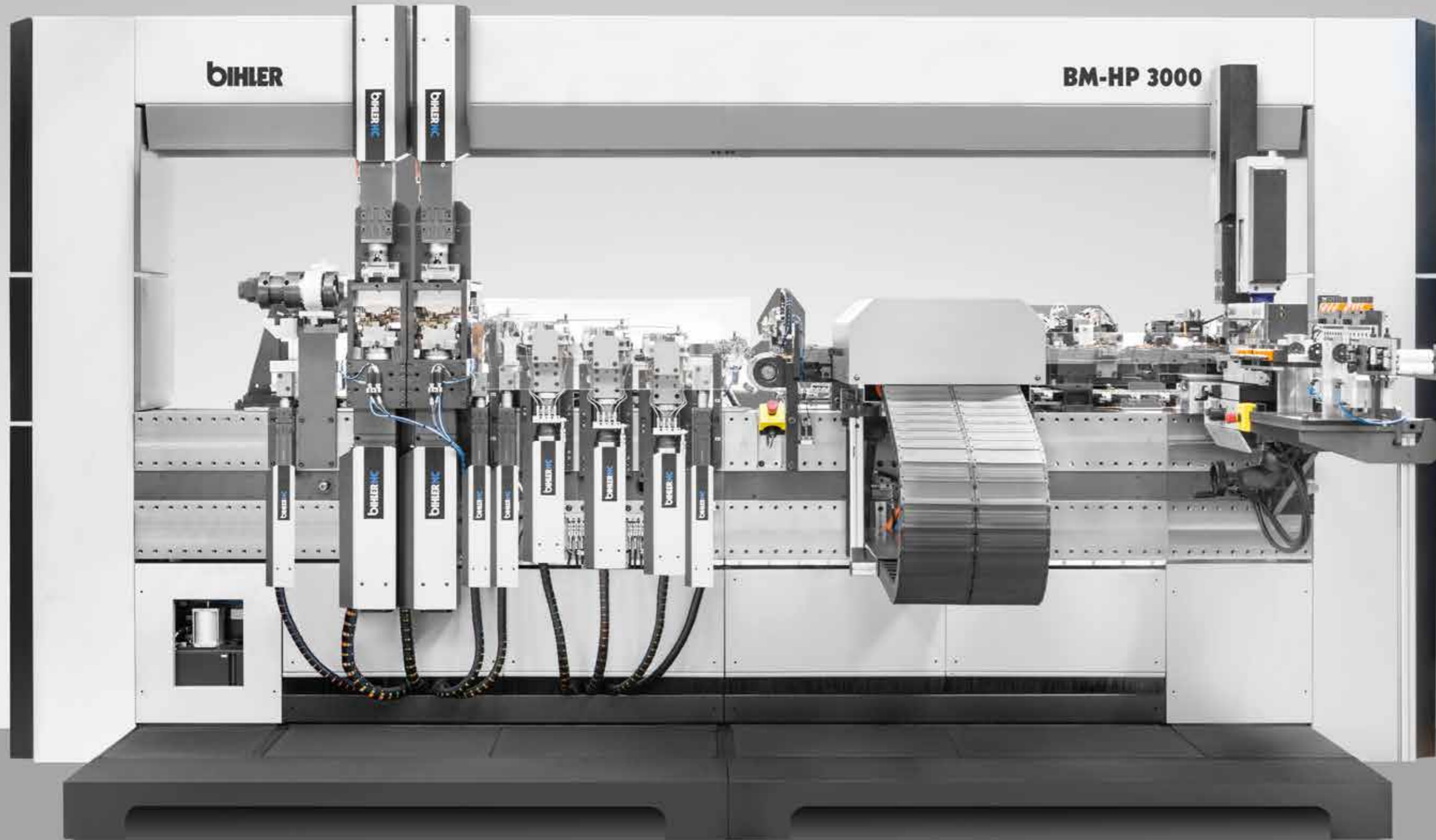




BM-HP

Servo system for the
production of hairpins

Efficient automation solution
for hairpins



BM-HP

Servo Production System

Based on more than 40 years of experience in hairpin technology, Bihler's complete solution opens up new perspectives in the industrial production of these electrifying parts.

The BM-HP production system with standardized machining processes combines all required process steps: Starting with the multi-stage straightening and the highly dynamic, slip-free feeding of the wire, precise cutting, NC-controlled mechanical stripping of the coating, simultaneous chamfering of the pin ends, 2D pre-bending and 3D die bending, all the way to the removal and mono-component storage.

You benefit from three times higher cycle rates than with sequential systems, easy and fast variant changes "on the fly", and flexible scalability to future tasks.



Highlights of the BM-HP

- All-in-one production of hairpins directly from the coil from flat wire
- All common hairpin, connection pin and I-pin types can be produced
- High output with 60 - 120 finished hairpins per minute
- Cycle speeds are three times higher than with sequential systems
- Flexible, rapid change of variants „on the fly“
- Predestined for industrial mass production
- 100 percent reproduced top quality of parts
- Additional machine and space requirements can be reduced
- Flexibly scalable to future tasks
- Fully automated coil change

BM-HP

All-in-one production / Process steps

5 3D die-bending

The hairpins are given their final head shape in a subsequent 3D die bending process. NC units guarantee a plastic deformation that is gentle on the material and coating. The precise control of the servo units guarantees one hundred percent reproducibility of the hairpins with short cycle times. As option: Integration of the final component geometry measurement and inline adjustment.



6 Transport and mono-component storage

The final step is the removal of the finished hairpins via a conveyor belt for sorting and storage. Equipment on the last module includes clearly defined interfaces for further links enabling integration into complete production lines for stators or turnkey systems for electric motors.



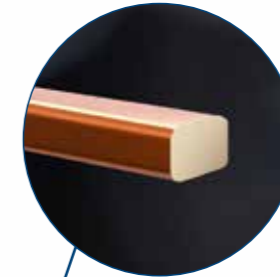
4 2D preliminary bending

During 2D preliminary bending, powerful servo units ensure in a parallel-cycle swivel-bending process the correct geometry values, which can be freely programmed if required.



3 Mechanical isolation removal and chamfering of pin-ends

The next step sees the mechanical, accurate stripping of the enameled insulation layer and the simultaneous chamfering of the two pin-ends under NC control. A sensor unit performs continuous inline measurements of the thickness of the enamel coating and the combined thickness of the coating and the copper wire. The total cross-section loss of the copper wire remains below 0.05 millimeters. The pin ends obtain a pure metal surface.



2 Precise cutting

An NC module equipped with a cutting punch then cuts the enameled copper wire precisely to the straight length – without deformation and damage to the insulation layer and with little cutting burr.



1 Multilevel straightening / wire infeed

The production process begins with the multi-stage straightening **1a** of the flat enameled copper wire to eliminate residual curvature and batch variations. The RZV 2.1 **1b** feeds the wire directly from the coil at up to 3.2 m/s without slippage. The servo feed guarantees a repeat accuracy of +/- 0.02 mm and ensures that the layer of insulation varnish is not damaged (three-point surface clamping).



VC 1

Machine and process control

Easy and save operation of the BM-HP and all processes via the VariControl VC 1 central control platform.



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