

HAIRPIN



Global Provider of Assembly Lines for EV-Products

Comau is leveraging its pioneering competencies in electrification and a 360° understanding of automotive manufacturing to help **speed technology advances** in the production of next generation E-Drive systems and batteries.

Assembly Line Types

Battery Module Assembly

Battery Pack Assembly

Battery Tray Assembly

UV Coating

Battery Recycling

EDS (including Stator, Rotor, EDS assembly, etc.)

Hydrogen

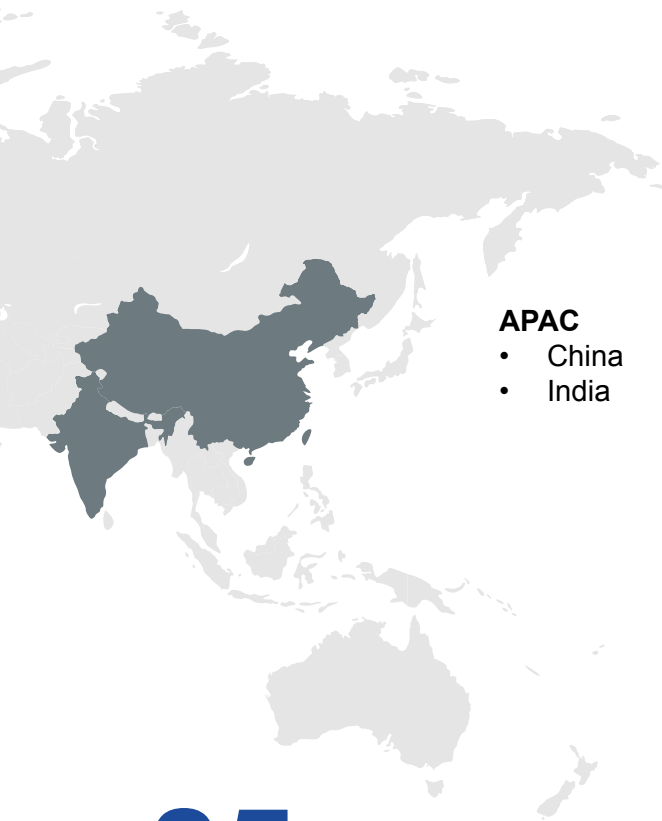
NORTH AMERICA

- United States
- Mexico

EUROPE

- France
- Germany
- Italy
- United Kingdom

Complete Portfolio for the Entire Electric Motor Value Chain



APAC

- China
- India

Our Offering

- Hairpin stator A/B/C prototyping
- Hairpin stator mass production line
- Standalone standard machine
- Lean line planning - Footprint / Energy Consumption / Platform Standardization
- Multi configuration - Prototyping / Manual / Semi-auto / Fully Automatic Line
- Flexible modular design and planning
- Multi process combinations to meet customized customer requirements
- Product R&D for production support
- Production 3D layout and simulation
- MES
- Equipment can be customized to support special products

85+ Applications installed globally qualify our expertise in the electrification market

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Hairpin Stator - Wire Forming

Fully automatic wire forming: unwinding → straightening → paint removal → cutting → 2D NC forming → 3D mold forming

High efficiency wire forming CT per pin < 2s

Wire straightness: < 0.2mm

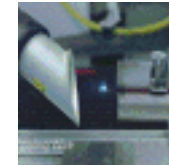
High consistency of the pin forms

Fully standardized functional module construction, compact design and small footprint

Configurable laser/mechanical paint removal solution, ensuring high quality and economical efficiency

High flexibility, high compatibility

High-precision cutting function, cutting and chamfering are done at the same time in a single action without generating burrs



Hairpin Stator - Wire Insertion



High automation rate, no manual intervention required

Highly compatible with different wire types

Ultra high-speed gantry movement with unwavering accuracy

The corolla pressing is equipped with an insulating paper protection function

Able to satisfy different special-shaped wire insertion requirements



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Hairpin Stator - Wire Widening



Quick changeover of standardized modules

Optimized gripper to avoid damaging paint film

Multi-configuration wire widening solution adapts to different stator types

Multi-program precision control solves copper wire rebounding

Level and smooth mechanism ensures that the paint film will not be damaged

Wire widening tool uses pass-through detection and ensures wire separation stays in place



Hairpin Stator - Wire Twisting

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Twisting cylinder is precisely controlled by the servo motor, ensuring smooth twisting process curve

Ultra smooth twisting cylinder surface and wire / paper protection disk surface protect the wires from paint film damage

Gear-driven twisting module with small footprint and high flexibility

Separated twisting module and drive for quick changeover and optimized maintenance

Multi layer twisting mechanism with synchronized rotation to ensure accuracy



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Hairpin Stator - Wire Cutting



The overall cam rotating structure uses a single, simultaneous cutting process to craft highly flat pin ends with no burrs

Special material and ultra smooth wire clamping disk protects the wires from paint film damage

Symmetrical design of the cutter increases the lifetime of the cutting tool and facilitates quick changes

Special material and process adopted for the cutter, taking into account both the cutting force and lifetime of the cutter



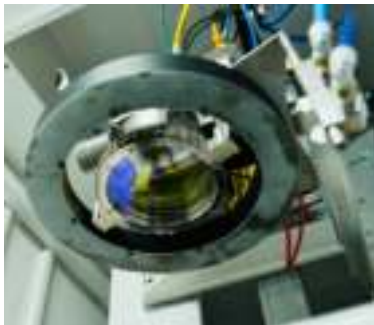
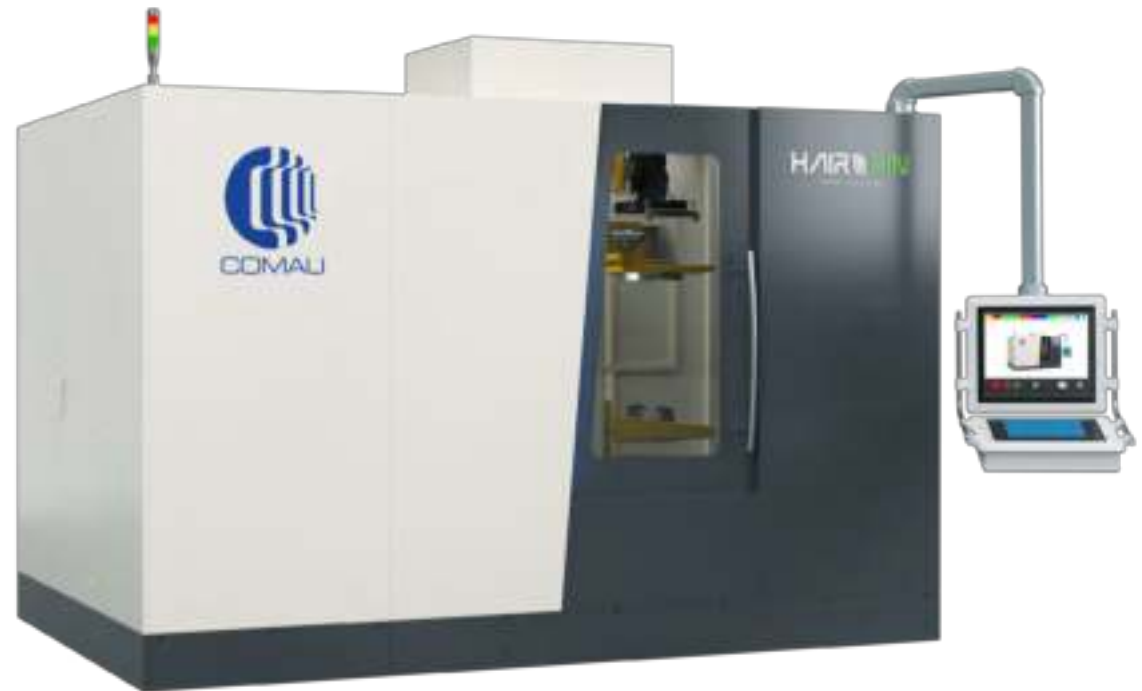
Hairpin Stator - Wire Welding

Laser welding process ensures deep penetration, high pull-out force, and high appearance grade

Configurable welding process takes into account both quality and cost effectiveness

Product option 1: Single machine for the cutting and welding processes ensures high welding quality with a compact footprint

Product option 2: combined cutting and welding station for better line efficiency. Laser movable design, large coverage and high flexibility



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Hairpin Stator Flexible - Press Wire

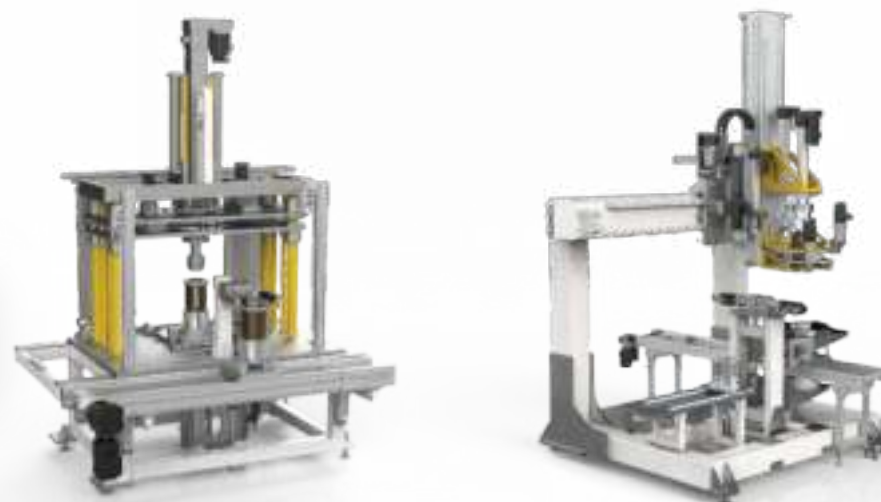


It can handle semi-automatic and automatic functions, high adaptability, meet the requirements of mixed-line

Available in both configurations (with or without wire gripper), highly convenient for process

Open design facilitates easy maintenance

Modular design enables the configuration of different pin protection modules to meet the requirements of various products



Hairpin Stator Flexible - Wire Widening

The paired design of the guard plate and the gripper offers better precision and cost effectiveness

A number of different widening grippers can be configured for compatibility with different cycle times and solutions

The widening gripper features the scissor type which has a higher inclusiveness

The independent configuration of widening modules with the servo drive



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Hairpin Stator Flexible - Wire Cutting



The quick change is convenient, and the multi-modules offer strong reconfigurability

Different numbers of cutting grippers can be configured, compatible with different cycle time and solution economy

Compatible with punching, rotary cutting for different product needs

Double-sided blade design, along with special materials and processes, taking into account both cutting and cutter life



Hairpin Stator Flexible - TIG Welding

It can be configured with different numbers of welding torches and different types of transfer fixtures to various scenarios

Visual system is configured to precisely control the moving trajectory with higher accuracy

Configurable Tig cold-welding system compatible with different products

Quick change of tungsten needle by automatic detection ensuring high consistency



One Partner For the Entire System

No matter how complex your manufacturing needs, our results-oriented methodology and systems expertise can support you.

Comau has the competence to develop any hairpin stator assembly process, and ensure productivity, flexibility and long-term quality that span the entire production chain, including test equipment and quality inspection across the lifetime of your manufacturing systems.



Driving E-Manufacturing With Enhanced Efficiency, Flexibility and Performance



Comau ensures the end-to-end process efficiency and continued reliability to cover your comprehensive manufacturing needs:

- *Insulation paper insertion*
- *Wire forming*
- *Wire insertion*
- *Wire widening*
- *Wire twisting*
- *Wire cutting*
- *Wire terminal welding & busbar welding*
- *Trickling & coating*
- *EOL test*



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