GRANLUND

GRANLUND
Machinery

Efficient manufacture of high quality tubes

The Granlund KOW tube welding mill is specially designed for manufacture of seam-welded tubes in stainless and heat-resistant alloys.
Flexible. Saves material. High output. Close tolerances

KOW-1 for continuous welding

The standard model of the tube welding mill is intended for continuous welding of bright tubes with an outer diameter between 5 and 19 mm and a wall thickness from 0.4 to 1.2 mm. The equipment consists of the following main units, assembled to form a production line:

1. Double strip dereeler.
2. Welding device for joining strips.
3. Strip accumulator
4. Strip forming rolls with stands.
5. TIG-welding unit with Arc stabilizer.
6. Calibration rolls with stands.
7. Straightening device type KRO.
8. Tube cutting device.
9. Tube receiving table.
10. Container for cut-to length tubes.

Tube cutting

The cutting method used today is of the guillotine type. Before cutting, the device is accelerated up to the same speed as the tube mill. The tube is now cut with a corresponding slight deformation of the tube.
The tube is dropped into the calibrating line where this deformation is neutralized.

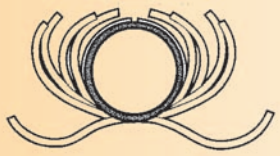
Function

The strip is drawn from the double strip dereeler and fed into the welding device where the ends are cut at right angles and joined by TIG-welding. Two strip coils can be welded together without stopping the tube welding mill, provided that the strip accumulator is used. The sufficient amount of strip can be feed into the accumulator to be used while the strip coils are welded together.
The strip is formed into a slotted tube by 8 pairs of forming rolls. The slotted tube then enters the welding box, where it is welded along the slot by means of an electric arc between itself and a tungsten electrode. The closed welding box is filled with inert gas which is also fed to the interior of the slotted tube. After welding, the tube is quenched in water and proceeds to 4 pairs of calibration rolls.

After passing a straightening device type KRO the tube proceeds through the cutting device to a receiving table. The cutting device is controlled by a length counter.

Saves material

The Kanthal method of forming tubes saves 1-1.5% of material compared to the conventional method.



Rolls

The forming of the strip as well as the calibration of the tube are operations performed by rolls with grooves which are designed for one particular tube size. At the strip forming stage there are two pairs of rolls made of hardened special steel and six pairs of tungsten sintered carbide. The four pairs of rolls in the calibration device are also made of tungsten sintered carbide.
When switching from one tube size to another, all the forming and guiding rolls, the sealing bushings at the welding box and the guide bushings for the cut-off device, have to be changed. When switching to another wall thickness but keeping the same tube diameter only the guide rolls and the first pair of forming rolls should be changed. A slight difference is accepted by the rolls i. e. 0.1-0.2 mm increase or decrease in strip width.
All rolls can be set vertically as well as horizontally. The rolls can be set an overall 0,5 mm from the normal setting giving the required tube diameter. This is used in order to compensate for wear, and thus extend the life of the rolls.

High output

The maximum tube welding speed depends on the type of alloy and quality of the strip. composition can have a significant effect on the welding speed.

Close tolerances

Normal recommended tolerances for the strip are:
width ±0.1 mm
thickness +0/- 0.05 mm or +0.015/- 0.035 mm. The strips must not have a camber exceeding 1 mm/m. An ovality of the tubes of ±0.04 mm can be obtained
with new rolls. With worn rolls the ovality will increase

Auxiliary equipment

If black annealed tubes are required the welding mill can be supplied with high frequency annealing.
To control the quality of the welding seam an Eddy current tester can be supplied.

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GRANLUND

GRANLUND
Machinery

Efficient manufacture of high quality tubes

The Granlund KOW-HD tube welding mill is specially designed for manufacture of seam-welded tubes in stainless and heat-resistant alloys.
Flexible. Saves material. High output. Close tolerances

KOW-HD for continuous welding

The new model of the tube welding mill is intended for continuous welding of bright tubes with an outer diameter between 10 and 30 mm and a wall thickness from 0.8-1.5 mm. The equipment consists of the following main units, assembled to form a production line:

1. Double strip dereeler
2. Welding device for joining strips
3. Strip forming rolls with stands
4. TIG-welding unit with Arc stabilizer
5. Calibration rolls with stands
6. Straightening device
7. Tube cutting device
8. Tube receiving table with sorting
9. Container for cut-to length tubes

Tube cutting

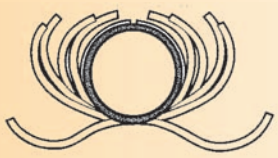
The cutting method used today is of the guillotine type. Before cutting, the device is accelerated up to the same speed as the tube mill. The tube is now cut with a corresponding slight deformation of the tube.
The tube is dropped into the calibrating line where this deformation is neutralized.

Function

The strip is drawn from the double strip dereeler and fed into the mill. The strip is formed into a slotted tube by 14 pairs of forming rolls. The slotted tube then enters the welding box, where it is welded along the slot by means of an electric arc between itself and a tungsten electrode. The closed welding box is filled with inert gas which is also fed to the interior of the slotted tube. After welding, the tube is quenched in water and proceeds to 4 pairs of calibration rolls. After passing a straightening device, the tube proceeds through the cutting device to a receiving table. The cutting device is controlled by a length counter.

Saves material

The GRANLUND method of forming tubes saves 1-1.5% of material compared to the conventional method.



Rolls

The forming of the strip as well as the calibration of the tube are operations performed by rolls with grooves which are designed for one particular tube size.
The forming and calibrating rolls can be supplied in hardened special steel or tungsten sintered carbide.
When switching from one tube size to another, all the forming and guiding rolls, the sealing bushings at the welding box and the guide bushings for the cut-off device, have to be changed. When switching to another wall thickness but keeping the same tube diameter only the guide rolls and the first pair of forming rolls should be changed. A slight difference is accepted by the rolls i.e. 0.1-0.2 mm increase or decrease in strip width.
All rolls can be set vertically as well as horizontally. The rolls can be set an overall 0.5 mm from the normal setting giving the required tube diameter. This is used in order to compensate for wear, and thus extend the life of the rolls.

High output

The maximum tube welding speed depends on the type of alloy and quality and thickness of the strip. Composition can have a significant effect on the welding speed.

Close tolerances

Normal recommended tolerances for the strip are:

- width ±0.1 mm
- thickness +0/-0.05 mm or +0.015/-0.035 mm

The strips must not have a camber exceeding 1 mm/m.

Auxiliary equipment

If black annealed tubes are required the welding mill can be supplied with high frequency annealing.
To control the quality of the welding seam an Eddy current tester can be supplied.

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4. TUBE MANUFACTURING
KOW, KSA, KCH, KCT, KOG, KCL, KOS

GRANLUND Machinery offers a complete range of machines for production of seam welded tubes. These machines enables continuous welding of strip, cutting to desired length, calibrating ends and cleaning

GRANLUND KOW-HD	tube welding mill "Heavy-duty".
GRANLUND KOW-M	tube welding mill standard
GRANLUND KSA	strip accumulator
GRANLUND KCH	tube cutting head
GRANLUND KCT	tube cutting table
GRANLUND KOG	tube calibrating unit
GRANLUND KCL	tube cutting line
GRANLUND KOS	tube cleaning equipment

For information on straightening devices, GRANLUND KRO and KRH, see chapter 9.

KOW-HD
Tube Welding line, comprising KOW-HD with accessories.

The best way for element manufacturers to control the tube stock and minimize stock costs, is to produce the tubes themselves. (It is also wise to minimize the number of tube sizes.) GRANLUND offers a tube welding mill intended for continuous welding of thin walled tubes for various applications.

- fast operation
- high quality of tubes
- easy change of tube size
- close tolerances
- turn-key installation

The quality of the strip is very important (cleanliness, burrs and dimension tolerances).

Construction

1. Double strip dereeler
2. Welding device for joining strip
3. Strip accumulator, type KSA (option)
4. Forming rolls with stands (14 pairs)
5. TIG welding unit with rectifier and arc stabilizer (arc stabilizer is optional)
6. Calibrating rolls with stands (4 pairs)
7. Eddy current tester (option)
8. Straightening device, type Turk´s head.
9. Tube cutting device, type KCT
10. Receiving table, type KOM-2W, and trolley, type KTT (option)
11. Calibrating and deburring unit, type KOG (option)
12. Hyperbolic straightening mill, type KRH (option)

1. Double strip dereeler
Takes 500 kg on each side. It is easy to turn around when the strip ends are to be welded together. To get the right tension of the strip, simple friction brakes are used. The dereeler can take all strip widths required for the tubes to be produced in the mill.

2. Welding device for joining strip
Movable and should stand at a distance of 1-1,5 m from the dereeler. The welding is done manually by means of a TIG welder. The ends are cut perpendicular (90°) to the strip side (if not, the joint may brake when formed into a tube). Argon or argon/hydrogen protection gas is used.

3. Strip accumulator, type KSA (option)
This device is needed for continuous production. It provides the operator with time to weld the ends of two coils of strip together.

The alternative would be to put a sufficient length of strip on the floor while the two ends are welded together. This could damage the results, e g if there is grease or oil on floor. Contaminations like these may cause holes in the tube.

4. Forming rolls with stands (14 pairs)
All forming rolls, except pairs 4 and 5, for which the wear is less severe, are made of tungsten carbide as standard. Seven rolls stands are operating in vertical position and seven in horizontal.

As standard, tube diameters up to appr. Ø30 x 1,5 mm can be produced.

5. TIG welding unit with rectifier and arc stabilizer (arc stabilizer is optional)
The tube is protected by inert gas, both inside and outside of the tube, in the welding box. The TIG welding unit (rectifier and torch), specially designed for this machine, has a capacity of 500 A in continuous running. The machines are normally equipped with an optional arc stabilizer, Cyclomatic 70B (solenoid around electrode - ”double cyclomatic”). Stabilizer is a requirement, if higher production speeds should be reached. It works both as a stabilizer for the arc and a preheater of the strip.

The stabilizer can also be used for occilation of the arc, if the strip thickness is large, or if even higher production speeds should be achieved. The welding unit is equipped with a high frequency start.

The two pair of pressing rolls (water cooled) in the welding box can be adjusted during operation. The tube is water cooled directly after the welding box.

6. Calibrating rolls with stands (4 pairs)
The calibrating part consist of four pair of rolls, two vertical and two horizontal. All rolls are made of tungsten carbide.
An adjustment of the final diameter can be made, within certain limits (the tube diameter is kept on the plus tolerance side before calibrating). If the strip is too narrow or too wide from the start, the adjustment will be difficult, if not impossible.

7. Eddy current tester (option)
Every machine, since 1974, has been equipped with and Eddy current tester for in-line testing of the tube, i e to control the quality of the welding seam (normall it only tests the weld, not the entire tube section). The device can either be used for automatic cut away of the faulty part, or automatic selection in good and bad.

Standard tester is Milli Q, but we can supply other brands, e g Förster or Prüftechnik, on request.

8. Straightening device, type Turk´s head.
For prestraightening of the tubes.

9. Tube cutting device, type KCT
Normally, this guilliotine type cutting device is used. For bigger tube sizes, an abrasive disc (rotary cutter) or saw can be used.

The advantage with the guilliotine cutter is that the burrs will be very small. No particles are left inside the tube. The life time of the blade, before sharpening is required, is very long, and many regrindings can be made.

For more information on KCT, see separate sheet in this chapter.

10. Receiving table, type KOM-2W, and trolley, type KTT (option)
Normally, when the welding line is equipped with the KCT cutting table, a separate receiving table is not required. In other cases, however, the line may be equipped with the KOM-2W; a two-way, sorting, receiving table equipped with wheels for easy moving. (For more information, see chapter 14.) In such a case, a separate trolley, type KTT, is used for cut tubes (4 or 6 m standard lengths).

11. Calibrating unit, type KOG (option)
For information, see seperate sheet in this chapter. After passing the KOG, the tubes are ready for the filling operation.

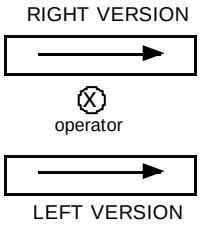
12. Hyperbolic straightening line, type KRH (option)
For very high demands on straightness and roundness, a hyperbolic straightening line, type KRH, can be supplied in line with the welding mill. For information, see chapter 9.

Gas mixer (option)
Required if the customer cannot find mixed gas.

Technical data

Control system		Mitsubishi MAC-90 PLC
Total height		1600-1800 mm
Total length		14-20 m (complete line), 5,7 m (welding mill only)
Width		appr 2500 mm
Weight		appr 4500 kg (complete line), 3600 kg (welding mill only)
Production speed (theoretical)		5 - 20 m/min depending of wall thickness.
Tube diameter		
	max	30 mm (guilliotine cutter).
Typical tolerance on tube		±0,04 mm
Wall thickness	min	0,5 mm
	max	1,5 mm.
Tube length after cutting	max	3000 mm (standard, longer on request)
Strip coil		max outer diameter = 1250 mm min inner diameter = 300 mm max inner diameter = 600 mm coilweight: max 500 kg.
Electrical connection		three-phase 400 V, 50/60 Hz, 120 A
Air supply		min 600 kPa, dry and oil-free
Argon consumption		200 - 500 l/hour (we recommend 95% Ar/5% H_2)
Water consumption		600 - 1000 l/hour

Right and left versions available:



Required information when ordering

- type of tube material
- tube diameter and wall thickness
- electrical connection
- right or left version

1 week training in Hallstahammar and 1-2 weeks installation is normally included

KOW-M
Tube Welding Mill

The best way for element manufacturers to control the tube stock and minimize stock costs, is to produce the tubes themselves. (It is also wise to minimize the number of tube sizes.) GRANLUND offers tube welding mills intended for continuous welding of thin walled tubes for various applications.

- fast operation
- high quality of tubes
- easy change of tube size
- close tolerances
- turn-key installation

The operator does not have to be a skilled welder. The quality of the strip is very important (cleanliness, burrs and dimension tolerances).

Construction

1. Double strip dereeler
2. Welding device for joining strip
3. Strip accumulator, type KSA (option)
4. Forming rolls with stands (8 pairs)
5. TIG welding unit with rectifier and arc stabilizer (arc stabilizer is optional)
6. Calibrating rolls with stands (4 pairs)
7. Eddy current tester (option)
8. Straightening device, type KRO
9. Tube cutting device, type KCT
10. Receiving table, type KOM-2W, and trolley, type KTT (option)
11. Calibrating and deburring unit, type KOG (option)
12. Hyperbolic straightening mill, type KRH (option)

1. Double strip dereeler

Takes 150-250 kg on each side. It is easy to turn around when the strip ends are to be welded together. To get the right tension of the strip, simple friction brakes are used. The dereeler can take all strip widths required for the tubes to be produced in the mill.

2. Welding device for joining strip

Movable and should stand at a distance of 1-1,5 m from the dereeler. The welding is done manually by means of a TIG welder. The ends are cut perpendicular (90°) to the strip side (if not, the joint may brake when formed into a tube). Argon or argon/hydrogen protection gas is used.

3. Strip accumulator, type KSA (option)
This device is needed for continuous production. It provides the operator with time to weld the ends of two coils of strip together.
The alternative would be to put a sufficient length of strip on the floor while the two ends are welded together. This could damage the results, e g if there is grease or oil on floor. Contaminations like these may cause holes in the tube.

4. Forming rolls with stands (8 pairs)
All forming rolls, except pairs 4 and 5, for which the wear is less severe, are made of tungsten carbide as standard. Five rolls stands are operating in vertical position and three in horizontal.

The vertical roll stands have open shafts, which makes it easy and quick to change rolls. The shafts are prepared for support bearings (bearing box kit) when tube diameters and wall thicknesses increase.

As standard, tube diameters up to appr. Ø19 x 1,0 mm can be produced. Normally, up to Ø12 mm tubes are produced.

5. TIG welding unit with rectifier and arc stabilizer (arc stabilizer is optional)
The tube is protected by inert gas, both inside and outside of the tube, in the welding box. The TIG welding unit (rectifier and torch), specially designed for this machine, has a capacity of 400 A in continuous running. The machines are normally equipped with an optional arc stabilizer, Cyclomatic 70B (solenoid around electrode - ”double cyclomatic”). Stabilizer is a requirement, if higher production speeds should be reached. It works both as a stabilizer for the arc and a preheater of the strip.

The stabilizer can also be used for occilation of the arc, if the strip thickness is large, or if even higher production speeds should be achieved. The welding unit is equipped with a high frequency start.

The two pair of pressing rolls (water cooled) in the welding box can be adjusted during operation. The tube is water cooled directly after the welding box.

6. Calibrating rolls with stands (4 pairs)
The calibrating part consist of four pair of rolls, two vertical and two horizontal. All rolls are made of tungsten carbide.The vertical roll stands have open shafts, which makes it easy and quick to change rolls. The shafts are prepared for support bearings when tube diameters and wall thicknesses increase.

An adjustment of the final diameter can be made, within certain limits (the tube diameter is kept on the plus tolerance side before calibrating). If the strip is too narrow or too wide from the start, the adjustment will be difficult, if not impossible.

7. Eddy current tester (option)
Every machine, since 1974, has been equipped with and Eddy current tester for in-line testing of the tube, i e to control the quality of the welding seam (normall it only tests the weld, not the entire tube section). The device can either be used for automatic cut away of the faulty part, or automatic selection in good and bad.

Standard tester is Milli Q, but we can supply other brands, e g Förster or Prüftechnik, on request.

8. Straightening device, type KRO
For information, see chapter 9. The drive motor is synchronized with the welding mills drive motor.

9. Tube cutting device, type KCT
Normally, this guilliotine type cutting device is used. For bigger tube sizes, an abrasive disc (rotary cutter) or saw can be used.

The advantage with the guilliotine cutter is that the burrs will be very small. No particles are left inside the tube. The life time of the blade, before sharpening is required, is very long, and many regrindings can be made.
For more information on KCT, see separate sheet in this chapter.

10. Receiving table, type KOM-2W, and trolley, type KTT (option)
Normally, when the welding line is equipped with the KCT cutting table, a separate receiving table is not required. In other cases, however, the line may be equipped with the KOM-2W; a two-way, sorting, receiving table equipped with wheels for easy moving. (For more information, see chapter 14.) In such a case, a separate trolley, type KTT, is used for cut tubes (4 or 6 m standard lengths).

11. Calibrating unit, type KOG (option)
For information, see seperate sheet in this chapter. After passing the KOG, the tubes are ready for the filling operation.

12. Hyperbolic straightening line, type KRH (option)
For very high demands on straightness and roundness, a hyperbolic straightening line, type KRH, can be supplied in line with the welding mill. For information, see chapter 9.

Gas mixer (option)
Required if the customer cannot find mixed gas.

Technical data

Control system		Mitsubishi MAC-50 PLC
Total height		1600-1800 mm
Total length		14-20 m (complete line), 4 m (welding mill only)
Width		appr 2500 mm
Weight		appr 3000 kg (complete line), 1500 kg (welding mill only)
Production speed (theoretical)		0 - 16 (20) m/min
Tube diameter	min	4-6 mm (4 mm requires a certain wall thickness)
	max	19 mm (guilliotine cutter)
Typical tolerance on tube		±0,04 mm
Wall thickness	min	0,3 mm
	max	1,0-1,2 mm (see below)
Tube length after cutting	max	3000 mm (standard, longer on request)
Strip coil		max outer diameter = 1250 mm min inner diameter = 300 mm max inner diameter = 600 mm
Electrical connection		three-phase 400 V, 50/60 Hz, 63 A
Air supply		min 600 kPa, dry and oil-free
Argon consumption		200 - 500 l/hour (we recommend 95% Ar/5% H_2)
Water consumption		200 -400 l/hour

For a wall thickness of 1,0 mm or thicker, we recommend double supports (option) for the bearing boxes, regardless of tube diameter.

Right and left versions available:

Required information when ordering

- type of tube material
- tube diameter and wall thickness
- electrical connection
- right or left version

1 week training in Hallstahammar and 1-2 weeks installation is normally included.

KCH
Cutting Head

GRANLUND KCH is used for cutting thin walled tubes. It is sold separately or mounted on the Cutting Table GRANLUND KCT or the Cutting Line GRANLUND KCL.

Construction
KCH is a guilliotine-type of cutting device with a knife, clamps holding the tube in position and a hydraulic device.

Technical data
El.connection three-phase 400 V, 3000 W

KCT
Cutting Table

GRANLUND KCT is used for cutting thin walled tubes into desired lengths. It is meant to be placed in line with a tube welding mill and to cut the welded tubes directly into desired final lengths. It is equipped with the GRANLUND Cutting Head, KCH.

KCT is often followed by a calibrating unit, GRANLUND KOG.

Construction and function

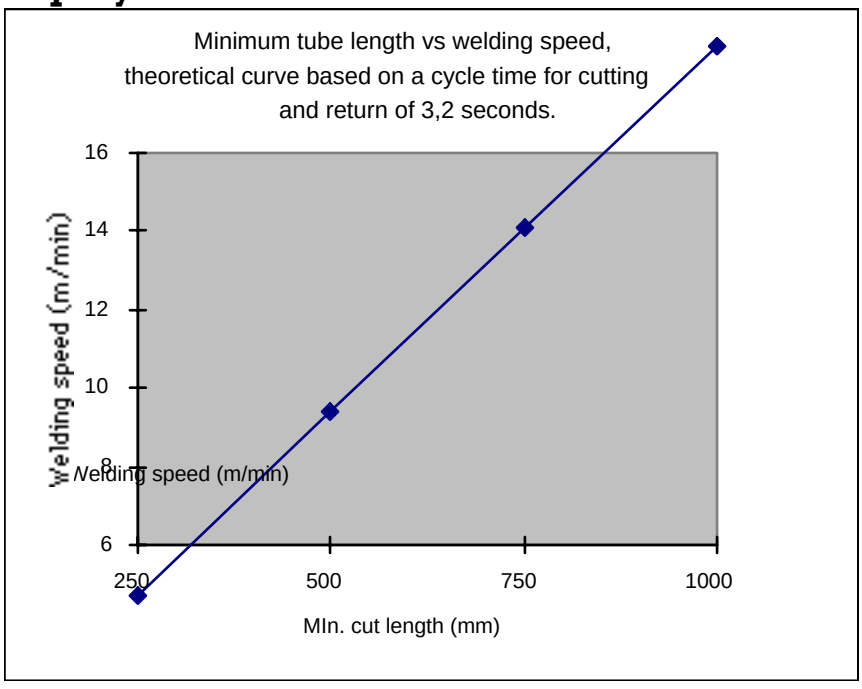
The cutting head, KCH, is mounted on a moving table. When the KCT gets a signal from the control system (in automatic mode) or a manual order to cut the tube, it ”hunts down” the tube and cuts it. Subsequently it is sorted by a tilting receiving table to the next operation (or sorted out as reject).

An eddy current testing device detects weld faults and KCT cuts and sorts out the defective part as a reject.

KCT is equipped with a control unit where the order and production parameters are set.

Technical data

Inquiry data



KOG
Calibrating Unit

The calibrating unit comes as a natural sequence after cutting. The tubes go directly to a walking beam feeder, which feeds one end into a calibrating tool. The tool is tapered and presses out the small deformation from cutting.

After calibrating one side, the tube is tranported over for calibrating the opposite end. As the cutting device is very rapid, very short lengths can be calibrated. Shortest length is 250 mm, and the longest is 3000 mm (6000 mm as option).

The tubes are now ready for the filling operation.

KOG is available in two versions: hydraulic (KOG-H) and pneumatic (KOG-P). The hydraulic version is suitable when heavy sizes of tubes are produced. The pneumatic version is normally suitable for production of tubes for tubular heating elements.

- clean deburring of both ends
- automatic operation
- can be placed in line with the tube welding mill

Technical data

Height		1000 mm
Length		4300 mm
Width		900 mm
Weight		appr 600 kg
Tube length	min	300 mm
	max	3000 mm (6000 mm as option)
Tube diameter	min	6 mm
	max	12 mm
Wall thickness	min	0,3 mm
	max	1,0 mm
Air supply	min	6 bar (600 kPa), large flow required

The cycle time is appr 3 seconds, i e appr 1200 tubes per hour.

Required information when ordering

- diameter, length and wall thickness of tube
- electrical connection
- to be used in line with a tube welding mill?
- hydraulic or pneumatic version?

KCL
Cutting Line

GRANLUND KCL is used for cutting standard length (precut) thin walled tubes into desired final lengths. It is, as oppposed to *KCT*, not meant to be placed in line with the tube welding mill, but to operate separately. Therefore, it is equipped with a magazine, storing the precut tubes.

KCL is equipped with the GRANLUND Cutting Head, *GRANLUND KCH*.

Construction and function

The KCL is equipped with a PLC system and a terminal with 4x20 digits. The desired cut length is set at the control panel. The length data can be changed during operation, i e no set-up time.

Too short and too long tubes are sorted out.

Changing to a new tube diameter takes about 2 hours, and requires changing:
- calibrating mandrels,
- clamping jaws in cutting device and calibrating device,
- tube holder,
- guide bushings and
- adjustment of slot in feeding device

Technical data

Tube materials	mild steel, stainless steel, high temperature steel	
Tube diameter	min	6 mm
	max	12 mm
Wall thickness	min	0,3 mm
	max	0,8 mm
Initial tube length	min	3000 mm
	max	6200 mm
Cut length	min	300 mm
	max	3000 mm
Container width	350 mm (e g appr 35 pcs Ø10 mm tubes or 55 pcs Ø6 mm tubes)	
Length tolerance	±1 mm	
Cycle time	normally 3-5 seconds per tube	
Max usage of tube	> L-150 mm	
Clean cut on front end	10-50 mm	
Time to change to new tube length:		can be made during on-going production
Time to change to new tube diameter:		appr 2 hours.

Capacity (only given as an indication)

Example 1: 1000 mm cut tubes from 6000 mm initial tube length
Feeding plus five cuts takes 5 x 4 s + 10 s = 30 s per five tubes (6 s/tube)
=> **12 pcs/min or 720 pcs/h**
(Waste part 995 mm)

Example 2: 500 mm cut tubes from 6200 mm initial tube length
Feeding plus twelve cuts takes 12 x 3 s + 10 s = 46 s per twelve tubes (3,8 s/tube)
=> **15,5 pcs/min or 940 pcs/h**
(Waste part 188 mm)

Inquiry data

KOS
Tube Cleaning Equipment

After cutting and deburring, the tubes are often internally contaminated. The contamination can normally not be removed by degreasing, but requires a mechanical method.

A common method is to use a rotating brush. The disadvantage with this method is the contamination of the brush, which after some time may make the tubes more dirty after the ”cleaning” operation than before.

To avoid this problem, the cleaning media should be used only once. GRANLUND KOS provides an efficient cleaning of tubes by blowing plugs of expanded polyethylene (XPE).

- quick and easy cleaning
- friendly to the environment
- low maintenance cost

Construction and function

A pneumatic tool punches out the cylindrical plugs of expanded polyethylene out of a strip, and blows these plugs through the tubes.

The tube to be cleaned is guided manually into the punching tool, which is connected to compressed air. The punching is started by pressing a foot pedal. Simultaneously with the punching of the plug, there is an air pressure built up behind the plug which blows the plug through the tube removing any burrs and solid dirt which remain inside the tube.

The pneumatic punch automatically feed a new plug into punching position.

Technical data

Height x Width x Length		1050 x 320 x 600 mm
Weight		75 kg
Tube outer diameter	max	13 mm (KOS-13)
	max	19 mm (KOS-19)
Production rate		25-40 tubes/minute
Air pressure		6 atm
Air consumption		0,2 l/stroke

Required information when ordering

• outer and inner diameter of tube