Abbey and OTO mill solutions

The guarantee of functionality, safety and productivity for the production of ERW tubes.

- Dedicated to the production of any type of ERW tubes: carbon steel and stainless steel from 4.75 mm to 914.4 mm OD and wall thickness from 0.4 to 28 mm
- State-of-the-art technologies
- Innovative design and continuous Research and Development
- High quality standards and advanced manufacturing techniques
- Professional systems integration, installation, start up and training
- Fast, reliable and skilled service
Fully automated entry lines composed by Turnstiles, Loading carriages, Automatic cranes, Decoilers, Pinch Rolls and Levellers, Shear End welders/Strip joiners, Strip accumulators

DECOILER

*Machines dedicated to high speed coil unwinding, maintaining a constant strip tension*

A wide selection of decoilers to satisfy all production requests and covering the largest market range. Double mandrel, single mandrel, double cone mandrels and double step mandrels uncoilers with manual or fully automatic coil preparation.

*Production coverage:*
- Strip width from 30 to 2400 mm and strip thickness from 0.4 to 28 mm. Max coil weight 45 t.

*Sturdy equipments that has been conceived to endure the loading and high speed layoff operations of heavy coils, with a focus on operators safety*

SHEAR END WELDERS / STRIP JOINERS

*Designed to provide the most reliable, the fastest, and the most automated joining of steel coils*

Built with ample engineering safety factors and precision-machined components, our strip joiners are conceived to provide precise weld operations. They offer the possibility to perform trimming and joining of the trailing of the strip either automatically, semi automatically or manually.

*Production coverage:*
- Strip width from 30 to 2400 mm and strip thickness from 0.4 to 28 mm

*Designed to simplify weld inspection and to withstand many years of use in the most demanding applications with minimal maintenance*
STRIP ACCUMULATOR

Horizontal and vertical accumulators with improved features

Fives’ strip accumulators have been designed to offer high speed capability and high accumulation capacity, without compromising on a careful strip handling required by modern quality materials. Our equipment allows the operations of end shearing and welding to be carried out while the mill continues to run at constant speed with no stoppages or decelerations. Fives has great experience with space-saving vertical accumulators and also offers a complete range of horizontal accumulators to satisfy different needs in terms of accumulation capacity.

— Excellent accumulation capacity / dimensions ratio
— Foundation work not necessarily required
— Ease and rapidity of installation
— Minimum strip damage due to distortion or scoring
— Few manual adjustment operations and low maintenance required
— Maximum noise control during all operating phases
— Safety of use
— Great possibility of customization in terms of manual or fully automatic adjustments
OTO TUBE MILL 322 FOR AUTOMOTIVE
High precision tube mill, for high steel grades up to 1200 N/mm

OTO Tube Mill 322 is a high Precision ERW tube mill for the production of tubes for Automotive Industry
— Outside diameter tight tolerances thanks to special backlash-free clamping systems
— Forming and welding of high strength and micro alloyed materials thanks to compactness and rigidity and accurate design of stands distances

— Free of burr tube cutting system and Tube length tight tolerances for sellable cut thanks to our patented electronic control system
— Short changeover times thanks to patented quick change over systems
— High quality welding process thanks to squeezing pressure load cells and temperature control

OTO TUBE MILL 897 FOR DRAWN ON MANDREL PROCESSES
Heavy duty tube mill, high yield material

Thanks to the experience obtained during the last decade on tube mills mostly utilized in the automotive and in the D.O.M. industry, Fives OTO designed and manufactured this heavy duty mill, specifically named OTO Tube Mill 897.

Main features
— High D/T ratio
— Possibility of processing high yield materials and at the same time the production of shapes for the heavy structural industry
— High accurate control of the pull through force that each pair of rolls applies to the strip
— Easy control of the production of a wide range of tubes, thanks to a dedicated and reliable software
— Quick and repetitive change of rolls when passing from a production to another one, thanks to OTO Q.T.C. system
Large outside diameter tube mill, extremely high diameter/ thickness ratio

Fully automated tube mill for the production of high D/T ratio laser welded stainless steel process pipes for fluids and food industry.
- Raw material: Austenitic stainless steel
- Maximum tube diameter: 609 mm
- Welding process: Laser

Tube mill configuration:
- Loading Car
- Single decoiler
- Strip-joiner
- Strip accumulation tower
- Edge trimmer
- Mill section
- 4 blade orbital cutoff
- Run-out conveyor

Abbey patented TBS, the latest forming technology for medium and large mills, is the heart of the forming section that features extreme size capability of tube and pipe mills.
- 24K Forming Section
- O.D. range up to 914 mm (36” Diameter)
- Minimized tooling cost
- Reduced size changeover times
- Extreme D/T’s to be manufactured efficiently
- Setups can be “remembered” and “recalled” and automatically adjusted

Abbey 3K3H TBS & 24K TBS large mill design

Fives supplies complete lines to make heavy wall products for specialty cylinder tubes to large ERW pipe for the oil, gas and construction industries.

— The most innovative tube mill for SS tubes
— Breakdown section with universal tooling
— Weld-box with bronze ‘caterpillar’ type edge trimmer
— ETC: Easy Tool Change system for Fin-pass and Sizing
— Orbital cutoff working with HSS and TCT blades
## Fives ERW Mills Round Tube Capability Table

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<th>OD (mm)</th>
<th>Wall Thickness (mm)</th>
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### Notes
- Out of range
- Mill size to be selected according to material properties
- Difficult because of the D/T ratio
Mills for max tube OD 660.4 mm (26inches) and above are suitable for plate processing too.

If required, if product falls in the “out of range” area of the table but is adjacent to the feasible products, please contact Fives OTO for technical evaluation.
QUICK TOOL CHANGE

OTO RTC: Rapid Tool Change system
Operating principle
- Two interchangeable sets of rafts (one on the mill base and the other off-line) for mill changeovers
- A Third Stand mounted on the mill base and permanently connected to the gearboxes
  
  - Roll height adjustment to bring the rolls to the new working position thanks to high precision hydraulic motors.
  - The automatic set-up saves time because precision off-line roll height adjustment is not necessary, tooling set-up being performed automatically from the main control desk.
  - The complete raft changeover of the forming, finish-pass, sizing and straightening sections is carried out in approximately 20-30 minutes, even on heavy mills.
  - Compactness and ease of handling of the rafts, which are not equipped with universal joints (in this system the universal joints are permanently on the mill, connected to the third stand).

OTO QTC: Quick Tool Change system
OTO Quick Tool Change system QTC, which enables a drastic reduction in downtime during mill changeover operations, is based on the principle of two interchangeable sets of rafts (one on the mill base and the other off-line) for mill changeovers.

With this solution the operator simply installs and sets up the rolls off-line so they are ready for the new tube size to be produced at the time of the next mill changeover.

OTO ETC: Easy Tool Change system
Operating principle:
- Mill configuration specifically designed to execute very quick change on large tube dimensions machines.
- A set of driven shafts and side roll supports assemblies fitted with rolls on line and one or more additional set out of line already equipped with different rolls for the production of new dimensions.

With this system the operators will have the possibility to maintain different productions “just in time” in one only shift.
The Abbey Patented Quick-change system is one of the most productive systems for quick change. This advanced system reduces change time drastically and yet is simple to use and maintain. It is the most cost-effective system for this type of mill in order to get to an advanced level of quick-change.

Our mills can be supplied with the CCT System in stages:
- Quick Change Ready (for future quick change)
- Additional Sub Plated Sections (for lift-off quick change)
- Addition of Third Stands (with driven push/pull used for lift-off sub-bases)
- Full On-Line CCT Quick Change System (with driven carts)
- Off-Line Quick Change Devices

— Cassette System with CCT carts usually take less than 30 minutes to change over.
— Eliminate the use of mill cranes for the on-line staging and interchanging of the cassettes
— Mill driven spindles remain in place in the stand as the cassette housing allows easy access to the rolls off line
— All adjustments are powered and automatic sequencing is used to load and unload the cassettes
— The cassette roll changeover system can be used on the fin, weld, pullout and sizing passes

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OTO HSU MILLS

A technology dedicated to the universal forming of Hollow Sections

OTO HSU Mills technology, based on high quality standards, guarantees the possibility to produce hollow sections within a certain range of dimensions and thickness without changing rolls, saving set up time, reducing maintenance and facilitating the use of the machine.

With OTO Universal forming system, square and rectangular sections are directly welded without going through the welding process of round tubes and subsequent shaping into four rolls sizing stands or turkshead sections.

This special forming system guarantees very interesting material savings and it provides the use of the same set of rolls to cover the complete range of products of the machine, drastically reducing the tooling costs that in a conventional tube mill represent one of the heaviest components of the total investment.

The use of the same rolls for every dimension allows a very fast changeover time and facilitates a real just in time production.

The process is completely automated and it is easily controlled by the operator.

— No rolls change required
— Saving time and space
— Reduced changeover time
— Costs reduction for rolls investment
— Rolls management optimization
— Material saving
— Just in time production
— High automation through the use of the “Mill Manager” software
— Minimal intervention of the operator required for tuning
— Easy maintenance thanks to easy access and good visibility
Operators friendly CUT-OFF with 90% of energy savings. New generation motion control card to enable faster and more precise control of cut-off trolley and scrap reduction.

**FLYING CUT-OFF**

The most complete range of flying cutoffs.
- Heavy-duty friction saw cutoffs
- Cold saw cutoffs
- Double shear cutoffs with mechanical clutch or hydraulic actuators
- Orbital cutoffs
- Carbide tool rotary cutoffs
- Laser and Plasma cutoffs
- Bandsaw cutoffs
- Cutoffs specially designed for inside scarfed tubes and for special profiles.

- Cutting speed adjustment to allow the use of all cold saw blades currently available (HSS, coated screwed tips, TCT) Minimum cut tolerances, with a guaranteed bar length tolerance of ± 1.0 mm at maximum operating speed
- Maximum quality levels: perfect clean in-line cut without distortion or burr
- Ease of use thanks to Cutoff Manager system enabling to set and to record all key cutting and statistical parameters
- High precision and reliability
- Minimal and easier equipment maintenance and longer blade life
- Proprietary control board card (Eltav 6) to optimize the cutting sequences and allowing a large variety of optimization features

**ORBITAL CUT-OFF**

Orbital milling cut-offs TOAC series are designed specifically for tube lines that require cuts without burr on a wide production range.

The use of 4 cutting heads means that you can considerably reduce cutting times and consequently increase the line’s speed. The machine is however designed to be able to work with just two cutting heads as well. Small diameter blades are used: this means greater rigidity, lower level of vibrations and consequently improved finishing and longer life of the blades.

- Universal clamping system.
- Outstanding carriage stroke: long stroke means high mill speeds for long cutting times. The tube is supported correctly throughout the whole stroke by mobile supports.
- Cutoff manager and oscilloscope: the machine is complete with software (cutting parameter management) and acquisition system of the main parameters (speed and current of motors) to be able to constantly monitor operational efficiency.
- Thanks to the remarkable strength of the machine and to the clearance recovery systems installed, the tube cut end is excellent.

- The machine is equipped with platforms and railings to guarantee access to all parts of the machine pursuant to current safety standards.
- The machine is equipped with automatic greasing and lubrication systems for the main moving components. There are also inspection hatches on the cut-off to access rotating parts normally protected against chips and emulsion water.