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WAFIOS SBM 12, newly designed tube bending machine for stabilizers

The current trend in the production of automobile stabilizers (sway-bars) is moving continually towards tubes with thinner walls and higher tensile strengths. This apparent contradiction is further strengthened by the substantially higher machine power required for their production.

For a long time the production of such stabilizers was done with special machines employing cold forming over multiple-stages or presses with pre-heated semi-finished stock. The afore mentioned change in the materials represents an increase in costs for the production methods used until now because of their lack of flexibility and increased tool complexity.

The background for this change is the constant push, especially in the automotive industry, to economically produce powerful vehicles that are energy efficient and produce fewer emissions. The lightweight construction must naturally be carried out in such a manner that the rigidity and security of the passenger compartment suffer no losses.

The machine concept to be introduced is well-suited for the production of a great number of structural components of the passenger compartment – besides sway-bars – which are critical to passenger safety, for example the A-column, the roll-over-bar, the side-impact protection beam and rear seat backs.

Additional design requirements are placed on the machines and tooling, in order to create the geometries demanded in regard to tighter bend radii and shorter spans – especially concerning the rigidity and construction of the tube bending machine.

The WAFIOS SBM 12 is a successor of the SBM 10, the bending head of which has been completely re-designed.

All users who want to process high strength and pre-hardened and tempered materials will be interested in the new construction. It should also be sensible for those who are currently bending tubes at the capacity threshold of a conventional WAFIOS B 10.

The underlying machine is the WAFIOS B 10, a fully electric right/left bending machine, the foundation of which the SBM 12 builds upon. In this respect, the SBM 12 also combines the essential advantages of the B 10, particularly:

1. Added value due to tested and precise technologies –
Re-tooling times are minimized thanks to branch-specific tool-kits (Plug & Play) as well as the ability to externally program the machine while it is running. Increased availability with the help of real-time simulation for a secure database and the stored characteristic curves of material properties and respective tools. The multilingual

user interface and fully electric, low maintenance, value-retaining machine concept further increase the availability.

2. Versatile applications with a high degree of automation –

Modularity means varied options for upgrading and retrofitting right up to production cells with pivoting bending head (loading and stacking possible) as well as versatile interfacing with periphery (inclusion in pre-existing manufacturing structure). High strength, and, in the case of the SBM 12, also pre-hardened and tempered materials can be processed with left, right, or free-form bending operations.

3. High production output with outstanding process safety

Machine is designed with contingency reserves for all bending operations. The ergonomic machine concept enables easy access to all essential components and increases the operator-convenience of all users whose safety is guaranteed with scanning laser protection fields. Diverse measuring systems for quality control during and after production as well as the rigid machine construction for exact repeatability and precision increase the process safety. All axes are interpolated and scaled and thus increase the output by means of parallel work cycles which positively affect the side-times of the machine.

As opposed to most tube bending machines currently on the market the SBM 12 is equipped with a simulation program which is fully integrated with the control system. The bending process is always represented with the actual part geometry and appropriate tool set-up. Any possible collision areas and the theoretical process time are calculated and a visualization of the bending process is rendered.

The greatest focus of developers has been on maintaining the extraordinary machine dynamics despite the reinforcement of the bending head. The solution was acquired through the lightweight construction and finite element modelling of the critical components subjected to high stresses. The nearly silent operation of the bending head is impressive; the solution is that power is transmitted by compound gear trains rather than belts.

On the SBM 12 the implementation of the higher power requirement was reached by reinforcing the housing, installing stronger drive-spindles as well as double-mounting the guide bar which in turn doubles the supporting and gripping force of the clamping piece. The smallest of radii as well as free-form geometries can be produced through the combination of the CNC inner mandrel device and high power-expansion of the booster function.

The hardening and tempering of the tube customarily follows after the bending, but this holds the danger of distortion in bent parts in addition to increased expenses in downstream processes due to additional facilities. The tooling technology allows bend-on-bend to be realized with the shortest clamping lengths in a single plane. Tool changes are therefore only required on changes of radius or diameter of the tube, thus the cost savings are significant.



Fig. 1 Base machine WAFIOS B 10

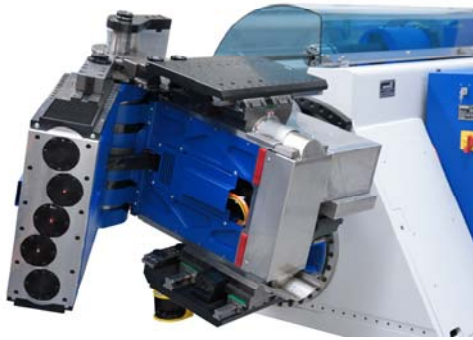


Fig. 2 Opened reinforced bending head with special tools for stabilizers

