

Automatic Straightening Systems



1890 Our Heritage

Founded in 1890 and fully owned by the Galdabini family, the company has its headquarters close to Milan.

The company has always been innovative - the initial artisan activity of maintenance and repair of the local textile factory soon evolved into the construction of machines for the mechanical industry.

Nowadays, we design and manufacture automatic and manual straightening machines, hydraulic presses and universal testing machines.

With more than 125 years of experience in the machine tools industry, our machines are found in applications and industries such as automotive, oil and gas, steel mills, aerospace, mechanical and electromechanical industries.



Milestones

'80

Straightener

1st Automatic Horizontal

Pioneers of straightening of linear guides (twist and bend)





'90

Merger of Jenny Precision AG with Galdabini Präzisions Maschinen AG

Takeover of Swiss engineering and production plant, specialized in profiles



2000

1st Heavy duty Straightener

Largest machine in the world - 2000 tons





to process

(barrels and

profiles)

measurements

3D Straightening

for correcting local deformations in all dimensions





ooking to the future Looking to the future

Innovation in Straightening

How do we satisfy your needs and requirements?

We provide the best know-how, experience and service in straightening applications; we supply state-of-the-art machines, innovative solutions, expert support and world-class service.

What do you expect from us?

We are a "worldwide family company", well aware of our responsibility towards customers, partners and employees. It has been over a century since we manufactured our first machine. Nowadays we go further than just manufacturing machines, we **INNOVATE STRAIGHTENING**.

We continue to grow and invest, which makes us strong enough to tackle the challenges that the future of machine tools holds in store. Today, as in the past, our goal is to satisfy customers' needs and requirements, and make them feel that our service and support are always on hand.

We invest more than **7% OF OUR TURNOVER IN R&D** and believe that innovative design and pioneering solutions make the difference in a market overflowing with low standard machinery and technologies.





Straightening Philosophy

How can we help you to improve productivity and product quality through straightening?

Straightening means:

measuring workpiece deformation, evaluating deviations in relation to the requested tolerances and pushing on the part to reduce its deformations.

Factors causing distortion:

- Heat treatment;
- Stresses from manufacturing processes;
- Material handling.

Precision straightening is the key factor in achieving the following advantages:

- Reduce costly machine operations such as turning and grinding;
- Improve final geometry of the part (more uniform, better gear geometry);
- 100 % final inspection of parts.

Our experience in straightening gained over the past decades has led to the development of specific solutions, equipment, measurement and programming for every different part.



Fourier Analysis



Straightening technology is applied through the use of:

- Measuring sensors;
- High-precision equipment specially designed to deal with workpiece deformation;
- Controlled stroke to provide exactly the right force required in the process (bending or hammering).

Measurements for straightening are mainly related to runout, linearity and circularity errors.

Shafts: Workpiece deformation is measured before and after the straightening process by means of a 360° rotation of the workpiece itself.

Runout measurement allows the detection of both deformation and error of form. The error of form is separated in the runout using complex mathematical algorithms, and only deformation is considered for the straightening process.

The polar graph thus obtained, intuitive and easy to understand, shows DEF and RUN OUT values which allow an easy, angular mapping of workpiece error.

The analysis of these values provides the opportunity to assess and formulate the best strategy for straightening.



RUNOUT E R1 R2 R3 R1 R2 R3 R1 R3 R3R3

Vectorial Straightening System "VESS", **PATENTED**

Vertical Straightening

"C" frame movable table Straighteners

Our PAS vertical straighteners are electromechanical machines designed for straightening short and medium length shafts. Their innovative C-shaped frame and the movable table holding workpieces are two important features which are ideal for producing large quantities of parts as well as small batches.

The electromechanical technology enables: energy saving and reduced floor space, flexible layout, low noise level, accessibility from three sides, and reduced maintenance. The force is generated through recirculating ball screws and is applied axially to the workpiece, ensuring robustness, durability and speed efficiency. The machine is accessible on three sides thus leaving the machine front free for changeover operations and / or maintenance by the operator. The table is equipped with oscillating half round anvils for workpiece support (floating and spring loaded) to allow perfect adaptation to the workpiece surface, following angular variations during pressing. PAS machines are the best technical straightening solution to achieve accurate tolerances in short cycle times. The measurement of critical points of the workpiece is performed through rotation by means of transducers.

The straightening process is fully automatic and carried out by pressing the outside diameter of the workpiece by means of a punch. 100% of parts are monitored and controlled; production statistics generated by machine software allow all the most significant production data (cycle time, initial and final tolerance..) to be recorded. Changeover on the machine can be performed with no operator intervention. The PAS straightening model is designed to be easily integrated into the customer's production lines.

- Primary and Secondary GB shafts
- Output and Input GB shafts
- Camshafts and Crankshafts •
- Balancing shafts
- CV Joint shafts
- Steering racks
- Pinions
- Axle shafts

- s Rotors
 - Screws and Pins
 - Armature shafts / bars
 - Rods
 - Hollowed Star / Lemon shaped profiles
 - Barrels



Shafts





Horizontal Straightening

2 in 1 Straightener for linearity and twist correction

Pioneers in the 80s with the development of the first horizontal machine, today Galdabini produces TWIN machines specifically designed for straightening long profiles. The system allows precision straightening and short cycle times; these conditions make the TWIN machine the only global solution for long profiles. The system is unique in its kind - the TWIN offers the combination of longitudinal (X-Y axis) and torsion straightening in a single machine.

The profile lies free on supports and force is applied horizontally. The horizontal measuring process makes the workpiece react in its most natural form, without weight or significant friction components, contrary to the traditional vertical systems, which "force" the part into position on the supports. An accurate, fast and continuous scanning measurement (laser) is carried out before, during and after straightening, and allows 100% inspection of the workpieces. This checking procedure is repeated over the entire length of the profile, storing the detected data and identifying the straightening parameters to be applied.

The straightening process is based on 3-point short wave and 4-point long wave technology. Straightening is carried out by bending, by pressing the outside diameter of the profile past independent punches. The advantage of this process is that the products obtained have excellent straightness, repeatable measurements and consistency of production. Automatic gantry loading and unloading systems and workpiece storage offer the ideal solution for unmanned production lines.



- Linear guides
- Elevator guides
- Round and Square racks
- Drilling rods
- Forklift guides
- Round and Square bars



Profiles and Bars





Heavy duty Straightening

Heavy duty Straightening systems

Heavy duty automatic straightening machines have greatly improved over the past few years, through the use of sophisticated kinematics, actuators and electronics. Application in fields such as energy, oil and gas, steel mills and hydraulics, require processes which guarantee high quality finished products. Tubes, round and / or square bars, profiles, which until the recent past, were straightened almost exclusively through the rolling process or by simple manual presses, can now be precision straightened - the only way to ensure achieve tight linearity tolerances.

The GANTRY heavy duty machine is designed for straightening long raw tubes and bars, forged or finished. Workpiece measurement takes place by continuous scanning (laser), which allows reading and reconstruction of the actual deformation curve. Fully automatic straightening is fast and optimises machine parameters, in addition to controlling workpiece deformation (absolute and linearity error). The advantage of this process is excellent straighteness results over the entire length, certified and repeatable measurements and high productivity of the system, especially when operating 24 hours a day, equipped with loading / unloading units.

The aim of reducing longitudinal dimensions to the minimum is achieved thus maintaining machine frame stability and flexibility of use. The machine is electromechanically or hydraulically controlled depending on the tonnage.

Measuring before and after straightening allows full traceability of the product, with an important impact on the quality of the production cycle. Easy maintenance is assured by diagnosis and maintenance messenger systems for the remote control of our customer service.



- Bars
- Tubes
- Hydraulic cylindrical tubes
 Marine crankshafts
- Forged bars

Railway axles

Hollowed bars



Bars and Tubes



Heavy Duty Straightening

Horizontal Straighteners for linearity and twist correction

The STEP model is the best solution for straightening workpieces with a constant section: profiles, rails, round, hexagonal and rectangular bars. The machine is designed for automatic straightening of workpieces (very long and thin), along X-X and Y-Y axes, in one single cycle, without any interruption or any operator intervention.

The machine consists of a robust and compact monoblock frame to minimize the required space and offers the user a complete overview of the straightening area (lean concept). The reaction units and the measuring elements are placed on the horizontal plane to avoid any influence from the workpiece's own weight. The punch is fixed and positioned between two independent supports, distributing the stress evenly on reaction points. Punch movement is servo-controlled to allow the correction of positive or negative errors in relation to the zero axis.

The STEP straightener model is equipped with a rotation unit to turn the workpiece on its axis and can be equipped with the continuous scanning (laser) measuring system. STEP is a reliable transportation system. The workpiece is always supported and kept on two wagons, for complete control. Loading and unloading of the workpiece can be provided on the same side or opposite to entry to make integration in automatic lines easier, without any change in the configuration of the machine.

- Profiles
- Linear guides
- Elevator guides
- Round and Square bars
- Forged bars



Profiles and Bars





Ring Rounding

Machines to measure and correct Roundness

The RING straightening machine allows the measurement and straightening of rings: car gearbox synchro rings, epicyclic sun gears, bearings and wind power rings.

Control is accurate and avoids the use of external equipment (off-line checking), eliminating production downtime.

The horizontal machine frame allows easy workpiece loading and accessibility on 3 sides. The clamping expansion assembly for ring drive is controlled by a high response and accuracy brushless motor.

The machine applies the concept of horizontal straightening and allows the measurement and correction of circularity, by discriminating between ovality, triangularity and quadrangularity. Straightening is performed by pressing on ring through a V-shaped punch. The vertical axis rotary table and full accessibility from the top allow the easy use of pick and place systems and anthropomorphous robots.





3Dimensional Straightening

Straighteners for parts and forms

The straightening of forms in three dimensions requires high accuracy in the dimensional control and continuous monitoring of the workpiece, to avoid overcorrections of deformation.

The machine is equipped with specially designed servomechanic control. This allows great accuracy and repeatability of movement of the actuating punches during the straightening process. The machine is equipped with different tools and is particularly suitable for hot and cold molded profiles and welded boxes for automotive and aerospace applications; wherever possible, the measuring system is of the optical, not the contact type; control software is based on the proven TOUCH architecture.



S model

| Measuring device



- Forks
- Propellers
- Engine heads
- Welded parts (chassis)
- Cast iron parts





Touch Software

Get in touch with Technology

Entirely designed and developed by the Galdabini software team, the TOUCH unit allows you to navigate through the program management and machine configuration menus quickly and easily.

The control and straightening unit is made up of a Windowsbased PC with a responsive touch screen; the control system is based on the HMI (Human Machine Interface) concept. The relationship between operator and machine is very intuitive, thanks to the bright widescreen display that allows for a pleasant user experience.

The TOUCH unit allows machine control in a few taps of the finger, through bargraphs (indicating workpiece status), scroll bars (vertical and horizontal window scrolling) and gauges (indicators of workpiece angular position) which make the real time analysis of straightening in progress faster.

The dynamic graphics, interactive and with icons, speeds up operator contact with the machine (just like smart phones and tablets). Adding probes and making measurements for straightening parameter setting is easy to understand and gives the operator full control of the process.



Software

The software monitors the straightening process, checks measurements and the main workpiece parameters for the program, in particular:

- Workpiece measurement and residual deformation in every straightening point;
- Measurement tolerances;
- Measurement arcs subject to correction;
- Transducer values.

After every single process, the software computes and stores the data and creates a report for user evaluation and analysis, including:

- Bend phase programming;
- Part to part statistics;
- Histograms of RUN OUT before straightening (linearity graph);
- Measurement programming;
- Statistics;
- Gage R&R;
- Measurement of polar graphics.

In addition to production statistics, the TOUCH software integrates measurements and energy values analyzed by external devices: laser sensor profilers and crack detection systems.



Workpiece real-time deformation Analysis



Part to part Statistic

Advanced Solutions

Our breakthrough Innovations

The expertise acquired over the years in measuring and straightening technology has led to the development of advanced solutions which optimize machine performances, throughout the entire production process.

Non-contact measurement is the latest innovation in the control process developed within the company, optical technology offers important advantages, thanks to the lack of wear in the measuring instrument and no influence on the workpiece to be measured. The laser technology integrated into Galdabini straightening machines is used in our: laser profile scanning and laser measurement of the inside diameter of pipes and hollowed barrels.

LASER SCAN allows accurate identification of linearity error over the entire length of the profile to be straightened.

One of the most recent innovations is the integration of a polychromatic LED light source, which allows precision identification of the position and extent of the linearity of a hole in relation to an outside diameter.

LASER TUBE TECHNOLOGY carries out an automatic process to correct the internal deformation of the tube by straightening the outside diameter. It is the only system available as an alternative to manual straightening with visual inspection of tube straightness.



Laser



Inside Automation

Without manual operations

The Galdabini straightening machines can be equipped with different automation solutions for workpiece loading and unloading.

Automation enables a flow of components, both before and after the straightening process, without operator intervention, thus avoiding possible mistakes due to manual operations, and ensuring continuity of the entire production process.

Many solutions have been developed:

- Passing through line
- Tandem system
- 6 axis Robot
- Walking beam loader
- Gantry loader
- Pick & Place system
- Pallet conveyors
- Hopper feeder
- Twist loader
- Rejects belts
- 4 axis Gantry loader
- Workpiece storage
- Multiple configuration
- Heavy part walking beam











Our Values

Quality, Training and Customer Care

Galdabini's philosophy is to work with dedication and commitment, putting the customer first.

QUALITY IN STRAIGHTENING

Due to the high repeatability and reliability of Galdabini straighteners and equipment, consistency in quality and production is ensured every day of the year.

TRAINING

We organise training sessions and workshops for employees, customers and partners in order to promote cross-cultural skills and create new opportunities.





Innovation is our culture

Technology Centre

CUSTOMER CARE AND RELIABLE SUPPORT

Our qualified staff supports customers on-site during installation, training and calibration on a world-wide scale, through specialized multi-lingual personnel, for a better understanding of customers' requirements and to find the most suitable solutions.

Galdabini staff can communicate in many languages including: English, French, German, Portuguese, Spanish, and Chinese. We provide local service in more than 95 countries.

We always include an on-line after-sales service carried out via remote interfacing "team viewer". In addition, a wide range of spare parts is stocked in our warehouse, enabling us to provide rapid delivery to customers.

CERTIFICATION

All our products are EC marked and the company is certified ISO 9001.









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