

STUD WELDING BENCHES



INTRODUCTION TO MACHINES>>>

CNC Automatic benches for stud welding combine high flexibility required by modern markets. They perfectly meet the challenge of **small but diversified batches**. Designed to counteract rising labor costs, these systems **allow different geometries and quantities** of features to be welded into a **cycle, optimising time** and setting a new standard of efficiency for modern carpentry and sheet metal processing centers.



APPLICATIONS>>>

Weldable fasteners are **threaded studs, bushings with threads and smooth pins**. The applicable materials are **stainless steel, cold-rolled sheet metal (iron/steel), aluminum, galvanized sheet metal** and the **main industrial metal alloys**. In addition, the high flexibility of the benches makes them ideal for automatic processing in various sectors: **infrastructure and energy, electrical panels and cabinets, charging stations, storage systems, elevator panels, locks, medical devices, household appliances and plates for thermal dissipation**.



ATSCDI3014



ATSCDI3012



ATSCDI2212



ATSCDI1612



ATSCDD1206



CONFIGURATIONS AND OPTIONS >>>

Type of heads

- Direct Loading Head
- Tilted head
- Universal arc welding head and Capacitor discharge

Zinc Remover

- Zinc removal unit Motorized (electric)

Configurations

- **Standard:** 1 to 3 independent heads
- **Advanced:** 4 to 6 independent heads (customized on request)

Workspace

- **3014 :** 3000x1400 mm
- **3012 :** 3000x1200 mm
- **2212 :** 2200x1200 mm
- **1612 :** 1600x1200 mm
- **1206 :** 1200x600 mm



ADVANTAGES >>>

- 1 High efficiency:** the system feeds and welds from 25 to 30 pins/min.
- 2 Positioning:** The control ensures a repeatability of ± 0.02 mm.
- 3 Quality:** CNC management for absolute precision of the parameters.
- 4 Squareness:** thanks to fixing and lasering, tolerances within 5° are
- 5 Joint tightness:** parameters and treatments guarantee quick and safe
- 6 CNC programming:** manages complex geometries for each weld.
- 7 Safety:** the operator works remotely on the console isolated from risks.



CONFIGURATION AND CHASSIS – COMPOSITION OF THE CNC BENCH >>>

The **automatic stud CNC welding machine** is mainly composed of nine key elements: frame structure, base, transmission system, drive system, welding table, auxiliary devices, automatic head assembly, automatic feeding system, and numerical control. The power supply is 400V/50Hz three-phase (with neutral).

The frame configuration is divided into **two** standard types based on the size of the workpieces to be processed:

- **Horizontal Structure:** ideal for pieces with a length of 3200 mm and a width of up to 1200 mm. Maximizes ergonomics in loading/unloading.
- **Vertical Structure:** used when the length exceeds 3200 mm or the width exceeds 1200 mm, optimizing large formats.



AXIS DYNAMICS & HANDLING >>>

- **Y-axis:** movement in dual transmission mode, to ensure maximum dynamic stability.
- **X-axis:** The beam adopts a special lightweight and durable aircraft-grade aluminum extruded profile, which prevents any structural deformation.
- **CNC precision:** finishing milling ensures an accuracy of parallelism and straightness within 0.02 mm.
- **Cantilevered design:** Allows the head to exit the worktop, simplifying maintenance and maximizing usable area.
- **Crankcase structure:** Entirely made of welded heavy steel and subjected to annealing to eliminate internal tensions.
- **Machining of the guides:** the installation surfaces of the guides (X-Y) are machined using large CNC gantry milling machines, ensuring a smooth glide.



TRANSMISSION SYSTEM >>>

X-Y axis drive systems combine synchronous belts and rack-and-pinion systems guided by precision linear guides to ensure high speed, smoothness and positioning accuracy.

MAIN AXIS CONFIGURATION (3014-3012-2212-1612)

- **Standard transmission (X-Y axes, v_{max} 40 m/min): high-precision** synchronous belt and linear modules. It guarantees high efficiency, high loads, simple structure and minimal maintenance.
- **HIGH-END x-axis option:** linear motor and metal optical scale. The system reads 20 µm bands with resolutions up to 20 nm. It offers maximum resistance to contamination, excellent dynamic response and zero mechanical wear.
- **Z-axis movement:** ball screw drive combined with linear guides for welding height control.



DRIVE AND CONTROL SYSTEM >>>

The x and y axes run on racks, moved by pinions mounted on linear motors, two for the x axis and one for the y axis, which are controlled by linear guides. This is to ensure high performance, durability and high reliability.

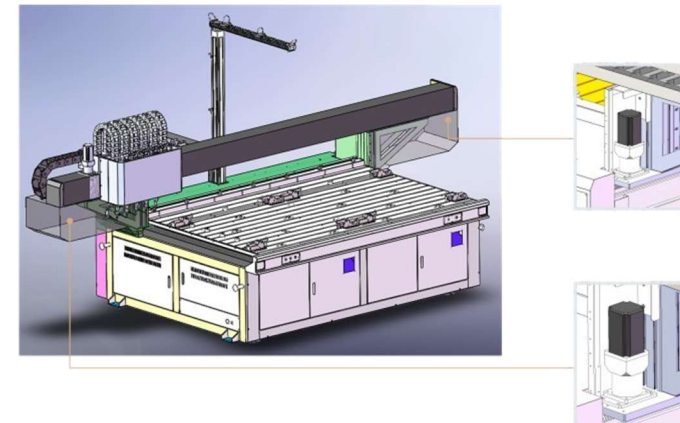


The **servo motors**, combined with the CNC control system, offer maximum industrial reliability and smooth management of trajectories.



DUAL Y-AXIS DRIVE CONTROL

- **Dual-drive:** Fitted as standard on the 3014, 3012 and 2212 models. The Y-axis is propelled by two electrically synchronized motors, eliminating the torsions of the gantry during strong accelerations.
- **Single servo motor:** standard configuration dedicated to the compact model 1612





WELDING TABLE AND AUXILIARY DEVICES >>>

The worktop is a modular structure made of insulating material for maximum precision, sheet metal protection and optimal grounding.

KEY COMPONENTS OF THE PLAN

- **Retractable load-bearing balls:** they are lifted during loading to avoid scratches and rubbing (ideal for stainless steel) and retract to block the piece.
- **Pneumatic clamping systems:** clamps adjustable in height, angle and position, also ideal for folded edges. Supplied in two sizes (large and small).
- **Dovetail inserts:** integrated guides for adjusting vices and strikers.
- **Copper grounding bars:** positioned on the table for constant electrical contact throughout the workpiece.
- **Movable positioning stops:** cylindrical blocks for zeroing any geometry (internal/external).

PRODUCTION EFFICIENCY

- **Double station logic (pendulum):** alternating management of zone A and zone B to eliminate downtime.



Modular worktop with concealed load-bearing spheres.



Pneumatic clamping systems as standard (large and small)



AUTOMATIC HEADS GROUP >>>

Automatic heads (CNC actuators): perform repetitive cycles at high speed, welding the studs with maximum precision.

CONFIGURATIONS AND FLEXIBILITY:

- **Direct or inclined loading:** maximum flexibility depending on the type of pin.
- **Dual function (CD/ARC):** management of both capacitor discharge pins and arc pins ($\varnothing$ max weldable with capacitive discharge and M10 short arc).
- **3-head configuration:** for handling 1 to 3 welding heads.
- **6-head configuration:** for handling 4 to 6 welding heads.



Standard configurations with 3 (left) and 6 (right) automatic heads.

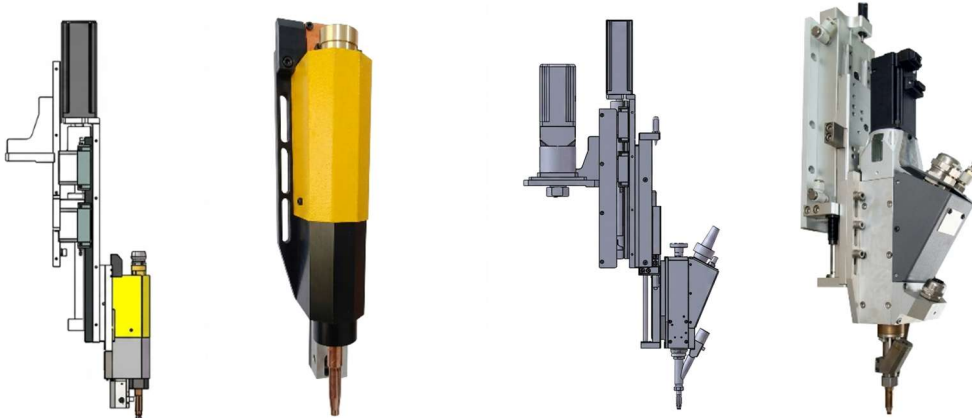


WELDING HEAD DRIVE SYSTEM >>>

The movement of the heads is managed by a **servomotor** (150 mm stroke) combined with a linear guide and a pneumatic cylinder.

KEY FEATURES

- **Dynamic adjustment:** the servo motor adjusts the distance between the head and the sheet metal, avoiding collisions.
- **Controlled pressure:** ensures uniform welds and prevents surface deformation on the sheet metal.
- **Height adjustment:** flexible range of 150+150 mm or 150+50 mm via dual mode.



WELDING HEADS >>>

DIRECT FEED HEAD

The pin enters from the top of the head and is inserted via a continuous pneumatic mechanism.

- **Advantages:** simple, compact and lightweight structure that guarantees a very high speed of unloading of the pins.
- **Applications:** ideal for thin sheets, stainless steel and small to medium-sized pins.

INCLINED FEED HEAD

Unlike the direct feed head, they offer the presence of an internal pusher which, depending on the model chosen, can be adjusted manually or automatically.

- **High adaptability:** constant welding on any material or size.
- **Inclined head with automatic pusher:** it allows the head to be fed with two different lengths of stud to be welded with the same diameter (as long as the difference in length does not exceed 15 mm).
- **Versatility:** the same head will be powered by two different automatic loaders, connected to the head with a double "V" input, it will then be the machine control to manage the sending of the stud and the movement of the pusher.



AUTO-DETECT FUNCTION >>>

The pins reach the head via the supply duct. A ring sensor binds the presence of the pin, if it is missing the system pauses to avoid damage to the gripper.

Pressure regulation

An adjustable valve controls the head descent force and clamping pressure, adapting the impact to the pin specifications.

Bottom feeding head

Developed for wide-head pins, the pins are inserted into the collet via a 90° swing arm.

The advantage is that premature wear of the caliper caused by heavy pins is eliminated, extending the life of the components.

Universal CD/ARC head

It has a dual mode (pre-charge or post-discharge) and mixed feeding, so it handles pins of the same diameter but different lengths in the same cycle.



HEAD NEBULIZER >>>

The head is connected to a high-efficiency nebulizer to prevent the adhesion of oxides and slag on the sheet metal.

- **Benefits:** Dramatically reduces cold welds, missing spots and weld burrs.
- **Clean finish:** the very little residual slag on the surface can be easily removed with a cloth, without leaving any traces.



PIN DETECTION OPERATION (OPTIONAL) >>>

Prior check: Detects whether the stud is correctly inserted into the collet before starting the welding arc.

- **Safety:** prevents no-load cycles, eliminating the risk of defective welds and protecting the pin-holder from electric shock or mechanical damage.





ZINC REMOVER (OPTIONAL) >>>

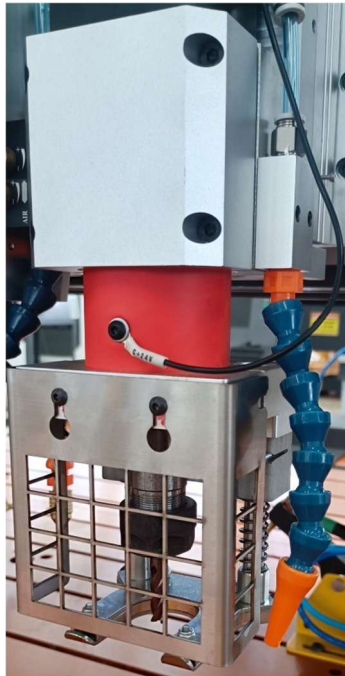
System developed to integrate 3 key functions: zinc layer removal, anti-splash protection and air blow cleaning.

"Layer removal" function

- Operation: The program automatically operates the cutter to remove the surface coating layer before welding.

Advantages:

- Millimetric adjustment of the milling depth.
- It ensures clean, aesthetically optimal and defect-free welding.
- Dramatically reduces post-production manual finishing costs.



ANTI-SPLASH FUNCTION >>>

The nebulizer system prevents oxides from adhering to the sheet metal.

- **Result:** the residual slag, once dried, is easily removed with a cloth without leaving traces, avoiding rust and without interfering with subsequent painting.



AIR BLOW FUNCTION >>>

The system blows compressed air to remove metal chips generated by milling.

- **Safety:** Prevents metal filings from entering the eyes or injuries to the operator's hands, eliminating the need for cleaning.
- **Precision and stability:** the entire positioning of the machine is managed by a numerical control (CNC) system, ensuring greater precision and repeatability than any human intervention.



AUTOMATIC PIN FEEDING SYSTEM >>>

The system integrates **selector**, **feeder** and **automatic head**.

- **Fast cycle:** automatic feeding with presence sensor for maximum speed.
- **Digital management:** silent operation, quick pin change and RS485 protocol.
- **Flexibility:** compatible with M3-M8 studs, quick adjustments for diameters and lengths.
- **Maintenance:** simplified modular structure with integrated manual testing.
- **Integration:** reduction of wiring costs in multi-vibrator systems.



SEMI-AUTOMATIC SYSTEM (OPTIONAL) >>>

Operation: the pin is manually positioned in the template, the X, Y, Z axes move the head for picking up and subsequent automated welding.





HARDWARE ARCHITECTURE >>>

Industrial PC and Network Controller

- **Controller:** GNC series with integrated multi-axis architecture.
- **Connectivity:** seamless connection between embedded PC and motion controller for superior system stability

Operator Interface (HMI)

- **Display:** 21.5" monitor for complete control.
- **Functionality:** mouse programming, graphic simulation of the work cycle (drawing comparison), and real-time monitoring of production data (times and piece counting).

Handling system

- **Technology:** servo motors for high-dynamic, millimeter-accurate movements
- **Options:** Compatibility with linear motor systems to further increase system speed and life.

Manual control device

- **Wireless handwheel:** allows quick positioning, self-learning programming and simplified management of mass production.



CONTROL AND MANAGEMENT SOFTWARE >>>

The system is designed to ensure maximum modularity, ease of use and total integration.

Modularity and flexibility

- **Architecture:** Fast hardware upgrades without software replacement.
- **Expandability:** compatible with any type of head (straight, inclined, automatic, arched) and process (blowing, spraying, milling...).

Advanced programming

- **Input:** Graphics programming, MPG, NC file, or CAD import.
- **Remote:** management and distribution of programs via LAN from the office, with bidirectional data exchange so as to avoid production downtime.

Productivity – Industry 4.0

- **Continuous cycle:** up to 6 programs in sequence on 6 workstations.
- **Global:** Integrated data graphics in multiple languages.
- **Monitoring and Industry 4.0:** Anomaly detection in the welding current, remote interaction, data collection and code scanning (optional).





STANDARD VERSION WELDING MACHINE >>>

System equipped with dual capacity and digital communication functions.

- **Technology:** The system manages two groups of capacitors, while one is operational, the second acts as a backup, doubling the efficiency and useful life of the components.
- **Reduced times:** recharge times are zero, ensuring continuous production cycles.
- **Automation:** thanks to the communication functions, the welding machine interacts in real time with the upper control system, receiving loading/welding instructions and sending feedback on the status of the machine.
- **Efficiency:** allows the connection of multiple welding heads to the same unit, drastically increasing overall productivity.



HIGH-END VERSION WELDING MACHINE >>>

Advanced version with dual-channel digital display for real-time voltage and current monitoring.

- **Touch interface:** the touchscreen panel replaces traditional digital displays, allowing simultaneous observation of multiple parameters (capacitor voltage, set voltage, current, times, weld counter and alarm history).
- **Advanced communication:** The system constantly communicates with the automation, allowing remote receipt of instructions and real-time transmission of machine status.
- **Parameters:** Allows detailed configuration of welding parameters, including sheet metal type, thickness and stud diameter.
- **Quality and safety:** it integrates an exclusive welding current monitoring function, in case of anomalies, an alarm is activated and the machine pauses, preventing defective welds.
- **Flexibility:** the current ranges are configurable independently of both the welding machine and the software.

