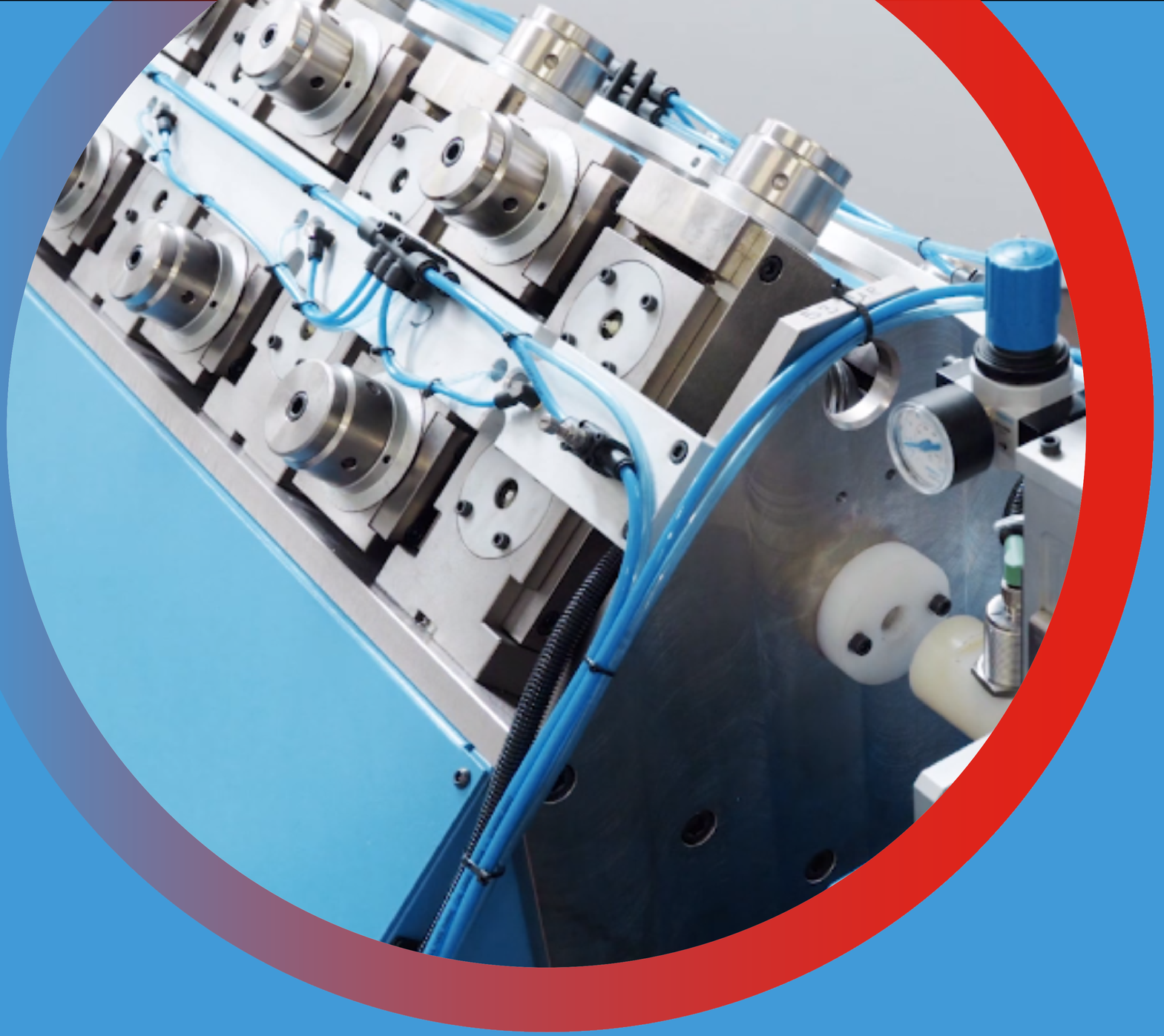
CSM MACHINERY

OAKLEY
INDUSTRIAL MACHINERY

Roll Reducing Mill

Rolling mill for reducing the diameter of tubular heating elements, increasing MgO compression and elongation.



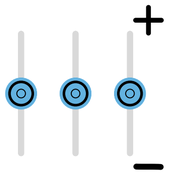
Machine composition

- Machine stand with 2 HP motors with gearboxes
- Transmission shafts
- Bearing box assembly with rolls (tool steel or tungsten carbide)
- Integrated straightening device (other straighteners available on request)

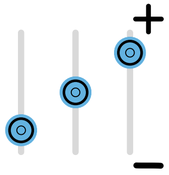
The gearbox shafts are connected by transmission shafts.
The bearing box assembly is set for a specific diameter reduction and can be replaced in approximately **30 minutes** to change to a new size.
The rolls are made of **tool steel** or **tungsten carbide**, all with the same diameter.
Their optimized profile prevents crease formation at the ends of the heating elements.
Guide bushings between each roll pair ensure correct element guidance throughout the rolling process.
After the final roll set, the tubes pass through a **roll straightener (Turk's head)** and are extracted by **motor-driven rubber rolls** positioned outside the mill.

Machine composition

Two families of roll reducers are available:



FIXED SPEED
Roll reducing mill with rolls having the same rotation speed
Each pair of roll is driven by a motor/gearbox with a fixed speed



VARIABLE SPEED
Roll reducing mill with individual speed control for each pair of rolls.
Roll speeds are programmable via **frequency inverters** according to tube elongation and material type.
Each roll pair operates at a speed matched to the tube's elongation, minimizing friction between rolls and tube. This results in **reduced heat generation, extended roll life, and improved straightness of the heating elements.**
Up to **five preset speed programs** can be stored for different tube materials.
Main advantages of the variable speed version:

- Proportional speed adjustment based on material elongation
- Reduced roll sliding, limiting wear and improving linearity
- Stored speed ranges for different tube materials
- Greater straightness of the finished heating element

Technical characteristics

Material of tube to be reduced	Stainless steel, copper
Min. length of heating element	250* mm (9.84″)
Tolerance on heating element diameter after diameter reduction (new rolls)	±0.05 mm (0.001″)
Rolling axis height from base	915 mm (36.02″)
Power supply	V to be defined
Dimensions • 8 station roll reducing mill - weight 1200 Kg (2645 lb) • 12 station roll reducing mill weight 1800 kg (3968 lb)	 1350×1700xH1130 mm (53×67xH44″) 1670×1700xH1130 mm (66×67xH44″)
Reduction in the area of the section (up to)	30% (8-station roll reducing mill) 35% (12-station roll reducing mill)
Speed	See available versions

* When the roll reducing mill is equipped with a marking device or with a marking device + lubricating system with a spray nozzle, the minimal length increases as follows:

- minimal length of the heating element if the roll reducing mill is equipped with a marking device: 350 mm (14″)
- minimal length of the heating element if the roll reducing mill is equipped with the marking device and the lubricating system with the spray nozzles: 420 mm (16.5″)

NOTES

The minimum safety distance between tubes should be **one third of the element length,** in order to make place for elongation. If this is not respected, a failure may occur which may result in bent shafts, cracked bearings or cracked rolls (carbide rolls).
The capacity (elements per hour) can be estimated to: rolling speed / (element length + safety distance).
For example the rolling mill mod. 140/08.A40000 has a rolling speed of 20 m (65.6′)/min.
When rolling 1000 mm (39″) long elements and keeping 333 mm (13″) safety distance, the capacity is 20 m/min / 1,333 m = 15 elements/ minute = 900 elements per hour.

Technical characteristics

AVAILABLE VERSIONS

The maximum recommended reduction in area for the 8-station machine is 30% of the starting area, and for the 12-station machine, this is increased to 35%.

The **8-station version** has 8 pairs of rolls, of which six have reducing function and two have calibrating function.

Model	Speed m (ft)/min.	Material of the rolls	Max tube Ø	Inst. power kVA
140/08.A40000	Fixed - 20 m/min (65.6'/min)	Tool steel	12 mm (0.47")	20 kVA
140/08.W40000	Fixed - 20 m/min 65.6'/min)	Tungsten carbide	12 mm (0.47")	20 kVA
142/08.A50000	Variable - 0-22 m/min (0-72'/min)	Tool steel	12 mm (0.47")	18 kVA
142/08.W50000	Variable - 0-22 m/min (0-72'/min)	Tungsten carbide	12 mm (0.47")	18 kVA

The **12-station version** has 12 pairs of rolls, of which ten have reducing function and two have calibrating function.

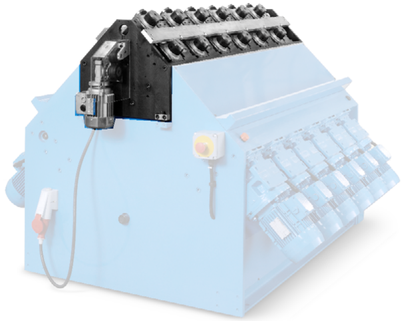
Model	Speed m (ft)/min.	Material of the rolls	Max tube Ø	Inst. power kVA
140/12.A40000	Fixed - 20 m/min (65.6'/min)	Tool steel	19 mm (0.74")	29 kVA
140/12.W40000	Fixed - 20 m/min (65.6'/min)	Tungsten carbide	12 mm (0.47")	29 kVA
142/12.A50000	Variable - 0-22 m/min (0-72'/min)	Tool steel	19 mm (0.74")	25 kVA
142/12.W50000	Variable - 0-22 m/min (0-72'/min)	Tungsten carbide	12 mm (0.47")	25 kVA

The advantages of the 12-station rolling mill compared to the 8-station version are:

- Lower reduction requirement in each pair of rolls reduces wear, improving rolls' life
- The reduction of the area can be increased to 35% without risk of longitudinal fins on the tubes.
- In lower diameter reductions it is easier to obtain a correct setting of individual pairs of rolls compared to corresponding 8-station version settings.
- Tube straightness is improved.

Individual parts

HEAD (V-INSERT)



Head (V insert) with motorised unit for the extraction of the rolled elements

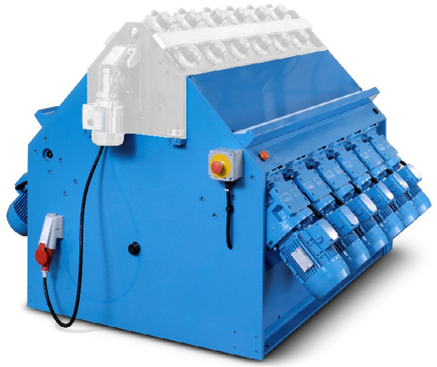
Head with rolls

Model	Number of pairs	Material
140/08.TA0000	8 pairs of rolls	Tool steel
140/08.TW0000	8 pairs of rolls	Tungsten carbide
140/12.TA0000	12 pairs of rolls	Tool steel
140/12.TW0000	12 pairs of rolls	Tungsten carbide

Head without rolls

Model	Number of pairs
140/08.T00000	8-roll version
140/12.T00000	12-roll version

MACHINE STAND



Machine stand with motors, gearboxes and electrical system

Base for 8-station roll reducing mill

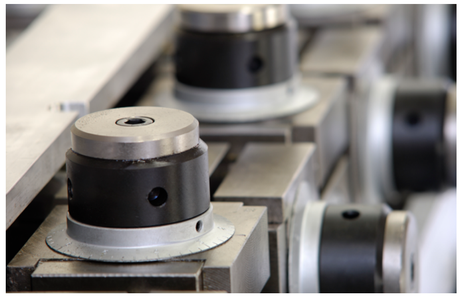
Model	Speed m (ft)/min
140/08.B40000	Fixed - 20 (65.6′)
140/08.B50000	Variable - 0-22 (0-72′)

Base for 12-station roll reducing mill

Model	Speed m (ft)/min
140/12.B40000	Fixed - 20 (65.6′)
140/12.B50000	Variable - 0-22 (0-72′)

Individual parts

REDUCING ROLLS



Reducing rolls are available in tool steel and tungsten carbide.

Model	Number of pairs	Material
140/08.RA0000	8 pairs of rolls	Tool steel
140/08.RW0000	8 pairs of rolls	Tungsten carbide
140/12.RA0000	12 pairs of rolls	Tool steel
140/12.RW0000	12 pairs of rolls	Tungsten carbide

Options

COOLING AND LUBRICATION SYSTEM

Improving the straightness of electric heating elements is one of the main challenges in the rolling process. CSM recommends this cooling and lubrication system as the preferred solution for achieving optimal straightening results, while at the same time protecting the heating element during the forming process and maximizing the service life of the machine's rolls.

The lubricant is delivered as a fine mist directly onto the tube surface, performing two functions simultaneously: it cools the tube as it passes through the rolling stands, and it forms a thin lubricating film that minimizes friction between the rolls and the tube. The combined effect is a reduction in heat generation during rolling, extended roll life, and improved straightness of the finished heating elements.

Adding this system to the rolling mill requires additional components on both the rolling head and the machine base:

ROLLING HEAD:

- Atomizing spray nozzles
- Lubricant distribution system
- Air blowing/drying bushing

MACHINE BASE ASSEMBLY:

- Dedicated lubrication atomizer
- Pneumatic assembly complete with filter

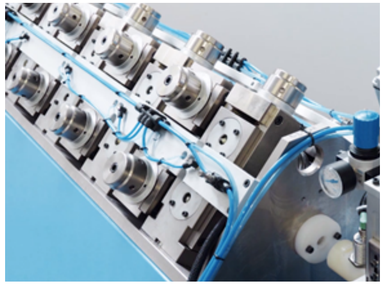
The system is available in two versions. **The recommended version uses multiple nozzles, one for each pair of rolls, cooling the element progressively at each station as compression increases along the rolling process.** A simplified version is also available, with a single nozzle located at the infeed bushing of the rolling mill.

In both versions, the activation of the cooling and lubrication system is fully automated. A single inductive sensor at the machine infeed detects the presence of the element and activates the mist system accordingly; the same sensor stops the system as soon as it no longer detects the element. Suitable delays are applied on both activation and deactivation to ensure that no moisture enters the rolling mill before the element arrives or after it has passed through.

Base and rolling head components can also be purchased separately (see codes in the table below), for customers who already have one of the two integrated on existing units and wish to complete the configuration — for example, adding an extra base to two rolling heads already equipped with lubrication, or an extra rolling head to two bases already equipped with lubrication.

LUBRICATING SYSTEM WITH MULTIPLE NOZZLES

140/08.SR0003	Complete system for 8-station reduction rolling mills
140/12.SR0003	Complete system for 12-station reduction rolling mills
140/08-12.030	Machine base assembly only (8 or 12 stations)
140/08.SR0004	Rolling head assembly only (8 stations)
140/12.SR0004	Rolling head assembly only (12 stations)



LUBRICATING SYSTEM WITH ONE NOZZLE

Mod. 140/08.SL0000

Options

TEAR AND WEAR PARTS

Set of tear and wear parts, made of a set of guide bushing and two rubber rolls (to draw the tubes out of the mill)

- **Mod. 140/08.000001** for 8-stand roll reducer
- **Mod. 140/12.000001** for 12-stand roll reducer

LUBRICANT

Vegetable-based lubricant, biodegradable and water-washable.

Model	Quantity
LUBRICANT05	5 kg (11 lb)
LUBRICANT10	10 kg (22 lb)
LUBRICANT25	25 kg (55 lb)

Rolling mill head overhaul

Dedicated overhaul service for the rolling mill head, **restoring full precision and operating reliability after wear caused by continuous high mechanical load, temperature, and vibration.**
The head houses the rolling dies, which directly determine the shape and dimensional accuracy of the finished tube; any wear or misalignment in its internal components results in out-of-tolerance straightness and an uneven outer diameter.

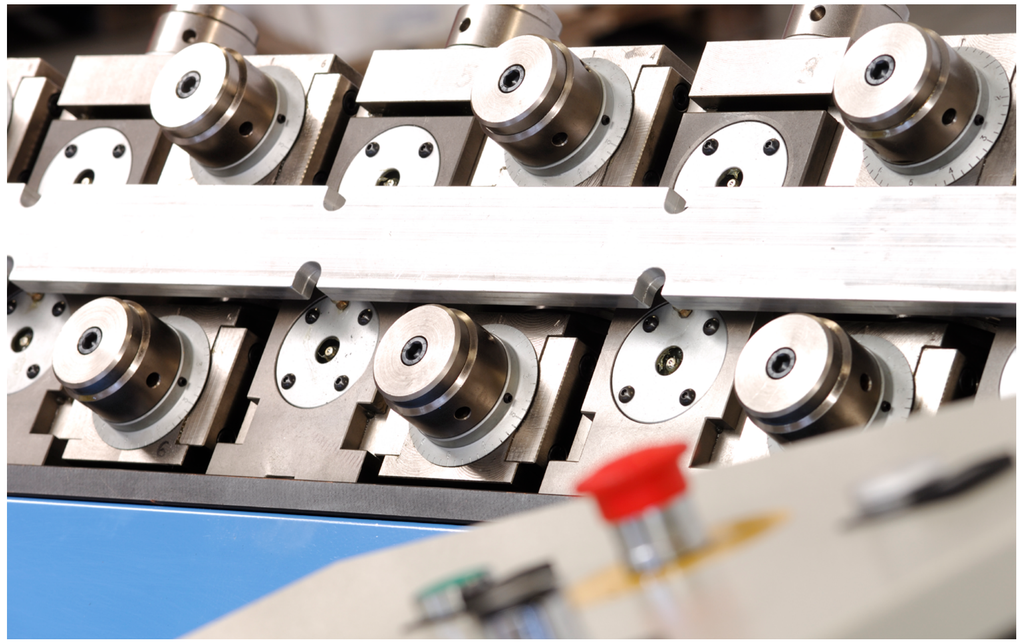
The overhaul procedure includes:

- Complete disassembly of the head and thorough cleaning of all components (turrets, vernier rings, adjustment rings);
- Full replacement of wear parts: bearings, thrust bearings, oil seals, and sealing rings;
- Replacement of rolls, roll shafts, and guide bushings;
- Restoration of upper/lower roll alignment via micrometric measurement between the roll shaft shoulder and the V-plate, using high-precision instruments;
- Reworking of critical components, where required, on high-precision machine tools;
- Adjustment of turret rings to ensure symmetrical roll spacing;
- Fine-tuning of roll gap and guide bushing alignment for smooth, accurate material feed.

Final calibration is carried out using material supplied by the customer, validating the diameter reduction under real production conditions. **Standard lead time: approximately two weeks.**

Overhaul of a rolling mill head

	8 station	12 station
with tool steel rolls	143/08.TA0000	143/12.TA0000
with tungsten carbide rolls	143/08.TW0000	143/12.TW0000
without rolls	143/08.T00000	143/12.T00000



Rolling mill head overhaul

Overhaul of a rolling mill head, with modification in metric system

This service is designed for customers operating rolling mill heads originally manufactured to imperial-system specifications. During overhaul, CSM converts all critical dimensions to the metric system, enabling full compatibility with CSM's proprietary tooling and component range, as well as with standard commercial parts available on the global market, such as metric bearings, oil seals, and sealing rings.

The conversion eliminates the dependency on non-standard or hard-to-source imperial components, reducing downtime and procurement complexity over the entire service life of the head. All modifications are carried out to the same precision standards as a standard overhaul, with full dimensional verification and final calibration under real production conditions.

Overhaul of a rolling mill head, with modification in metric system

	8 station	12 station
with tool steel rolls	143/08.TKPA00	143/12.TKPA00
with tungsten carbide rolls	143/08.TKPW00	143/12.TKPW00
without rolls	143/08.TKP000	143/12.TKP000

Overhaul of a rolling mill head, with conversion from rolls with progressively decreasing diameter to rolls having the same diameter

This service addresses a specific configuration found in older rolling mill heads, where rolls were manufactured with progressively decreasing diameters across the stations — a design originally adopted to compensate for the increase in element length resulting from diameter reduction, by proportionally increasing the peripheral speed of each successive roll.

While functional in its original context, this approach introduces significant alignment challenges: maintaining precise concentricity and straightness across rolls of different diameters is inherently complex, and even minor setup deviations result in out-of-tolerance straightness of the finished element — a critical quality parameter in heating element production.

CSM's conversion replaces the full roll set with rolls of uniform diameter across all stations. This eliminates the geometric variability of the progressive configuration, greatly simplifying roll alignment and delivering a measurable improvement in the straightness and dimensional consistency of the finished product.Where speed variation between stations is required to account for material elongation, CSM recommends pairing the converted head with a base unit equipped with an inverter-controlled drive, providing precise and continuously adjustable speed management without compromising roll geometry.

Overhaul of a rolling mill head, with conversion from rolls with progressively decreasing diameter to rolls having the same diameter

	8 station	12 station
with tool steel rolls	143/08.TA0PN0	143/12.TA0PN0
with tungsten carbide rolls	143/08.TW0PN0	143/12.TW0PN0
without rolls	143/08.T00PN0	143/12.T00PN0