Clamping bar • Built in ammeter • Abrasive belt arm with tensioning and tracking controls.

The machine does not have an overload control. The motor is designed to withstand high contact pressures.

These machines are recommended for internal work only and therefore supplied without guards.

## THE SYSTEMS

### Tube End Deburring

For machine details see page 34

Tube end deburring machines work with wire wheels or abrasive brushes. The tube is manually pushed against the wire wheel and rotated. The support can be set for deburring OD only or ID only or both simultaneously.



With V-guide support for deburring internal and external tube ends





## THE SYSTEMS

### Automatic Tube and Bar Cutting

*For machine details  
see pages 35 - 36*



*This photo shows a typical tube and bar cutting machine. With infeed and outfeed conveyors, clamping system and abrasive blade cutting head.*

Machines with semi or fully automated operation are available, as well as models operating dry or wet.

Cutting blades are between 450 and 800mm diameter. Cutting head drive motors are between 18,5 kw and 90 kw. A powerful drive motor is essential for a clean, cool, fast cut without a burr.

With too little power, the abrasive blade will deflect and the cut will not be square. The cutting action will also be slower with the danger of overheating the tube or bar.



*Chromed bars cut to length  
without burrs.*

## THE SYSTEMS

### Alloy Bar Grinding

*For machine details  
see page 37*



*A fully automated tube and bar OD grinding machine.*

*With automatic loading and unloading, automatic throughfeed, automatic grinding and wheel ear compensation.*



*The OD grinding head and carriage inside the enclosure*

## THE SYSTEMS

### Manual Tube and Bar Cutting

*For machine details see page 34*

Manual tube and bar cutting machines consist of a vice, adjustable to various sizes, variable cutting angle settings and an abrasive belt cutting head.

A handle on the cutting head allows the operator to apply very slow and light, or very fast and high cutting pressure.



We can offer several abrasive blade cutting machines.

Abrasive cutting  
blade dia: 350 - 500mm  
Drive motor: 5 kw - 18.5 kw  
Cutting speed: 80 m/sec  
For max tube dia: 180mm

All machines can also cut bar and hollow sections.

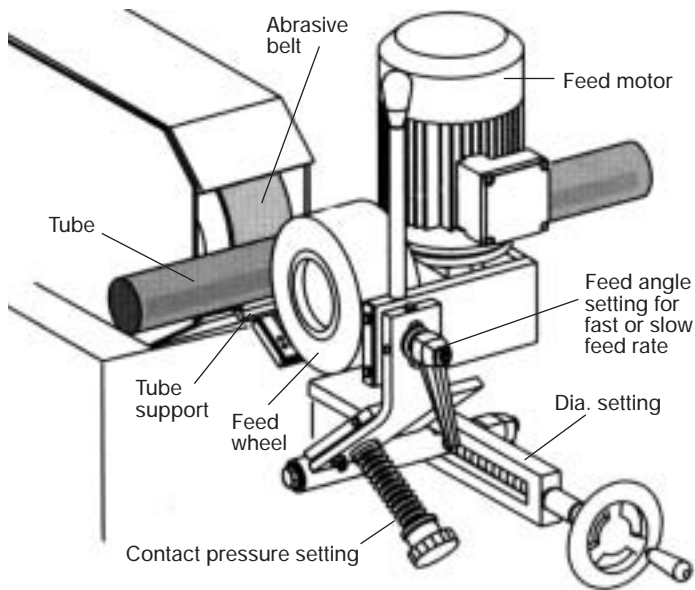
# THE MACHINES

## Centreless Grinding, Finishing and Polishing of tubes, round bar and other cylindrical parts

### INTRODUCTION

The previous section explained the many systems for polishing tubes. This section concentrates on individual machine models from simple, single head budget machines, to fully automated multihead installations with handling equipment.

### THE MACHINES CENTRELESS



*Diagram of a simple, low cost centreless machine.*

Contact wheel and abrasive belt are at the rear and the feed wheel in the opposite position.

At the front are diameter controls and contact pressure controls. Between the contact wheel and the feed wheel is the tube support which can be set in height according to the tube diameter.

Although the basic configuration of centreless machines never changes, many design details do vary, dependent on the size of tube, the finish required, the tube material and the production rate.

### Model 604 BC Single head buffing machine

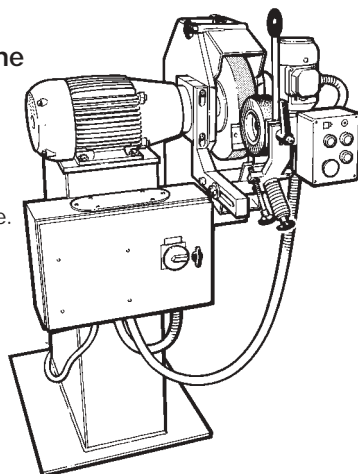
This machine is based on Model 504 BC abrasive belt machine but has a buffing head instead of an abrasive belt head.

All other specifications are the same.

Model 604 BC can be used with polishing buffs, abrasive wheels or nylon wheels.

The machine is built to special order only. In most cases the abrasive belt version 504 BC can produce the required finish with abrasive belts, engineered belts or cotton polishing belts.

Made to order only.



### Gritty says . . .

*Even the cheapest Centreless machine consists of the same basic controls as the most expensive.*

### Model 128 S

**With One, two or more abrasive belt heads.**

**Dry or wet operation.**

The wet operation is recommended to cool tubes which would get very hot in a two head dry system.

With coolant tank and spray nozzles.

With optional stainless steel hinges, stainless steel coolant tray and larger coolant tank with paper filter.

For long (approx. 1000mm+) and heavy tubes (approx 10 kg+) it may be necessary to fit a roller conveyor and driven pinch rollers.

For shorter and lighter tubes a simple V-channel is usually sufficient.



*Model 128 DL with 2 heads*



*You can connect several machines. This one has six heads.*

### TECHNICAL SPECIFICATIONS

Belt motor:	2.6/3.3kw, two speed, 400V, 3 phase
Drive motor:	0.1kw, variable speed
Abrasive belt size:	2000mm x 75mm
Contact wheel:	200mm dia x 75mm wide
Machine dimensions:	Approx. 1450mm high x 1500mm deep x 600mm wide
Machine weight:	Approx. 140kg

Wet operation machines do not need a dust extractor.

For dry operation machines we can offer a number of dry or wet dust extractors.



*Lowest ever price for a multi-purpose machine*

## THE FABRICATOR'S ABRASIVE BELT GRINDER

**Changes from Belt Grinder to  
Tube Finisher in minutes!**



### **Abrasive Belt Grinder**

#### **Model BSM 75**

With 2000mm x 75mm belt size. 3 kW motor, 400V, 3 phase.

#### **Model BSM150**

With 2000mm x 150mm belt size. 3 kW motor, 400V, 3 phase.

Both models with adjustable working height, rear dust extraction flange, front spark box, top flatbed platen.



### **Centreless Attachment**

#### **Model RSE 150**

Belts on to Models BSM 75 and BSM 150 in minutes.

Turns belt grinders into tube finishers.  
0.25 kW, 400V, 3 phase motor.  
150mm OD x 40mm wide drive wheel.  
Separate socket.



### **Tube Finisher**

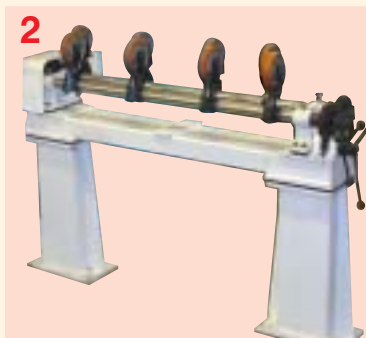
#### **Model BSM-RSE**

Based on either Model BSM 75 or BSM 150.

Will grind, finish and polish tubes from 10mm to 100mm diameter.  
Variable feed speed.  
Adjustable contact pressure.  
Max tube weight approx 10 kg without conveyoy system. Over 10 kg with suitable conveyor system.

### **OPTIONAL EXTRAS**

- 1 Infeed and outfeed tube supports
- 2 Roller Conveyor systems and dedicated conveyor systems
- 4 Bolt on dust extractor for small amounts of non-hazardous dust
- 5 Stand alone dust extractors for large amounts of dust

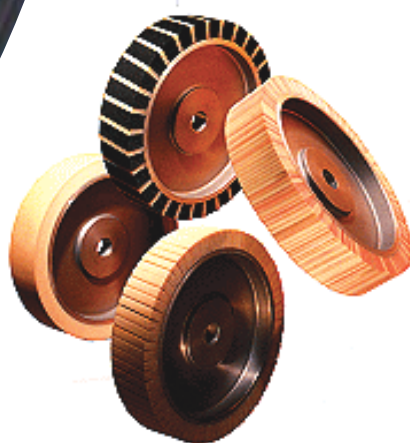


## **MODEL 504 BC CENTRELESS ABRASIVE BELT GRINDER**

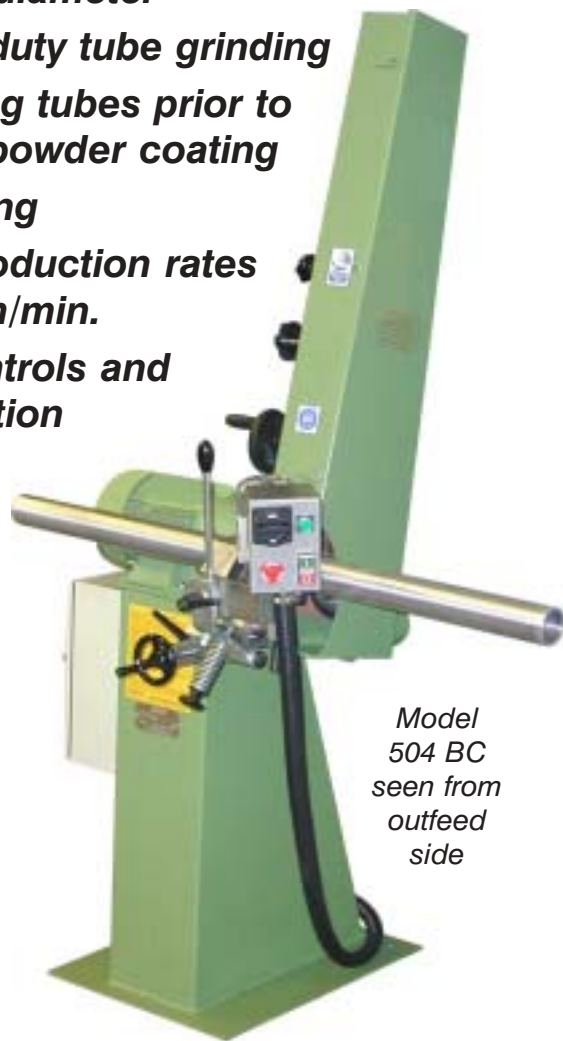
- For grinding and finishing of parallel and tapered tube and bar from 3mm to 100mm diameter
- For heavy duty tube grinding
- For finishing tubes prior to plating or powder coating
- For polishing
- For fast production rates of up to 5m/min.
- Simple controls and safe operation



*Model 504 BC seen from infeed side*



*Optional special contact wheels*



*Model 504 BC seen from outfeed side*



*Optional tube conveyors*



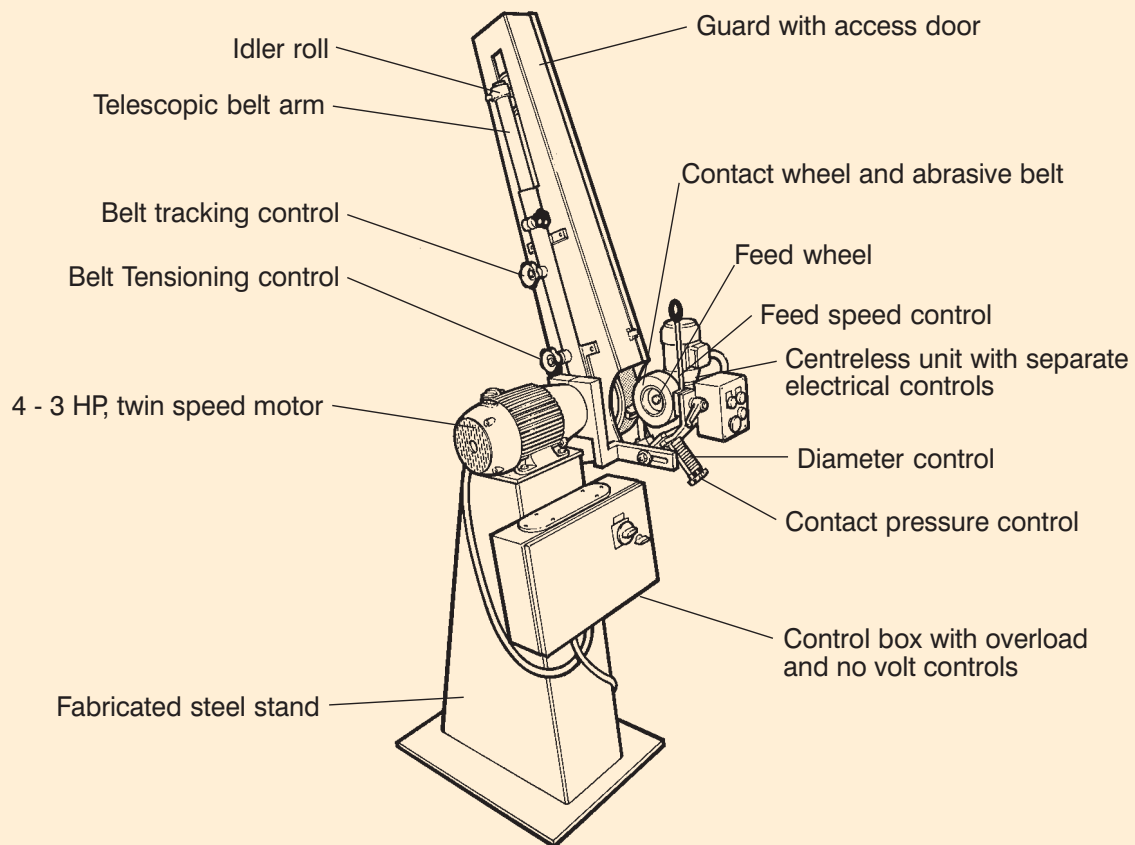
*Optional tube guides*



*Optional bolt on or stand alone dust extractors*



## Model 504 BC CENTRELESS ABRASIVE BELT GRINDER



Model 504 BC is a low cost centreless tube and bar grinding machine suitable for batch production use. It has all controls found on larger machines, but it is limited to dry operation and one abrasive belt head only.

### APPLICATIONS

- Parallel and tapered tube and bar, hydraulic and pneumatic pistons, needles, stainless steel tubes, non ferrous tubes, wood & plastics, rods, etc.
- Heavy duty grinding with high stock removal rates.
- Fine finishing to 4 CLA and below.
- Mirror polishing.

### FEATURES

415/420V, 3PH, 50Hz electric motor, 4-3 HP, twin speed.  
Abrasive belt: 75mm x 2500mm  
Contact wheel: 250mm dia x 75mm wide  
Diameter range: 3 -100mm  
Feed rate: 0-5m/min  
Extraction flange.

### OPTIONAL EXTRAS

- Range of contact wheels for heavy grinding to fine finishing.
- Built in dust extractor.
- Stand alone dust extractors.
- Supports for small or short tubes.
- Large range of dedicated tube conveyor systems.

### CONSUMABLES

- Abrasive belts from grit 36 to grit 600.
- Structured abrasive belts for polishing prior to plating and powder coating.
- Non woven polishing belts for mirror finishing.
- Cork belts for polishing.
- Nylon belts for satin finishing.

# THE MACHINES

## Traditional Centreless Tube Grinding and Polishing Machines

Traditional machines have vertical abrasive belt heads. Both belt head and feed wheel move in a horizontal direction for setting tube diameter and contact pressure. A support strip between the contact wheel and the feed wheel prevents tubes from falling through.

### Model Range ST CENTRELESS TUBE GRINDING AND POLISHING MACHINES WITH ABRASIVE BELTS

- Single or multi head.
- Wet operation.
- Also available fully enclosed.
- Optional tube conveyor system
- Optional automatic loading and unloading.

Belt size: 200 x 3,500mm  
Max feed speed: 7m/min  
Min/max tube dia: 6 - 110mm  
Motors: 5.5 or 7.5 kW.



*Complete with coolant tank.*

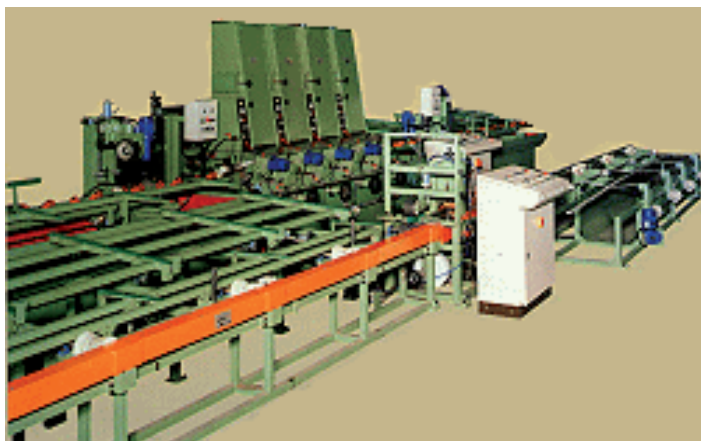


*Fully enclosed machine with automatic feeder magazine*



*Side view with vertical belt head, contact wheel and feed wheel.*

### Model Range STP CENTRELESS TUBE GRINDING AND POLISHING MACHINES WITH ABRASIVE BELTS AND BUFFS



*A centreless tube finishing machine with four heads, tube conveyor system and load and unload tables.*



*Centreless tube finishing machine with two vertical abrasive belt heads*

- Single or multi head.
- Dry or wet operation.
- Contact wheels can be replaced by polishing buffs.
- Also available fully enclosed.
- Optional tube conveyor system.
- Optional automatic loading and unloading.

Belt size: 200 x 3,500mm  
Max feed speed: 7m/min  
Min/max tube dia: 6 - 100mm  
Motor: 7.5 kW.

### Model Range PT CENTRELESS TUBE POLISHING MACHINE WITH BUFFS



*Centreless tube polishing machine for use with cotton or sisal polishing buffs*

- Single or multi head.
- Dry operation.
- Also available fully enclosed.
- Optional tube conveyor system.
- Optional automatic loading and unloading.

Buff size: 400 x 200mm  
Min/max tube dia: 6 - 110mm  
Motor: 7.5 kW.



# THE MACHINES

## Modern Centreless Tube Grinding and Polishing Machines

Modern machines have horizontal abrasive belt heads. There are no tube supports and no feed wheels. The contact wheel sits on top of the tube.

### Model Range STO TUBE GRINDING AND POLISHING MACHINES WITH HORIZONTAL BELT HEADS OR BUFFS



*A multi head STO model, fully enclosed, with automatic loading and unloading, large roller conveyor and pinch rolls.*

- Mostly multi head
- Wet operation
- Usually supplied fully enclosed
- With automatic loading and unloading and automatic conveyor system

STO are extra heavy duty tube grinding and finishing machines for multi shift work.

Belt size: 220 x 4,000mm  
Max feed speed: 10m/min  
Min/max tube dia: Up to 300mm  
Motors: 11 to 21 kW.  
Contact wheels: 400mm dia x 220mm wide  
Polishing buffs: 400mm dia x 300mm wide  
Motors for polishing buff heads: 15 kW.

# THE MACHINES

## Orbital Tube Grinding and Finishing Machines

With orbital machines the tube does not rotate. Instead brushes or belts rotate around the tube. Smaller machines are used for finishing bent tube.

### Model Range PLS TUBE FINISHING MACHINES WITH ORBITAL BRUSH HEADS



*A line of orbital tube finishing machines.*

- Single or multi head
- Dry operation
- Optional tube conveyor systems

Orbital brush machines are not suitable for stock removal but are excellent for finishing.

The feed speeds are considerably higher than with centreless machines and depend on the width of the abrasive brush.

Three models are available:

**PLS 300**  
Brush dia x length: 300 x 300mm  
Max feed speed: 20 m/min  
Min/ max tube diameters:  
6 - 114mm or 12 x 220mm  
Motors: 2 x 3 kW.

**PLS 600**  
Brush dia x length: 300 x 600mm  
Max feed speed: 40 m/min  
Min/ max tube diameters:  
6 - 114mm or 12 x 220mm  
Motors: 2 x 5.5 kW.

**PLS 1200**  
Brush dia x length: 300 x 1200mm  
Max feed speed: 90 m/min  
Min/ max tube diameters:  
20 x 160mm  
Motors: 2 x 11 kW.



*Close up of an orbital brush head. With two abrasive brushes which both rotate around the tube. The tube is fed through the hole between the brushes.*

## Model Range PLN TUBE FINISHING MACHINE WITH ORBITAL BELT HEADS

- Single or multi head
- Dry operation
- Optional tube conveyor system

Three models are available:

### PLN 120

Belt size: 150 x 2500mm  
Max feed speed: 20 m/min  
Max tube dia: 110mm  
Motors: 2 x 5.5 kW.

### PLN 200

Belt size: 200 x 3000mm  
Max feed speed: 20 m/min  
Max tube dia: 160mm  
Motors: 2 x 7.5 kW.

### PLN 400

Belt size: 200 x 3000mm  
Max feed speed: 10 m/min  
Max tube dia: 380mm  
Motors: 2 x 13 kW.



*Orbital belt machines*

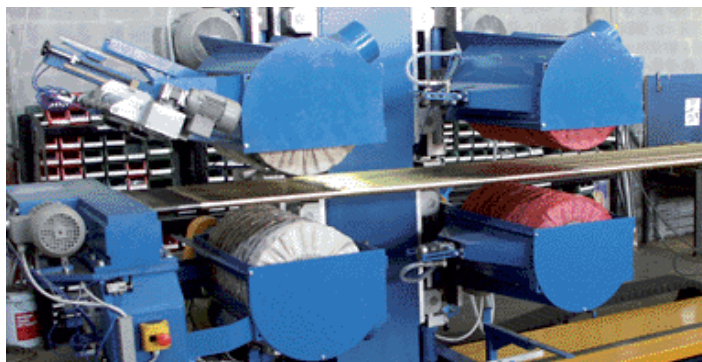


*Close up of an orbital abrasive belt head. Both belts rotate around the tube.*

## Model Range STL LONGITUDINAL TUBE MIRROR POLISHING MACHINE

These machines polish down the length of the tube while it is slowly rotating. The result is a mirror polish that is better than that achieved with a traditional centreless machine.

You can use either cotton or sisal buffs or a combination of both. There are several sizes of machines with capacities up to 10 tubes. The machine can also be used for square tubes.



*Model STL with a twin cotton buff and a twin sisal buff head and automatic polishing compo applicator.*

Buff size: 500 x 600mm  
Min/max tube dia: 20 - 80mm

## THE MACHINES Roll Grinding & Polishing Machine

### Model LC

#### Roll Grinding & Polishing Machine



An extra heavy duty roll grinder for roll diameters from 150mm to 1,000mm and lengths from 1,500mm to 12,000mm. Weight capacity up to 12,000 kg.

Depending on sizes, rolls can be mounted between centres or on bogeys. One or several grinding or polishing heads then travel up and down the length of the roll.

Abrasive belts are 110mm wide x 4,000mm long. Polishing buffs are 400mm dia x 200mm wide.

## THE MACHINES Grinding between centres Roll Grinding Grinding on Bogeys Longitudinal Polishing of tubes

### Model SO with support on bogeys



Support on bogeys is recommended for extra large cylindrical parts. Diameters up to 1200mm and lengths up to and over 10m are possible.

The horizontal abrasive belt heads have motors from 25 KW to 50 KW.

Diameters from 200mm to 1,200mm  
Lengths from 3,000mm to 12,000mm

Max. weight capacity: 20 tonnes

Abrasive belt drive: 55 KW

Abrasive belt dimension: 150mm wide x 5,000mm long

Abrasive belt speed: 30 m/sec

Contact wheel size: 400mm dia x 150mm wide



## CENTRELESS GRINDING - Some common operational faults and their cures

### COMPONENT REVOLVES TOO FAST

The tube support, contact wheel and feed wheel are not set up correctly. The support not only prevents the tube from falling down but also acts as a brake. The feed wheel also acts as a brake but only if sufficient contact pressure is applied. The abrasive belt, the support and the feed wheel must be clean and not contaminated with oil.

*Clean the tube before feeding it through the machine.*

### COMPONENT LIFTS FROM TRANSPORT ROLLERS

The support is too high.

*Adjust the support so that the tube centre is below the line between the centre of the feed wheel and the centre of the contact wheel.*

### THE FINISH IS UNEVEN AND WITH SCRATCH MARKS

The abrasive belt is worn and some metal slivers are embedded in the support.

*Fit new belt and clean the support.*

### TUBES END UP WITH A SPIRAL FINISH

1. The contact wheel edges are too square and possibly slightly raised.

*Put a radius on both edges of the contact wheel with a piece of abrasive cloth.*

2. The abrasive belt is not used across its full width and a few mm on edge side remain unused.

*Blunt the belt edges with a flint stone or an old file.*

3. The feed wheel is not parallel with the contact wheel and either the leading or trailing edge is too close to the contact wheel.

*Re-set the feed wheel.*

### THE ABRASIVE BELT WANDERS IN THE DIRECTION OF THE PART

The abrasive belt tensioning is too low or the belt has stretched.

*Increase tension and set tracking.*

### THE PART IS BEING SLIGHTLY TAPERED AT THE ENDS

The tube does not run straight and enters and exits at an angle.

*Make sure the tube runs perfectly straight. If necessary fit outriggers.*

### THE TUBE IS PULLED DOWN BETWEEN SUPPORT AND CONTACT WHEEL

The gap is too large. Set the support as close to the contact wheel as possible. The support is not clamped.

*Tighten it so it cannot move.*



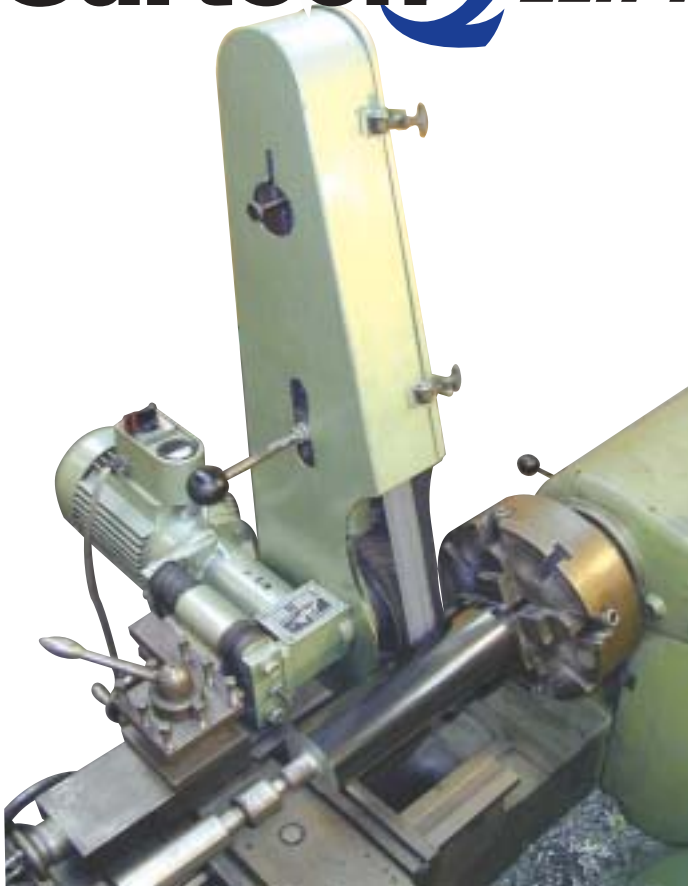
### Gritty says . . .

*Traditional centreless polishing machines with sisal and cotton buffs are no longer used as much as in the past.*

*Modern abrasive belt centreless machines have 400mm dia contact wheels which can be exchanged for buffs and brushes.*

*Advances in abrasive belt technology have produced belts capable of finishes very close to a commercial mirror finish which is just below a full no. 8.*

# Surtech **LEH ROLL GRINDING HEADS**



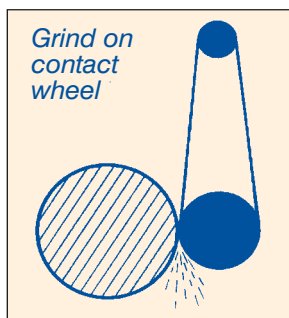
## Convert your LATHE to a ROLL GRINDER

### ABRASIVE BELTS CUT FASTER AND FINISH FINER!

The LEH abrasive-belt head can be mounted on the tool post of almost any lathe to convert it to a versatile and inexpensive tool-post roll grinder. It can also be fitted to abrasive-wheel roll or tube grinders to provide the greater efficiency and finer finish of belt grinding.

The LEH is primarily intended for coarse grinding with high stock removal rates and for finishing and polishing. It is used by many major manufacturers of rolls for the textile and paper industries, as well as hard chrome platers and hydraulic piston manufacturers.

When used for grinding, on the contact wheel, it is capable of the same tolerances on diameter, ovality and parallelism as the lathe and its operator, working to accepted good practice of constant measuring and localised grinding.



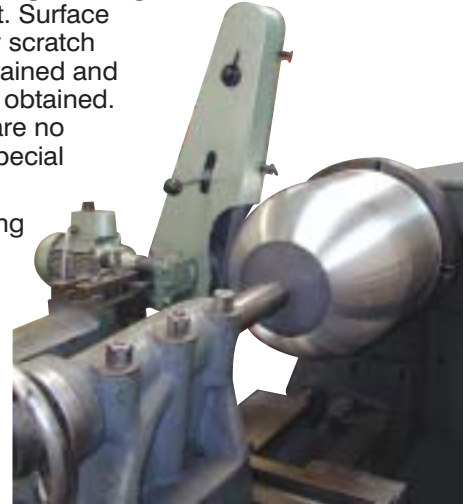
## APPLICATIONS, FINISHES

The LEH abrasive-belt grinder can be used to grind or polish rolls or tubes in a variety of materials including steel, iron, copper, aluminium, plastics and rubber.

Any required standard of surface finish can be produced using an appropriate grade of grit on the slack of the belt. Surface finishes from heavy scratch patterns to finely grained and satinised are easily obtained. Polished surfaces are no problem with our special polishing belts.

Slack-of-belt grinding will, with the appropriate grade of grit, give you any finish required prior to chrome plating, down to approx 6 CLA.

Finishes to 4 CLA and below will need our special Superfinishing or Microabrasive belts. Extremely fine finishes to below 1 CLA will need the Microfinisher. *Please ask for details.*



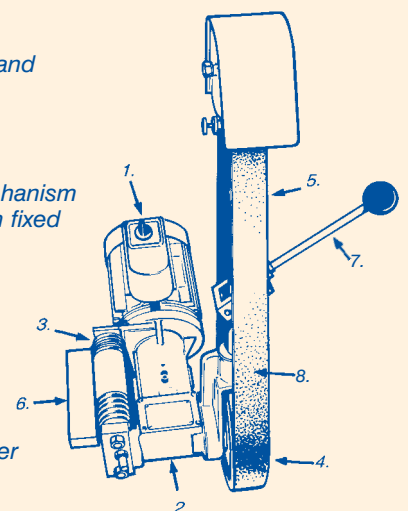
## BENEFITS

The LEH Lathe Conversion Roll-Grinder offers significant advantages. Here are a few:

- It is the simplest *reliable* way of gaining the versatility of abrasive-belt roll grinding.
- It is specially designed and developed for roll grinding - not a modified standard head.
- It can be fitted with an optional Floating Head to handle out-of-round components.
- Floating Head grinding by contact wheel improves operation cycles by more than 50% compared with slack-of-belt grinding - more effective AND more economical.

### Front View

1. Motor with switch and ammeter
2. Gear Box
3. Floating head mechanism (also available with fixed head)
4. Contact wheel
5. Abrasive belt arm
6. Fixing bracket
7. Belt tensioning lever
8. Abrasive belt





## FEATURES

The LEH abrasive-belt head consists of a contact wheel mounted to a belt-arm assembly which provides belt tracking and tensioning control. Electric drive is built-in, and the whole assembly is easily fitted to most lathe tool-posts.

### Abrasive Belt Arm

An integral, solid, mounting bracket automatically and accurately positions the contact wheel on the roll or tube's centre-line. The belt arm, mounted vertically to save space, can be swivelled through 180°, which facilitates grinding with the slack of the belt as well as on the contact wheel. The arm is fully adjustable to give control of belt tension and belt tracking.

### Fixed or Floating Head

The standard LEH belt grinder has a fixed head. For grinding out-of-round rolls, a floating head is needed. It will also avoid the risk of 'hot spots'. (Hot spots are caused by a fixed head putting greater pressure on the highest part of the circumference of an out-of-round roll and causing localised expansion of the roll, with consequent increased metal removal in that area. This can lead to serious tolerance discrepancies on cooling).

The optional LEH floating head, with adjustable spring pressure control, follows the contours of the roll whilst still maintaining an even contact pressure. As the head can also be fixed when required, it greatly increases the versatility of an already-economical belt grinding conversion.

### Drive Unit

The power-train is a compact arrangement of a totally-enclosed electric motor coupled to the contact wheel through a heavy-duty right-angled gear box. A particular feature of the design is its minimum width, allowing longer rolls or tubes to be handled. An integral ammeter provides operator-control of grinding pressures.

### Contact Wheel

Abrasive-belt performance is heavily influenced by the grade of contact wheel fitted. We have a wide range of contact wheels available, whether for heavy stock removal, general-purpose grinding, or fine finishing.

### Dust Extraction, Wet Operation

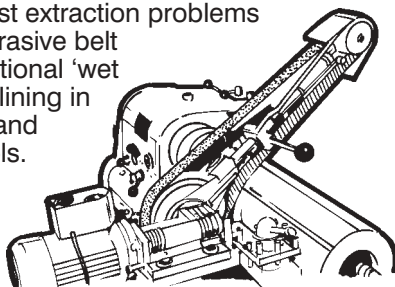
All abrasive belt grinders create dust. Dust can be hazardous, harmful and even dangerous.

All abrasive belt grinders must therefore be connected to a suitable dust collector.

As the unit travels it is necessary to fit flexible ducting which travels with the abrasive belt head. Some dusts are more hazardous than others and require special extraction equipment. Never connect an abrasive belt grinder to a dust extractor unless you have taken expert advice that it is suitable for the materials you wish to grind. If in doubt ask! Surtech can give advice on the various methods of dust collection.

One way of overcoming dust extraction problems is to grind wet. The LEH abrasive belt heads are available with optional 'wet pack' including waterproof lining in guard, waterproof bearing and waterproof electrical controls.

Do not use the standard abrasive belt head for wet operation. It is not safe.



Wet operation means using water as coolant with a proprietary additive added to aid lubrication and prevent corrosion.

## Guards

All LEH abrasive belt heads are supplied with a guard which totally encloses the abrasive belt arm and only leaves the working area of the contact wheel open. The guard has an access door for fast and simple belt changes.

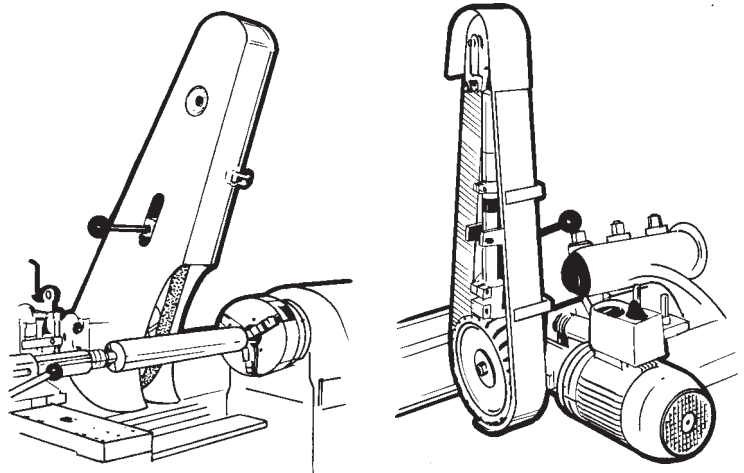
For customers who want to use the abrasive belt head for slack of belt finishing we can modify the guard to allow this operation.

*Please note:* Unless you specify slack of belt operation the machine is supplied in its standard form for contact wheel grinding only. The guard incorporates a dust extraction flange.

### Extraction Flanges

Model III - 80mm dia.

Models V-IX - 100mm dia



LEH abrasive belt head shown here with guard modified for both contact wheel and slack of belt grinding. Shown on left with belt tensioning lever. On right with access door removed to show internal tensioning and tracking controls.

### Dimensions

 All in mm.

Model	Head Type	Motor HP 420V 3HP	Contact Wheel Dia x Width	Abrasive Belt Size	Centre Height (max)
LEH III/X	Fixed	3	250 x 50	2000 x 50	250
LEH V/X	Fixed	5.5	350 x 75	3000 x 75	350
LEH VI/X	Fixed	7.5	350 x 100	3500 x 100	350
LEH VII/X	Fixed	10	350 x 100	3500 x 100	350
LEH VIII/X	Fixed	12.5	350 x 100	3500 x 100	350
LEH IX/X	Fixed	15	350 x 100	3500 x 100	350
LEH III/F	Floating	3	250 x 50	2000 x 50	250
LEH V/F	Floating	5.5	350 x 75	3000 x 75	350
LEH VI/F	Floating	7.5	350 x 100	3500 x 100	350
LEH VII/F	Floating	10	350 x 100	3500 x 100	350
LEH VIII/F	Floating	12.5	350 x 100	3500 x 100	350
LEH IX/F	Floating	15	350 x 100	3500 x 100	350

### Weights

Model	Fixed Head	For Floating Mechanism Add	For Full Guard Add
LEH III	42 kg	11 kg	9 kg
LEH V	103 kg	18 kg	18 kg
LEH VI	110 kg	18 kg	29 kg
LEH VII	115 kg	18 kg	29 kg
LEH VIII	123 kg	18 kg	29 kg
LEH IX	135 kg	18 kg	29 kg

# THE MACHINES

Planetary abrasive belt machines  
for Grinding, Graining and Polishing  
of bent and straight tubes

Orbital abrasive belt and brush  
Finishing machines for straight  
tubes and round bar

## INTRODUCTION

The working principle of planetary and orbital tube polishing machines is the same. In both systems two abrasive belts rotate around the tube, the tube does not rotate.

Planetary machines are smaller than orbital models. They can polish straight and bent tube. Orbital machines are much larger and can only polish straight tubes.

Planetary machines are designed for use by subcontractors and fabricators, orbital machines are used by tube mills and stockists.

See page 9 for an explanation of how planetary machines work.

## Model TP 100 S

### WET OPERATION PLANETARY TUBE POLISHING MACHINE

For stainless steel and non ferrous.  
Plastics and composites.

- Parallel cylindrical tubes
- Hollow sections
- Extrusions
- Rectangular tubes
- Oval tubes
- Door handles
- Tubular furniture frames
- Car exhaust tubes
- Balustrade tubes
- Bicycle and motorcycle tubes
- Tubular yacht fittings
- Wooden handles
- Plastic rods
- Swan neck water fittings
- Etc. etc.



## DESCRIPTION

The machine has a planetary abrasive belt head with 2 abrasive belts which rotate around the part.

The part does not rotate but is simply fed through the machine. By choosing standard abrasive belts, finishing belts or abrasive impregnated nylon belts finishes from rough ground to satin finish and commercial mirror polish can be produced.

## WET OPERATION

Model TP 100 S is designed for wet operation but it can also be run dry. Wet operation cools the part, improves the surface finish and extends abrasive belt life.

Basic machine for manual operation only. Coolant keeps temperatures down, improves finishes, prolongs belt life and eliminates use of an extractor.

For tubes from 10mm to 100mm diameter.

One motor drives both the abrasive belts and the planetary disc.  
Abrasive belt size: 740 x 30mm.

Machine dimensions: 1260mm high x 800mm long x 500mm wide.

Weight: approx 160 kg.

## TECHNICAL SPECIFICATION

4 KW main motor, 3 phase.

Min. diameter: 10mm Max. diameter: 100mm

Abrasive belt size: 740 mm x 30 mm

With abrasive belt tracking and tensioning controls.

Weight: 162 kg

Coolant tank: Plastic - 600mm x 400mm x 320mm high.

Submersible pump, hoses, nozzle, water flow control.

Non woven fabric filter.

When comparing prices remember that wet operation Model TP 100 does not need a dust extractor.

Can be a saving of around £2000.00.

## OPTIONAL EXTRAS

Variable speed drive.  
Highly recommended.

We recommend the variable drive. It makes the machine more versatile and allows you to use abrasive belts, nylon belts and special finishing belts which all work best with different cutting speeds.

Supports to suit the part

Supports are built to order. In most cases the machine can be run without work supports. In some cases a suitable work support can aid operation and improve safety.

## CONSUMABLES

For most tubes belts with straight edges are OK.

For tubes with very sharp bends these machines should be used with abrasive belts with scalloped or wavy edges and with bump free joints.

## SURTECH can supply the correct belts

Abrasive belt size 740 x 30mm - Model TP 100

### Aluminium Oxide belts.

General purpose aluminium oxide belts.

Available in grit sizes 36 to 120.

### Zirconia belts

Recommended for stainless steel

Available in grit sizes 36 to 120.

### Conglomerate belts

Longer lasting than standard belts.

### Cork/SiC Belts

Grit 800 only. Very fine finish

### Structured abrasive belts

For very fine finishes. Up to equivalent to grit 2500.

### Cork only belts

For polishing

### Diamond belts

For materials that cannot be finished with traditional belts.



*The planetary drive of a planetary tube polishing machine for diameters from 10mm to 100mm.*



## Model 142

### DRY OPERATION PLANETARY ABRASIVE BELT MACHINE FOR GRINDING, GRAINING AND POLISHING OF BENT AND STRAIGHT TUBES

2,2 KW, 3 ph abrasive belt drive motor.

Belt drive motor with variable speed from 10 m/sec to 25 m/sec.

1,5 KW, 3 ph planetary disc drive motor.

Noise: 78-80 dBA

Abrasive belt size: 950 x 50mm

Overall dimensions approx:  
1200mm x 650mm x 1250mm

Weight approx: 350 kg.



## MODEL P42 PLANETARY FINISHING & POLISHING MACHINE

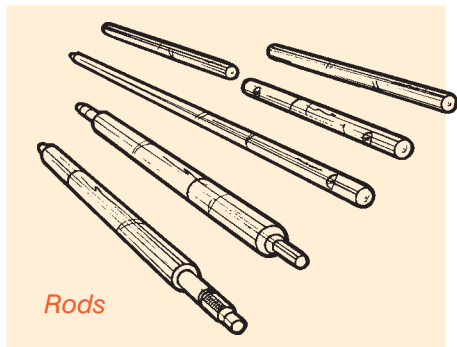


- For straight and bent tubes
- For straight and bent hollow sections
- For radius polishing of square tubes and flat bars
- For oval tubes

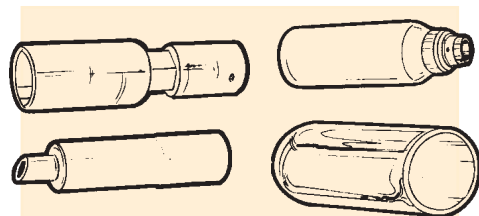
- Bull bars
- Roll cages
- Towel rails
- Roof rack bars
- Grab rails
- Door handles
- Tubular furniture frame
- Bicycle and motorcycle tubes
- Tubular yacht and boat fittings
- Car exhausts
- Balustrades
- Handrails
- Handle bars
- Rods
- Tapered tubes
- Swan neck water fittings

### DESCRIPTION

This machine consists of a planetary disc drive with 2 abrasive belts, an interlocked hinged guard, a foot pedal and small support tables on the infeed and outfeed sides.

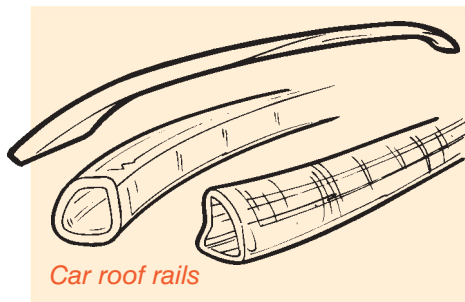


Rods



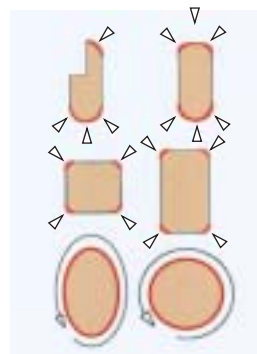
Bottles, fabricated tubes, exhaust pipes, etc.

In standard version motors are single speed. Optional variable speed motors are available. The optional variable speed abrasive belt drive motor is highly recommended. It allows the use of all abrasive belt grades and helps to produce a much greater range of finishes.



Car roof rails

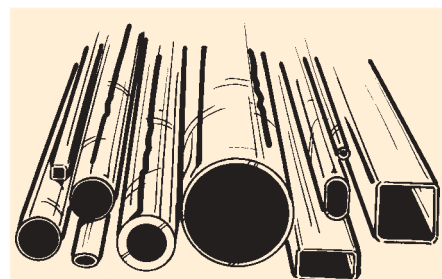
For high production of slightly bent tubes and straight tubes we recommend the optional automatic feed roller system with sensors.



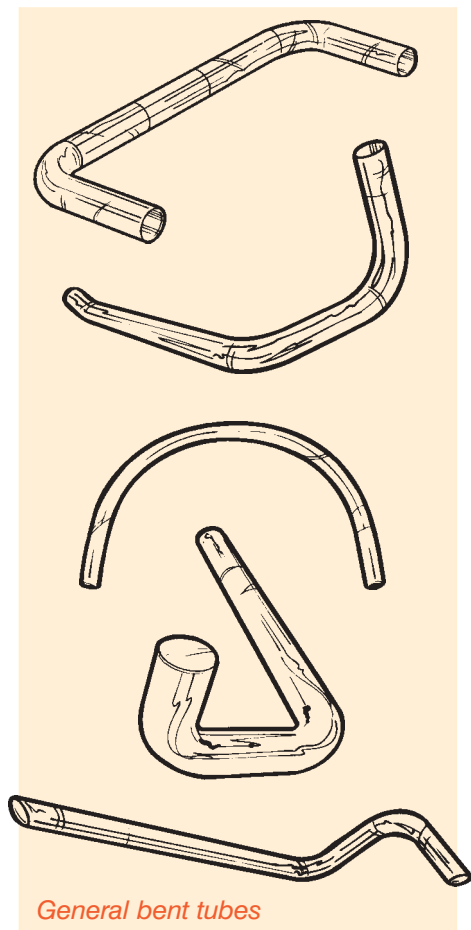
Polished areas

The sensors automatically open the belts for insertion of the tubes. No foot pedal needed.

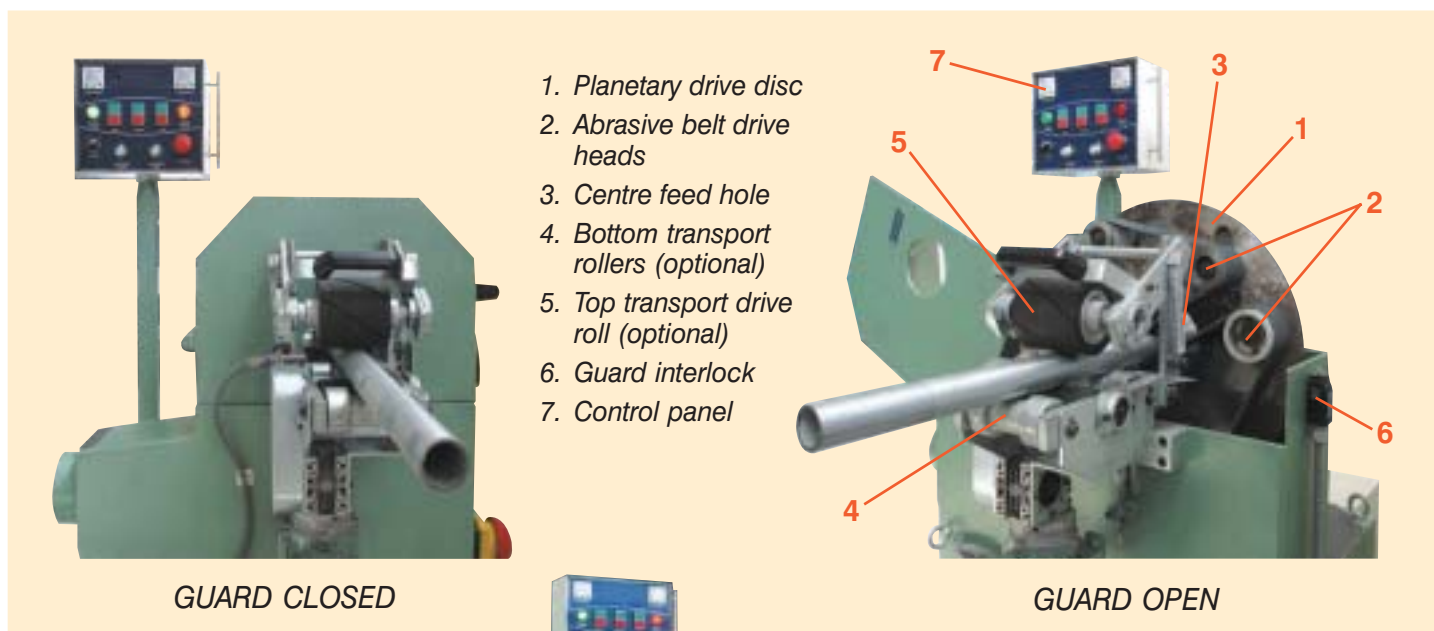
The standard manual feed with the help of a foot pedal is all that is needed for bent tubes and small batch finishing of straight tubes.



Straight tubes and hollow sections



General bent tubes



## HOW DOES IT WORK ?

1. Open guard
2. Fit abrasive belts
3. Set machine to tube diameter.  
Set abrasive belt tension. The higher the tension the more aggressive the belts work.
4. Close guard.
5. Start machine
6. Press foot pedal to open belts
7. Insert tube through feed hole
8. Release foot pedal to close belts
9. Manually push or pull tube through the machine
10. Press foot pedal to open belts and withdraw the tube.

Machines with optional automatic feed do not have a foot pedal but automatic sensors which do the same job as the foot pedal.

## TECHNICAL SPECIFICATION

Dry operation

Min. tube dia.:	10mm
Max. tube dia.:	100mm (in some cases 120mm)
Min. tube length.:	Approx 300mm (shorter with jig)
Max. tube length:	No limit
Feed speed:	1-3 m/min recommended
Disc drive motor:	1.5 kW
Belt drive motor:	3 kW
Optional feed drive motor:	0.18 kW, geared
Abrasive belt size:	60 x 940mm
Min. tube bend radius:	150mm
Dust extraction spigot size:	125mm dia.



Two rotating abrasive belt heads mounted on rotating disc

## CONSUMABLES

Aluminium Oxide Cloth abrasive belts from grit 40 to grit 400 for general grinding and finishing of most materials.

Zirconia Cloth abrasive belts from grit 40 to grit 120 for grinding of stainless steel tubes.

Structured Mineral Cloth belts from grit 180 to grit 2500 for finishing and superfinishing.

Cork Cloth belts for polishing.

Abrasive impregnated nylon belts in fine, medium and coarse grades for blending and satin finishing.

Special polishing belts for mirror polishing.



For some operations, abrasive belts with wavy edges are recommended.



# THE MACHINES

## Tube Notchers

### Model TN 75

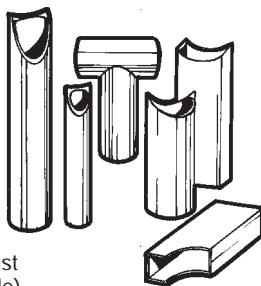
Abrasive belt width x length:  
100mm x 2000mm  
Abrasive belt tracking: Manual  
Min. tube dia: 20mm  
Max. tube dia: 76mm  
Angle settings: 30° - 90°

Motor size: 3 KW, 3 ph, 400 V  
Motor amps: 6  
Motor speed: 2800 rpm  
Motor Insulation class: B  
Motor spec: IP 44

Working height 1030mm  
No. of extraction spigots: 1  
Extraction spigot diameters: 75mm OD  
Top flatbed platen size: 390mm x 100mm  
Colour: Blue/white  
Weight: Approx. 200 kg  
Size: 1200mm long x 500mm

#### Optional extras

- Bolt on dust extractor for small to medium amount of non hazardous dust.
- Ducting for bolt on extractor
- Stand alone dust extractor for medium to large amounts of non-hazardous dust
- Ducting for stand alone dust extractor
- Stand alone dust extractor for hazardous dust
- Abrasive belts for mild steel (aluminium oxide)
- Abrasive belts for stainless steel (zirconia)
- Abrasive belts for high alloy steels (ceramic)
- Abrasive belts for finishing
- Modifications, jigs, fixtures for special purpose notchers.



### SPECIAL DESIGN NOTCHER FOR COMPOUND ANGLES



*These three photos show one of the modifications that only SURTECH can carry out.*

A compound angle notcher as often requested by manufacturers of motorbike frames and other more complicated tubular fabrications.



### Model MA 98



A dedicated notcher for special applications. The tube clamping vice is mounted on a crossslide with a handwheel for feeding the tube into the abrasive belt.

Unlike other machines Model MA 98 has both the belt tracking and tensioning controls at the front of the machine in easy reach of the operator.

### Model 133

A dedicated notcher for special applications.

The tube clamping vice is mounted on a cross slide with a lever for feeding the tube into the abrasive belt.

Unlike other machines cutting angles are set by swivelling the abrasive head. Model 133 is also the only machine available with an optional chuck for short tubes.

Model 133 notches tubes up to 150mm OD and hollow sections up to 150 x 150mm.

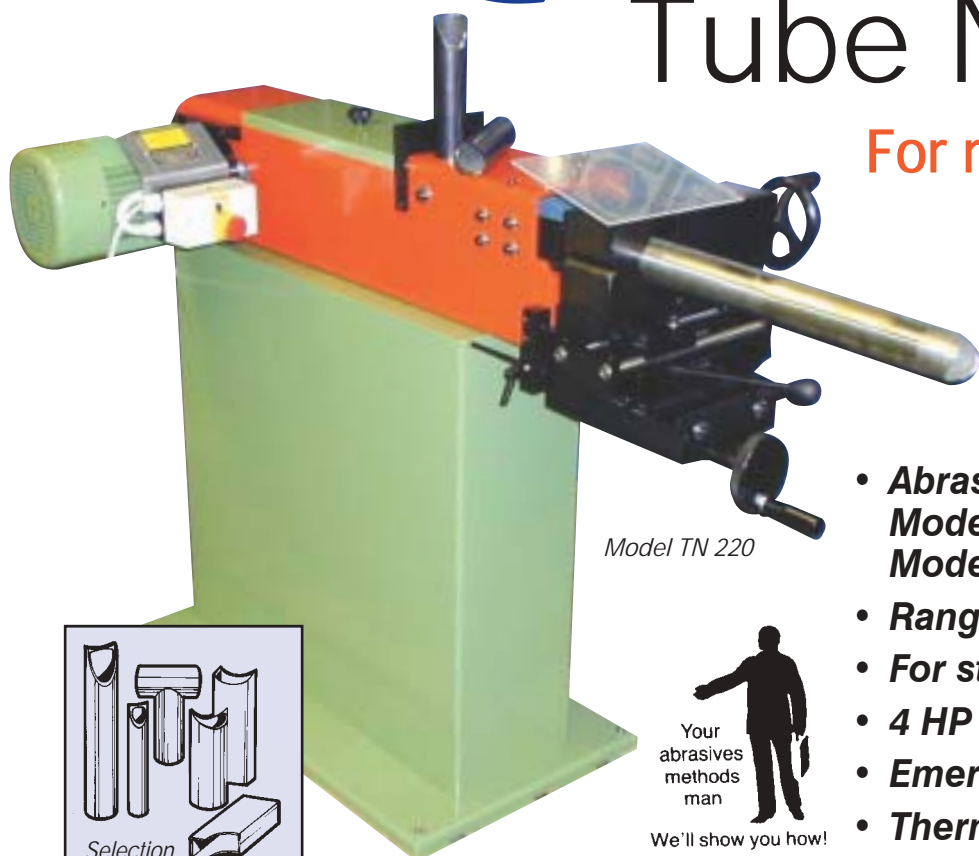


## Model TN 201 & Model TN 202 Tube Notchers

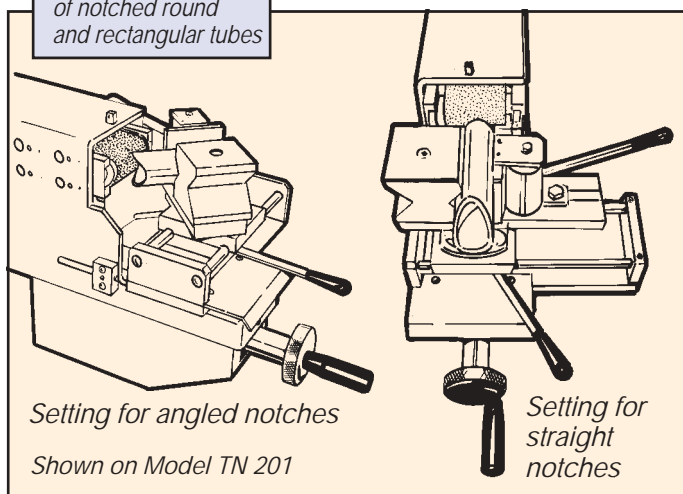
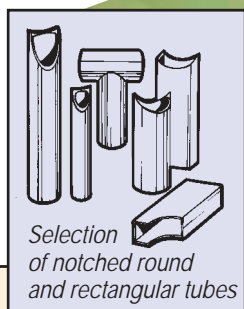
**For round & square tube**

**Model TN 201**  
**20 - 70mm dia.**

**Model TN 220**  
**20 - 116mm dia.**



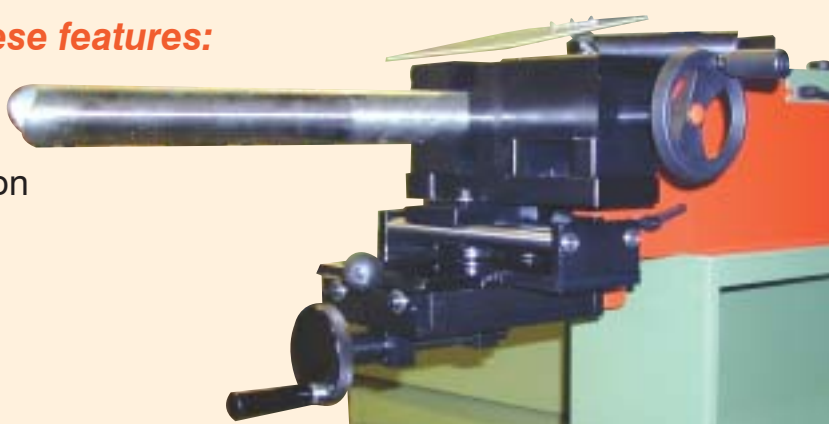
- **Abrasive belt sizes**  
Model TN 201 - 75 x 2000mm  
Model TN 220 - 120 x 2000mm
- **Range of quick change mandrels**
- **For straight and angled notches**
- **4 HP motor on both models**
- **Emergency stop button**
- **Thermal overload**
- **No volt control**
- **Optional built-in or stand alone dust extractor**



Angle in degrees	Max. tube diameter in mm	
	TN 201	TN 220
30	37	60
45	52	84
60	60	105
90	70.3	116
	TN 201	TN 220
Max Notch Dia (mm)	68.8	114.5

### **Only this machine has ALL of these features:**

- Solid steel vice with 'V'-jaws
- Infeed control for depth of cut
- Slide bar for belt wear compensation
- Lead screw covers
- Depth of cut stop
- Swivel slide for angled cuts
- Protractor scale



# KOMBI Belt Grinder / Notcher

**Perfect for the jobbing shop**

Two models are available:

## KOMBI 3075

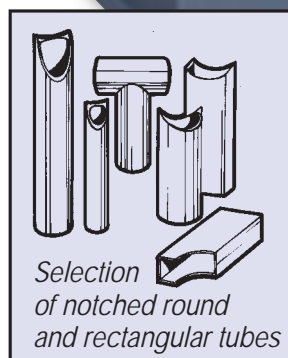
- Min/max. tube dia: 20mm / 70mm
- Motor size: 3kW, 4HP
- Abrasive belt size: 75 x 2000mm
- Top flatbed size: 100 x 390mm

## KOMBI 3150

- Min/max. tube dia: 20mm / 145mm
- Motor size: 4kW, 5HP
- Abrasive belt size: 150 x 2000mm
- Top flatbed size: 150 x 390mm

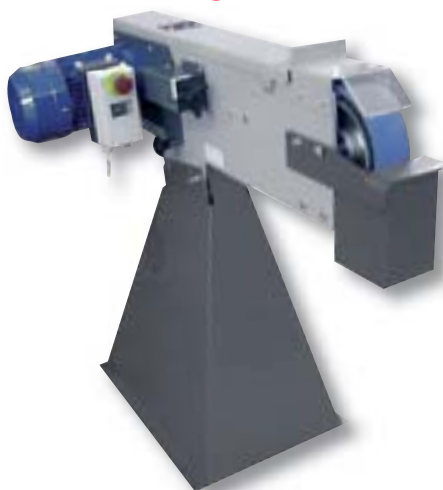
## General Spec - both models

- Min/max angle settings: 30° - 90°
- Mandrels made to order
- Twin motor speeds: 1400 & 2800
- Motor insulation & class: B/IP44
- Tube fed into belt by lever.
- Method of using total belt width: Lead screw positioning.
- Working height: 1030mm
- Extraction spigots and size: 1 off 75mm OD.



**Changes from belt grinder to notcher in minutes**

*Take a belt grinder... add a notcher head...*



*and you  
have an  
Abrasive  
belt tube  
notcher*



## WHAT NOTCHER ?

### A guide to choosing an abrasive belt notcher from SURTECH's extensive range

There are around 10 manufacturers of tube notchers in Europe. Specifications and build quality vary widely and prices reflect both. Only you can decide which features are important to you. This guide is meant to help you with your deliberations.

If after reading this guide you still have questions please ring one of our sales engineers. Alternatively visit our Abrasive Test Centre and test the machines described in this guide.

All our machines are test run before they leave our works. We are the only Company who offer in-house modifications, upgraded electrical controls, bolt on and stand alone dust extraction and a complete After Sales Service.

#### *What to look for:*

##### ANGLES AND DIAMETERS

Obviously you need to check what size of tubes you want to notch. Max. tube diameters are given for 90 degree notches. You will need considerably wider abrasive belts if you want to notch at 60, 45 or 30 degrees. See tables below showing notching angles and abrasive belt widths.

##### TUBE FEED METHODS

There are two methods of feeding the tube into the abrasive belt for cutting:

1. By handwheel
2. By lever.

The lever is faster but if not used correctly will reduce belt life and create too much heat, resulting in considerably higher operating costs. The handwheel is slower but makes it impossible to damage the belt with too fast a feed and too much pressure. A cross slide is even better as it allows the tube to be moved across the face of the belt for better belt usage and economy.

##### CUTTING SPEEDS

The most economical cutting speed for most metals is between 30 and 35 m/sec. For stainless steel speeds of between 15 to 20 m/sec are recommended to prevent overheating and discolouration.

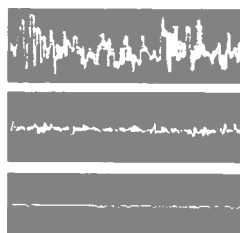
Check cutting speeds and choose twin speed machines where possible.

## THE MACHINES

### Microfinishing of rolls, tubes, bars and other cylindrical parts



*Standard Microfinishing Heads*



**UNIFORM  
REPEATABLE  
PREDICTABLE  
FINISHES FROM  
60 CLA TO 0.5 CLA**



*A top quality Microfinisher*



*Mounted on the  
toolpost of a lathe*

Microfinishing heads can finish to below 0,5 CLA, impossible for abrasive belt heads.

Microfinishing heads are mounted in the tool post of a lathe or on a bracket on dedicated roll grinders.

They work with rolls of 50mm, 100mm or 200mm wide Microfinishing Film which is continuously advanced over a contact platen, similar to a ribbon in an old fashioned typewriter.

This finishing system produces more consistent, more uniform and finer finishes than any other abrasive finishing method.

	Model SLBF 30-50	Model BF30-100
Max. width	50mm	100mm
Air supply	7 bar	7 bar
Cylinder stroke	30mm max	30mm max
Contact Pressure	max. 7 bar	max. 7 bar
Oscillation	2 mm	4 mm
Feed speed	0-150 mm/min	0-120 mm/min

Diagram showing the Microfinishing system.

The new roll of Microfinishing film moves slowly over the contact platen which applies the contact pressure via a pneumatic cylinder.

The spent microfinishing film is then wound on to a second reel and discarded once the whole roll has been used



The main applications are for rolls and cylinders.



A large 200mm wide Microfinisher in action. Its reflection in the roll shows the quality of finish that is possible.

Microfinishing eliminates chatter marks, traverse marks (barberpoles), grinding marks (fishtails) and produces low Ra finishes consistently and repeatably.

For a detailed description of the Microfinishing system, the settings and the consumables.

#### ASK FOR OUR MICROFINISHING CATALOGUE.

It answers questions like:  
How long does it take to finish a particular roll?  
What film speed should I use?  
What roll rotation should I use?  
What carriage traverse rate should I use?  
What coolants are recommended?  
What Microfinishing film grades are available?  
Etc., etc.

## THE MACHINES

### Microfinishing - Centreless

Centreless Microfinishing involves Microfinishing heads similar to those described above but mounted on a centreless unit.

The centreless method allows the finishing of large quantities of parts: gudgeon pins, rods, etc.

Like the dedicated between centres Microfinishing machines. Centreless machines are designed and built to individual requirements and with one head or several heads.

Diagram showing the principal of centreless Microfinishing.

The part sits on support rollers which rotate it. The Microfinishing head works from above in the same way as the Microfinishing head in a lathe.



## THE MACHINES

### Machines for blending of tube welds



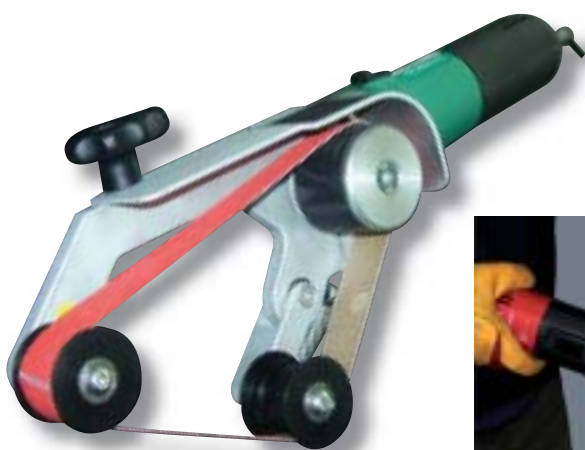
Welded stainless steel tubing is made from high quality flat rolled sheet or strip, slit to extremely accurate widths, the flat stock being formed and sized on successive stands of a roll forming machine. Buffed edges, forming an open seam, are closed by one of several highly sophisticated welding methods.

After welding, special built-in abrasive belt heads grind and blend the weld and part of the radius only. Depending on individual requirements, between one and three heads are necessary, positioned over the weld bead. The abrasive belt reciprocates over the weld and part of the tube circumference. To avoid flats, the grinding and blending operation is carried out on the slack of the belt.

Diameter range: 10mm - 200mm.  
Abrasive belt size: 3500mm x 150mm.  
Abrasive belt drive: 10 HP.  
Coverage: 15 degrees either side of the weld.

## Portable Tube Finishers

Five Portable Tube Finishers to suit all requirements. They all perform well, but which is the right one for you depends very much on your personal preferences.



*Roto-Tube-CH with Surtx motor*



*Roto-Tube GRI with German FLEX motor*

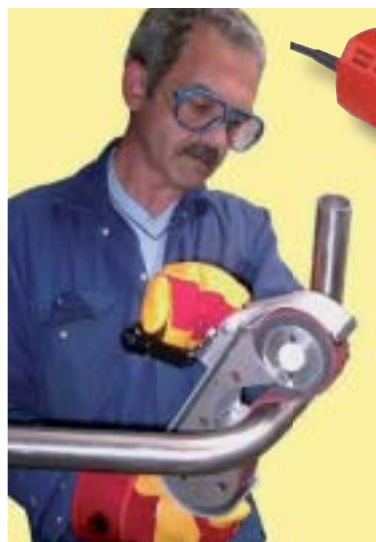


**Roto-Tube-BOA**

*Available as a set only. With consumables in carrying case. With German FLEX motor.*



*Roto-Tube-POL with German FLEX motor. Used in horizontal position above and vertical position, right*



**Roto-Belter**

*The only dual purpose machine. Can be used on slack of belt for tube finishing or on front contact wheel for heavy duty grinding. With German FLEX motor.*



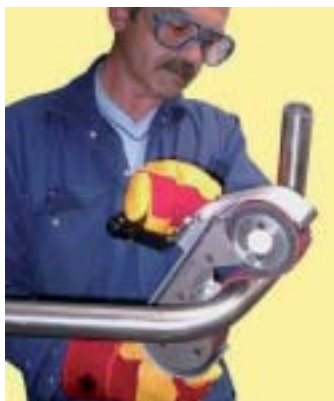
*All Roto-Tube machines can be used with abrasive belts, structured belts, nylon belts or polishing belts.*

Model	Motor Power kw	Voltage	Speed m/sec	Abrasive Belt Size Size mm	Tube dia coverage in degrees	Weight Kg (approx)
Roto-Tube-GRI	1.2	230 or 110	Variable	650mm x 12, 15 or 30mm	160	4.3
Roto-Tube-CH	0.8	230 or 110	Variable	650mm x 12, 15 or 30mm	160	3.9
Roto-Tube-POL	1.2	230 or 110	Variable	820mm x 10, 20 or 40mm	180	4.4
Roto-Belter	1.2	230 or 110	Variable	620 x 20 or 40mm	n/a	4.2
Roto-Tube BOA	1.2	230 or 110	Variable	760 x 20 or 40mm	270	3.7



## CONSUMABLES FOR PORTABLE BELT GRINDERS

### Model ROTO-BELTER



### Model ROTO-TUBE-CH



### Model ROTO-TUBE-GRI



### Model ROTO-TUBE-BOA



### Model ROTO-TUBE-POL



### Abrasive Belts for Belt Grinders and Tube Grinders

#### VZ1

Zirconia mineral, open coated to prevent premature clogging.

Grit 24 - 240.

Polyester x-weight (stiff) backing grit 24 - 150.

Cotton backing grit 180 - 240.

Zirconia mineral belts are the recommended belts for stainless steel.

Zirconia mineral is tougher than aluminium oxide mineral and therefore better suited for stainless steel.

#### VZ2

Zirconia mineral with top size to keep cool. High zirconia content.

Grit 24 - 80.

Polyester X-weight (stiff) backing

Zirconia mineral belts are the recommended belts for stainless steel.

Zirconia mineral is tougher than aluminium oxide and therefore better suited for stainless steel.

#### VCER2

Ceramic mineral with top size to keep cool.

Grit 36 - 80.

Polyester X-weight (stiff) backing

Next to diamonds and boron nitride minerals ceramics are the toughest available today. They are more expensive but should perform better and last longer than zirconia.

#### VCA1

Granulated aluminium oxide compact grain.

Grit 80 - 1200.

Polyester J-weight (flexible) backing.

Also called compact grain. A multilayer grain structure with self sharpening action. Compact grain belts are more consistent, last longer and can reduce the steps in a finishing sequence. Because of their wide grit range they are particularly well suited for finishing stainless steel

#### VNYL1

Abrasive impregnated non woven nylon. Coarse, Medium, Fine, Very fine

Not suitable for stock removal but best for finishing and blending. Ideal for satin finishes.

*For more detailed descriptions see our abrasive belt catalogue.*

## CONSUMABLES FOR PORTABLE ABRASIVE BELT FILES

### Model ROTO-FILE 24A

Portable abrasive air power tool



### Model ROTO-FILE 620A

Portable abrasive air power tool



### Model ROTO-FILE 610A

Portable abrasive air power tool



### Model ROTO-FILE 710E

Portable abrasive air power tool



*For belt sizes see page ??.*



### Abrasive Belts for Belt Files

#### VA1

Aluminium Oxide. Very flexible.

Grit 60 - 800.

Polyester J-weight (flexible) backing. Aluminium belts are the basic grade for general grinding and blending.

#### VZ2

Zirconia mineral with top size to keep cool. High zirconia content..

Grit 24 - 80.

Polyester X-weight (stiff) backing

Zirconia mineral belts are the recommended belts for stainless steel. Zirconia is tougher than aluminium oxide and therefore better suited for stainless steel.

#### VCER1

Ceramic mineral with top size to keep cool.

Grit 24 - 120.

Polyester X-weight (stiff) backing.

Next to diamonds and boron nitride minerals ceramics are the toughest available today. They are more expensive but should perform better and last longer than zirconia.

#### VCER2

Ceramic mineral with top size to keep cool.

Grit 36 - 80.

Polyester X-weight (stiff) backing

Next to diamonds and boron nitride minerals ceramics are the toughest available today. They are more expensive but should perform better and last longer than zirconia.

#### VCA1

Granulated aluminium oxide compact grain.

Grit 80 - 1200.

Polyester J-weight (flexible) backing.

Also called compact grain. A multilayer grain structure with self sharpening action. Compact grain belts are more consistent, last longer and can reduce the steps in a finishing sequence. Because of their wide grit range they are particularly well suited for finishing stainless steel

#### VNYL1

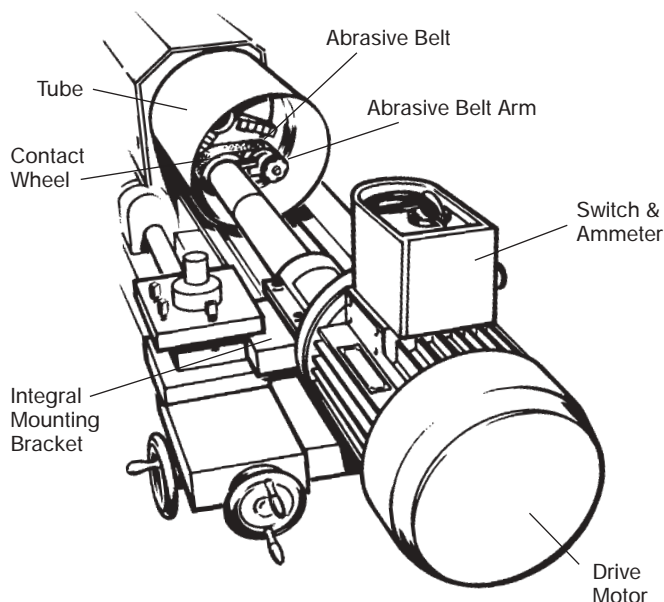
Abrasive impregnated non woven nylon. Coarse, Medium, Fine, Very fine. Not suitable for stock removal but best for finishing and blending. Ideal for satin finishes.

*For more detailed descriptions see our abrasive belt catalogue.*

# THE MACHINES

## Abrasive belt heads for internal grinding and finishing

*Convert your Lathe to an INTERNAL GRINDER*



### LEH INTERNAL GRINDING HEADS

Abrasive belt head fits into most tool posts of lathes and can be used for internal grinding, deburring and polishing.

Geared motor, 420 V, 3 phase • Extension shaft • Clamping bar • Built in ammeter • Abrasive belt arm with tensioning and tracking controls.

The machine does not have an overload control. The motor is designed to withstand high contact pressures.

These machines are recommended for internal work only and therefore supplied without guards.

Use screened cable and connect via residual current breaker of correct capacity fitted on wall. Fixed or floating heads.

#### Fixed head - Floating head

##### Model J2

3 HP, 60mm dia. shaft, Max. depth 1000mm.

With abrasive belt head for internal dia. of 185mm and larger.

Abrasive belt: 400 x 30mm

##### Model J2

ditto, but with abrasive belt head for internal dia. 140mm and larger.

Abrasive belt: 800 x 12mm.

Tri-planetary abrasive belt head.

Abrasive belt: 800 x 12mm.

##### Model J2

ditto, but with abrasive belt head for internal dia. 85mm and larger.

Abrasive sleeve: 75mm dia. x 30mm wide.

#### OPTIONAL EXTRAS FOR J2

Tri-planetary abrasive belt head for belt size 800 x 12mm, for diameters from 140mm to 180mm.

Expanding wheel, for diameters from 85mm to 140mm.

#### Fixed head - Floating head

##### Model J3

4 HP, 90 mm dia. shaft.

Max. depth 1800mm.

With abrasive belt head for internal dia. 250mm and larger.

Contact wheel: 130mm x 50mm.

Abrasive belt: 550 x 50mm.

### DUST EXTRACTION

It is difficult to impossible to fit dust extraction to these internal grinding heads. Depending on size of internal opening it may be possible to fit a capture hood and a hose. Discuss with our technical representative.

### NOTE:

It is necessary to work these heads without extraction when they are used for internal grinding.

# THE MACHINES

## Internal Tube Grinding and Polishing Machine



### Model IDP

IDP machines are built to individual requirements. They are available with one or more heads to finish several tubes simultaneously.

One design can process internal tube diameters from 20 - 114mm, another from 30 - 240mm.

Depending on tube size and before and after finish, several abrasive and polishing tools can be used. There is also an optical automatic loading system available.

### PORTABLE FLEXIBLE SHAFT INTERNAL GRINDING AND FINISHING TOOLS



With standard lengths up to 1000mm.

With special designs for up to 3000mm.

These portable tools consist of an electric motor with variable speed control, a flexible shaft inside a rigid extension shaft and a collet to mount a range of shaft mounted abrasives.

Each one of these portable tools is made to individual requirements. The maximum length is 3000mm.



*Abrasive Star disc for deburring holes or tube ends*

# THE MACHINES

## Tube End Deburring

### INTRODUCTION

Tubes and hollow sections have to be deburred after cutting. Either for technical or for personal safety reasons.

Manual deburring with wire brushes is often the most economical most effective and simplest method, but only if specially designed wire brushes are used. Such brushes are made from high tensile strength wire of between 1600 kp/mmsq to 3000 kp/mmsq. Wire diameters from 0.15 to 0.50mm cover most applications from heavy duty to delicate deburring of steel and stainless.

Stainless steel tubes must be deburred with stainless steel brushes to prevent contamination and corrosion.

Non ferrous tubes are best deburred with abrasive impregnated filament brushes.

Brush diameters of at least 250mm or better still 300mm offer the best results. Smaller brushes are less efficient.

Peripheral cutting speeds should be a min of around 30 m/sec. It is most important that the wires cut with the tips only and do not bend. Bent wire cuts on the side and is far less efficient and far less economical

Simple manual machines use rotary brushes as described above. The tube has to be turned manually. More sophisticated machines use one or more cup wheels. With these the tube remains stationary and the brush rotates around the tube.

### Model SURTX JT TUBE END DEBURRER



*With V-guide support for deburring internal and external tube ends*

With V-guide for tubes. 3 phase, 400V, 2 - 3 HP, 2 speed motor.  
Single speed, 230V, variable speed.  
Wire wheel size: 250mm OD x 60mm wide.  
100mm Extraction Spigot. Approx weight 80 kg.

# THE MACHINES

## Manual Tube and Bar Cutting machines

### Model TV 350

Our smallest manual cut off machine.

Motor:	5.5 kw
Cutting Disc:	350mm dia
Cutting speed:	80 m/sec
Max opening of vice:	190mm
Max tube diameter for 90° cut:	120mm
Max tube diameter for 45° cut:	105mm
Weight:	Approx. 140 kg





# THE MACHINES

## Cut off machines for Bar Stock

### Model TR-O-K 600

Dry operation



- Cutting wheel diameter 600mm.
- Power up to 90 kW.
- Speed 80 m/s.
- NC controlled.

Cutting of hardened guide rods, guide rails, threaded bars, etc.

The bar stock will be delivered from a magazine or roller conveyor to the cut off machine.

The cutting mode is fully automatic.

Automatic cutting wheel compensation.

Machine status is monitored.

Modern Link for diagnosis of the controller functions can be installed.

#### OPTIONS

- Marking unit for cut parts.



### Model NTS 450

Wet operation



- Cutting wheel diameter 450mm.
- Power 18.5 kW.
- Speed regulation: Frequency inverter 20 till 80 m/s.
- NC controlled with setting data for 100 workpieces can be stored.

Cutting of hardened guide rods, chromed piston rods, guide rails, threaded bars, etc.

The workpiece infeed is manual, but the cutting mode works fully automatic.

Automatic cutting blade compensation.

Machine status is monitored.

#### OPTIONS

- End stop adjustment via hand wheel, digitally monitored.



Digital End Stop



Cutting Operation



Chromed bars cut to length without burrs.

## Model NTS 600

### Wet operation



- Cutting wheel diameter 600mm.
- Power 90 kW.
- Cutting speed 80 m/s or variable.
- NC controlled.



Cutting of hardened guide rods, chromed piston rods, guide rails, threaded bars, etc.

Loading and unloading conveyor.

Wheel wear compensation is automatic.

#### OPTIONS

- Marking unit for cut parts.



*Input magazine*



*Output magazine*



*Total view*



# THE MACHINES

## Alloy Bar Grinders

### Model ST 400 ALLOY BAR GRINDER



For diameters from 70mm to 225mm and lengths from 250mm to 2000mm.

Model ST 4000. Top photo fully enclosed with load and unload tables outside the enclosure. Bottom photo shown without enclosure. Loading table on left with transport carriage behind, grinding station in the centre and end face grinding unit and unload table on right.

#### Operation:

Bars are loaded from the loading table onto the transport carriage with variable speed rotating rollers. The carriage then moves into the grinding position under the grinding head. Grinding parameters can be set and programmed from the control panel outside the machine.

After the OD grinding operation, bars are offloaded on to the end face grinder from where they are moved to the unload table after end faces have been ground.

#### Technical Specification:

OD grinding head motor: 37 kW

End face grinding head: 25 kW

Grinding speed: 60 m/sec

Grinding wheel size:

500mm OD x 50mm wide

Grinding head hydraulically controlled

Choice of manual or automatic

setting of grinding cycle.

PLC controls.



*The end face grinding unit*



*The OD grinding head and carriage inside the enclosure*



# THE APPLICATIONS

## THE APPLICATIONS

### POLISHING BRIGHT STEEL BAR

Cold drawn steel bar is peeled and pre-ground. To improve the finish abrasive belts are ideal, faster and cheaper than other methods.

Induction hardening swells the diameter of the bar and a centreless abrasive belt operation can grind it back to tolerance.

Cold drawn and peeled bar is typically available from 10mm to 130mm diameter and lengths from 2.5. to 8m. Diameter tolerance is H 9 and above. Surface finish before polishing is normally around Ra 16 µm and after polishing, Ra 1 - 5 µm.

The various stages in the production of the bright bar are:

#### Hot rolling or heat treating

Hot rolling produces a tight hard scale on the surface of the bar. Heat treatment produces a looser scale. This is important because the type of scale has a considerable effect on the life of abrasive belts. Unfortunately, there are no hard and fast rules and, since scale characteristics can change from batch to batch, it may also be necessary to change machine settings and to change to a different grade of abrasive belt.

The correct choice of contact wheel and abrasive belt mineral is essential for effective scale grinding.

#### Turning

In the production of bright steel bar, approximately 1mm of material is removed per 25mm of bar diameter by turning from the outside of the bar, ie. 3mm would be removed from a 75mm diameter bar. Feed rates for turning vary from 1m/min to 6m/min.

Turning produces the required tighter tolerance on ovality to H 10. The surface finish is still relatively rough, with ridges.

#### Grinding

Abrasive wheel grinding after turning produces even tighter tolerances (H9 or even H7), and finer surface finishes.

Stock removal rates are in the order of 10 to 25 thou. On diameter, and surface finishes are around 35 CLA. Feed rates are a maximum of 6 m/min.

## THE APPLICATIONS

### GRINDING AND CLEANING TUBE ENDS



Tube ends have to be ground and cleaned for ultrasonic testing or in preparation for welding. The ground finish can extend from a few inches to several feet from the end of the tube.

Special machines can plunge grind the ends.

The machine consists of an abrasive belt centreless head complete with a roller conveyor and appropriate controls. A magazine, and automatic load and unload mechanism could be added for fully automated operation.

Tubes are loaded on to the roller conveyor and driven into the abrasive belt head by pinch rolls, the length of the grinding operation being determined by an adjustable solenoid switch. The abrasive belt head then retracts, and the tube is reversed along the roller conveyor.

A number of optional extras available: wet grinding system, automatic diameter adjustment, fast tube reversal, twin head abrasive belt unit, etc.

With short tubes, this operation can be carried out on the small size centreless abrasive belt grinder, model 121/4 BC or KS 350 BC.

## THE APPLICATIONS

### HARD CHROME PLATED BAR AND TUBE CENTRELESS GROUND STEEL BAR SHOCK ABSORBER PISTONS



Cold finished bar steel is the raw material for hydraulic cylinders, a typical specification being:

Turned and ground bar supplied by the mill with a finish of around 30 CLA (Ra approx 0.7, Rt approx 2.4).

10 - 200mm diameter,  
6000mm long  
Diameter tolerance to ISO H 8.  
Surface Finish RA 0.8 - 1.2 (approx CLA.)



To be suitable for hydraulic operations, the bar needs to be finished to approximately 7 to 8 CLA (RA 0.2 - 0.4). Centreless abrasive belt machines are ideally suited for this application.

Hard chrome plated bar and tube is chosen for components subject to hard stresses and corrosion, such as piston rods for hydraulic machinery, pin bolts, pistons and shafts for heavy duty motors, piston rods for pneumatic cylinders, mining pit props, shock absorber rods, tipper lorries, fork lift trucks etc.

The surface of the bar is chrome-plated to prevent corrosion and the finish must be smooth enough to prevent leakage and seal wear, yet must have a surface texture sufficient to carry some oil to lubricate the seal.

Hard chrome plated bar and tube is manufactured in standard lengths of between 3000mm and 6000mm and diameters from 12mm to 150mm.

The bar or tube supplied by the mill is pre-ground to diameter, out of round and straightness tolerances, which vary in accordance with the

final application. Such tolerances are expressed in H values, H 7 being a tighter tolerance than H 10.

The material to be converted to hydraulic bar is generally supplied to the manufacturer from the bar or tube mills with a surface finish between 25 and 30 CLA. This surface finish is, however, too coarse, and needs to be improved to between 6 CLA and 10 CLA prior to chrome plating, again depending on the bar and tube's final application.

### Post-hardening Oxide Removal

After polishing, hydraulic bar can go first to induction hardening if required, or straight to chrome plating. Induction hardening swells the bars, necessitating grinding back to tolerance. It also calls for removal of oxides formed during the induction hardening process.

To remove oxides, very fine *Scotchbrite A*, cutting and polishing wheels are ideal. They remove the oxide without significantly changing the surface finish.

### Polishing After Chrome Plating

The final operation is to polish after chrome plating to remove chrome nodules and nibs. Depending on the severity of the nodules and nibs and the required final finish, a number of *Scotchbrite* products are recommended:

7S Fine Light deburring wheel

7S Fine SST wheel

A - Very fine cutting and polishing wheel

S - Super fine Blend 'n finish CB belts.

*Surface Technology Products* can advise the best polishing sequence for each, including carrying out practical tests on your own material.

A number of abrasive belt centreless grinding machines of different designs and sizes are available, usually multihead and for wet operation. The choice of machine depends on:

- a) the diameter range
- b) the exact finish requirement and
- c) the production rate

Diameters between 12mm and 60mm, with only the occasional batch over 60mm can be finished on Models **RPS**. Diameters from 50mm to 200mm and above are best finished on the extra large model with horizontal heads.

Single-head machines are only suitable for very small batch production. To achieve 8 CLA finishes from a starting point of 25 - 30 CLA, between two and three passes are necessary. For medium to high production rates, three to five-head machines are recommended. These machines are usually also equipped with automatic loading and unloading units.

Abrasive belts in grit sizes 280 to 600 are used for finishing bar and tube from approximately 30 CLA to 8 CLA. This is normally sufficient prior to hard chrome plating.

After plating, the surface needs to be polished. This can be done on the same machine, but with abrasive belts between 400 and 600 grit size with polishing wheels described above.

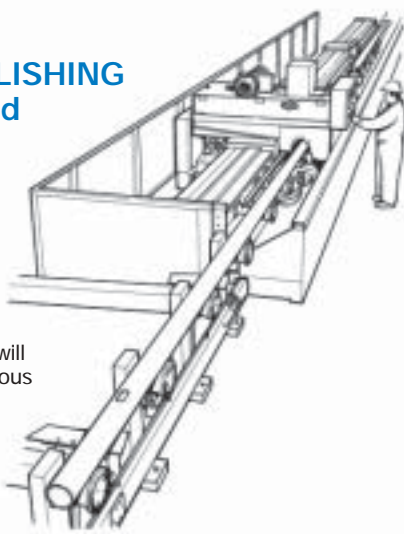
### THE APPLICATIONS

#### GRINDING and POLISHING of LAMP POSTS and SAILING MASTS

Lamp posts and sailing masts are often made from aluminium alloy and tapered.

To improve tolerances and finish they are ground on centreless machines which have floating heads. This means the abrasive belt head will automatically adjust to the various diameters of the taper.

Masts considered here are either stepped and tapered or tapered only, with a maximum length of 13000mm and a maximum diameter of 250mm.



### Shock Absorber Pistons

Shock absorber pistons are very much like hydraulic pistons, just smaller. They need to be ground and polished prior to hard chrome plating and finished or polished again after plating.

Because quantities are high multihead machines with up to 5 heads and automatic loading and unloading are used.

Finish requirements vary from very smooth to cross hatch patterns depending on the degree of oil retention wanted..

### THE APPLICATIONS

#### TUBES for SPORTING GOODS

Golf shafts, ski sticks, javelins, etc.

Abrasive belt centreless machines can run at feed speeds of up to 25 m/min. Because of the very high production rates the machines run fully automated, with loading and unloading units.

The applications for tubes in the manufacture of sporting goods include golf shafts, ski sticks, javelins, etc; such tubes being mostly either steel, which is then chrome plated after abrasive belt polishing, or aluminium, which is lacquered or anodised after abrasive belt polishing.

All these tubes are tapered, and in the case of tubes for golf clubs they also have a series of steps.

The purpose of abrasive belt polishing is to remove all surface defects whilst maintaining a specified weight per tube within defined limits, and to provide a uniform surface finish to a specified CLA standard. This can only be achieved by rather sophisticated and fully automatic controls and a very careful selection of consumables.

Since tubes for sporting goods are manufactured in very large quantities the necessary centreless installation is invariably multihead, usually between two and five heads, and operated wet.

Fully automated ski stick abrasive belt polishing machines, with magazine-fed automatic loading and unloading, can run at between 10 and 20m/min; and golf shaft machines up to 30m/min. This makes them the fastest-running centreless abrasive belt machines on the market.

### THE APPLICATIONS

#### GRINDING NUCLEAR TUBE



Nuclear tubes are made from a variety of materials: stainless steel, zirconium and many other alloys. Finish requirements vary widely. Most can be met by abrasive belt grinding.

Tubes used in the nuclear industry must comply with very stringent surface finish specifications to facilitate accurate and critical ultrasonic testing procedures and to improve corrosion-resisting properties.

Centreless abrasive belt machines have been used for decades to finish tubes for the nuclear industry. During this period they have proved to be well capable of producing tube to these very strict specifications.

Although Zirconium is practically the only metal which can be used to clad enriched uranium - with ninety percent of Zirconium tube production being used on nuclear applications - specifications can vary widely. Some tubes must not be ground wet and must not touch other materials for fear of surface contamination. Others present particular problems because of their small size of 6mm and below.

Some alloys used for nuclear tubes are extremely tough and quickly wear out abrasive belts if run at the wrong speeds.



#### Typical requirements:

Material:	ASTM 321 (18/8) Inconel 600 Inconel 800
Diameter range:	6 - 60mm
Length	3 - 25m
Straightness:	less than 2mm per m
Max. stock removal:	0.1 mm
Feed rates:	6 - 35mm (5 - 8m/min) 35 - 60mm (2 - 6m/min)
Operation:	Fully automated, including loading and unloading
Other Requirements:	No tapering of tube ends

This specification is met by a 10-head Centreless installation Model **RPS** with roller conveyor, pinch rolls and automatic loading and unloading systems.

The **RPS** model range is extremely versatile and adaptable to most requirements. Leading nuclear tube manufacturers throughout the world use **RPS** machines for grinding and polishing their tubes.

#### THE APPLICATIONS

### DEBURRING TUBES and MACHINED CYLINDRICAL COMPONENTS



*Centreless machine with 2 abrasive heads and automatic loading and unloading. For finishing of ratchet screwdriver rods.*

Examples of components which need to be deburred or deflashed include: ratchet screw driver rods, hydraulic valve control pistons, brake pistons.

#### THE APPLICATIONS

### WELDED STAINLESS STEEL TUBE

Welded stainless steel tubing is made from high quality flat rolled strip, slit to extremely accurate widths, the flat stock being formed and sized on successive stands of a roll forming machine. Buffed edges, forming an open seam, are closed by one of several highly sophisticated welding methods.

Welded austenitic stainless steel tubes are used for mechanical, structural and general engineering, water services, boilers, superheaters, heat exchangers, etc. The tube can be supplied annealed, pickled or polished.

Annealing increases ductility, which is important for subsequent manipulation like bending, coiling and flaring. Annealing also increases corrosion resistance. After annealing the tube is pickled.

The pickling process removes the oxide scale produced during the annealing operation.

### SOME MANUFACTURING METHODS

This outline of customary methods of tube production, based on material kindly provided by NOWEA, must necessarily be brief.

In **Mannesmann rotary piercing and pilger mills**, material passes through a heating furnace, the rotary piercing mill, the pilger stands and the sizing mill, emerging five to ten times longer, and with its cross section reduced by 80 or 90%. Pilgering can produce pipe lengths of up to about 28 metres.

The **piercing mill** process uses on mandrel as an inside die, supported by a mandrel rod against a fixed support. The wider angle and higher speed of the rollers means that the output speed is substantially greater than in the pilger step-by-step method.

In the **continuous pip rolling** process a rotary piercing mill stretches the workpiece by a factor of two to four; the continuous stepped roll stretches by a factor of four; the stretching reducing mill (with 28 stands) stretches by a factor of up to ten; the process producing pipe lengths of up to 160 metres.

In the **Assel rolling process**, which is used for making pipes of especially accurate concentricity, a rotary piercing mill uses three conical rolls, the shoulder height of which determines the reduction in wall thickness achieved. This is followed by a reducing or finishing mill.

The **reducing process** uses up to 28 consecutive rolls stands. The basic material - relatively thick-walled pipe - is used to manufacture the smaller sizes, with the wall thickness dependant on the length of the longitudinal pass. This enables different sizes of pipe with different wall thicknesses to be made from a single size of raw pipe material.

Uniform increase in density is a feature of the **pressing and drawing process**, used to make pipes to especially demanding specifications, eg. High temperature resistance, or special alloy grades of material. Polygonal ingots are first hydraulically pierced and then stretched on a horizontal press using a mandril rod of the inside diameter being achieved by pressing through annular drawing dies.

In the **extruding method**, used mainly for ferritic or austenitic steels and nickel alloys, broadened-out peeled, turned or ground extrusion ingots, coated with special powdered glass as lubricant and a mould release agent, are pressed through an annular gap formed by drawing die and press mandrel.



# THE CONSUMABLES

## INTRODUCTION

The choice of abrasive belts is governed by the material to be ground and the finishes to be achieved. With today's vast range of abrasive belts it is not difficult to find one that meets individual requirements.

Abrasive belts have firmly established themselves as the favourite grinding, deburring and polishing tool for centreless finishing operations.

The vast range of available abrasive belts offers the correct grade for all operations: high stock removal, general grinding, decorative finishing, polishing.

Apart from choosing the right belt grade working out the best belt sequence is essential for an effective and economical operation.

Most finishing operations require between two and six step sequences. Cutting down the number of steps saves money and time. Structured and compact grain belts are particularly well suited for cutting down steps.

Abrasive belt grades must be matched with the correct contact wheel specification to obtain full value and long belt life. Use coarse belts with hard contact wheels and fine belts with soft contact wheels.

See contact wheel details on page 47.

### Abrasive belt grits

24, 36	<b>Coarsest</b> grit sizes available but rarely used in centreless operations
40, 60	<b>Coarse.</b> For fast cutting and high stock removal. Leaves rough finish
80, 120, 150	<b>Medium.</b> Good intermediate grit sizes on the way to finer finishes
180, 220, 240, 280	<b>Fine.</b> Often acceptable as final finish.
320, 400, 500, 600	<b>Very fine.</b> Smooth finish. Very acceptable as final finish. Suitable for subsequent polishing with buffs or for plating.
800, 1000, 1200	<b>Ultrafine.</b> The finest grit sizes for traditional abrasive belts. Rare and little used with centreless machines.

Even finer grits are available with structured abrasives and microabrasives. Structured abrasives have their own grit codes. From A 500 (equivalent approx. grit 50) to A 3 (equivalent approx. grit 3500).

### Grit sizes and finishes

Grit	Approx. finish in Ra	Grit	Approx. finish in Ra
40	4.2	280	0.9
60	3.4	320	0.7
80	3.0	400	0.4
120	2.3	500	0.4
180	1.7		
220	1.4		

## ALUMINIUM OXIDE BELTS



Standard aluminium oxide belts for general purpose grinding. Available in full grit range.

## ZIRCONIA BELTS



Zirconia belts for grinding stainless steel and some alloys. Available only in grits 40 to 120.

## CONGLOMERATE BELTS (Compact Grain)



Conglomerate belts for long life, perfect finishes and certain alloys.

## CORK BELTS



Cork belts for polishing. Coated with cork only, but needs preparation for use on centreless machines.

## SILICON CARBIDE BELTS



For a pleasing bright, decorative finish.

## SUPERFINISHING BELTS



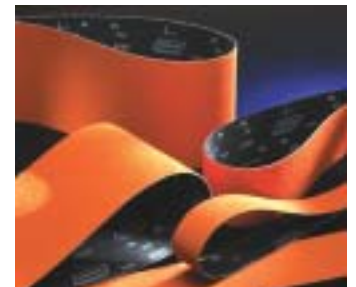
Abrasive impregnated nylon belts for blending and satin finishing. Available coarse, medium and fine.

## STRUCTURED ABRASIVE BELTS



From medium to ultrafine. Cuts down on finishing steps.

## CERAMIC BELTS



The toughest and longest lasting belts. Will cut materials other belts cannot.

## DIAMOND BELTS



For information on Diamond Belts see our Consumables Catalogue.

## ABRASIVE IMPREGNATED NON-WOVEN NYLON BELTS



For satin finishing. Available in coarse, medium and fine.

## COTTON POLISHING BELTS



For mirror polishing. Must be used with polishing compo.

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*More than 25 bench and pedestal grinding, deburring and polishing machines are always on show*

At the Surtech Abrasive Test Centre where you will find the UK's largest selection of the very latest grinding, deburring, polishing, satin finishing & brushing machines.

Bring your own parts and discuss your requirements with our skilled engineers who will also set up practical demonstrations. See for yourself how our machines can be used to solve problems and improve efficiency.

Surtech was formed in 1973 to specialise in the manufacture and distribution of mechanical surface finishing equipment and materials.

Within this field we aim to provide the latest available technology from anywhere in the world. We are constantly reviewing the needs of our customers and we tailor our product range accordingly.

## HOW TO ARRANGE A VISIT

Please Ring our sales office on 0121 359 4322 and tell us when you want to visit. We can fit you in most days. Please give a brief outline of what you want to see so that we can arrange to have the most suitable machines available. Surtech trained engineers will be on hand to advise and demonstrate.

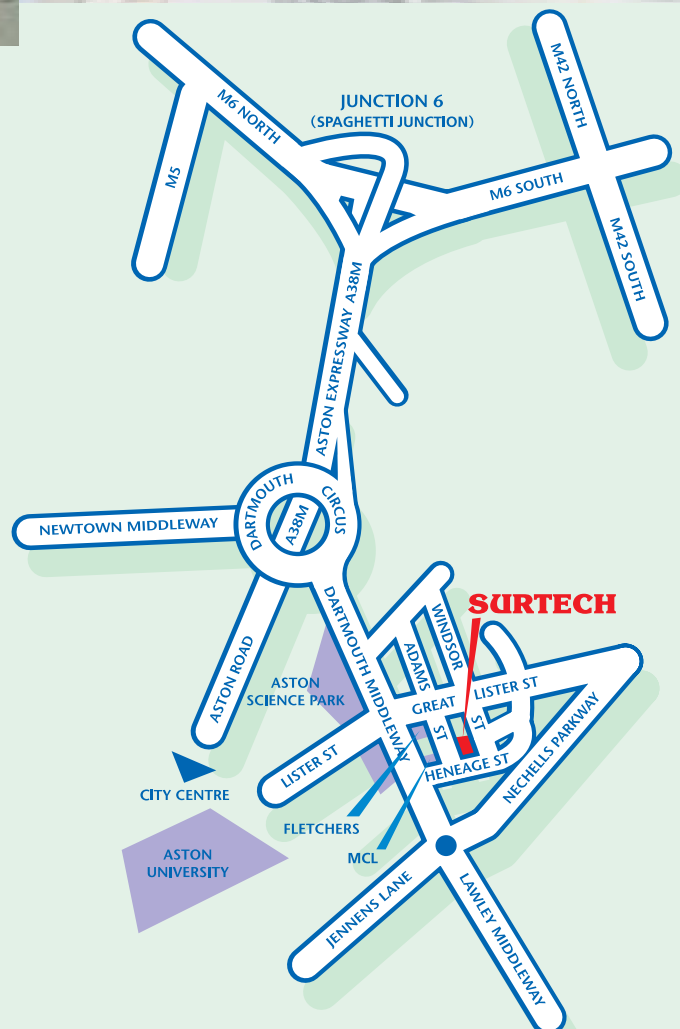
## HOW TO FIND US

Coming from **M6 North** or **South** exit at '**Junction 6**' (**Spaghetti Junction**) following signs '**Birmingham Central A38 (M)**' stay in left lane. Ignore first A38 (M) exit signposted '**Aston, Perry Barr**'.

Follow overhead signs to '**Ring Road, City Centre, Bromsgrove (A38)**'. Stay in left lane to leave roundabout at first exit and follow signs '**Wholesale and Indoor Markets**' then signs to '**Convention Centre, National Indoor Arena**' and finally '**Ring Road And Other Routes**', '**Birmingham Airport, NEC, Lichfield**'.

Stay in left lane to set of traffic lights outside '**Fletcher's Autostore**'. Stay in left lane for approx another 100m and take first left turning into '**Heneage Street**', also signposted '**The Parkway Industrial Centre**'.

Surtech are the first Company on the left after '**Adams Street**'. Park outside or opposite on the industrial estate.



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244 Heneage Street, Birmingham B7 4LY  
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Narrow belt throughfeed  
machines



Single and multi-head  
tube polishers



Single and twin long belt  
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Sheet mirror polishing  
machines

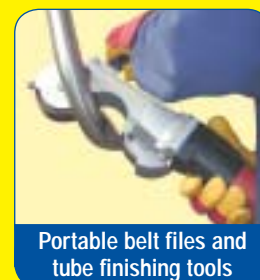
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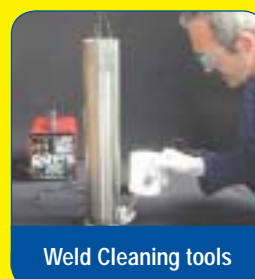
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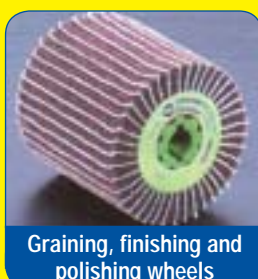
Manual sheet Deburrers



Pneumatic, expanding &  
standard contact wheels



Polishing mops  
and compo



Graining, finishing and  
polishing wheels



Narrow and wide abrasive belts for all applications