MAV

Technical Features Summary



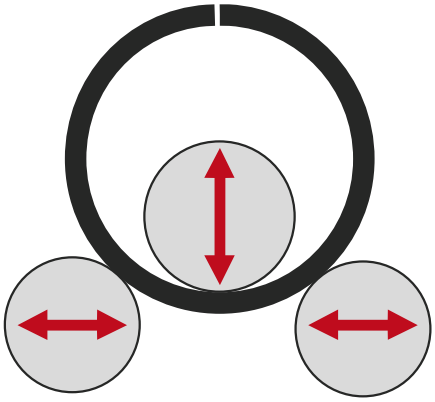
DAVI

Davi MAV

3-Roll Variable Axis Plate Bending Machine

A 3-roll variable-axis plate rolling machine operating principle is conceptually similar to that of a press-brake, with the top roll pressing the plate between the two side rolls. However, a 3-roll bending machine is much more flexible and accurate, **being able to vary the interaxis distance between the bottom rolls**.

In this regard, **Davi MAV** allows for **individual, horizontal movement of both side rolls and vertical movement of the top roll**. Furthermore, each one of the 3 rolls features **rotation drives** and **can be tilted in every direction for cone bending**.





Shortest Flat End and Safer Operations

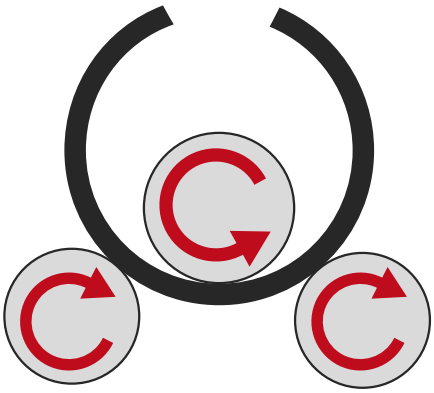
Thanks to Ideal Torque Transmission and Rolls Synchronization

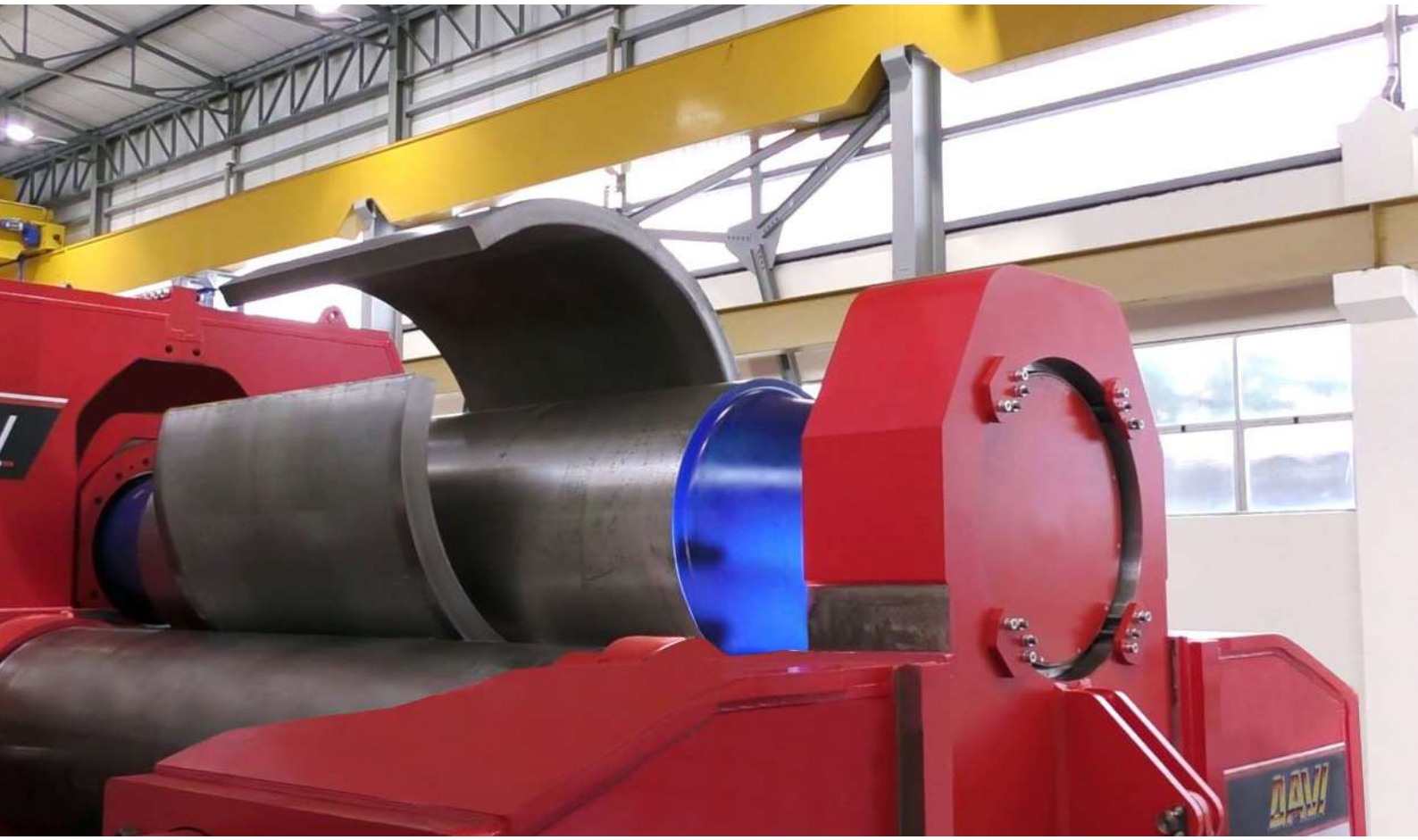
Particularly on a **3-roll machine,** it is of paramount importance to hold as much grip as possible on the plate.

Featuring **motorized top and side rolls as standard**, **Davi all-rolls-drive** technology guarantees the optimum torque transmission to the plate and distribution between hydraulic motors.

Thanks to this system:

- **no mechanical brakes** need to be installed
- rolls speed is **automatically and hydraulically synchronized**
- **no risk** of **plate slippage/falling during pre-bending**
- plate can always be positioned **at the tangent point** to achieve the **shortest flat end**





Maximum Flexibility

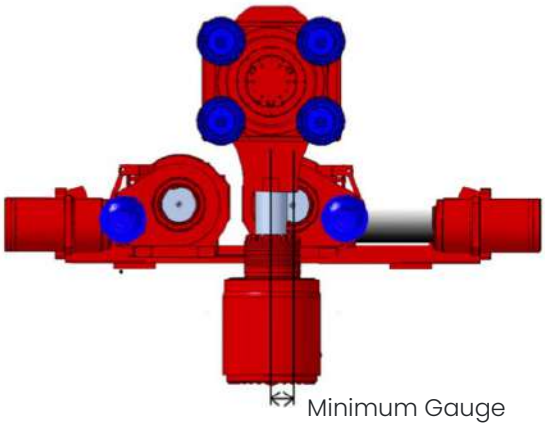
Thanks to 3 Motorized Rolls with Flat Gearboxes

The torque is transmitted to the rolls through Davi exclusive **flat gearboxes**.

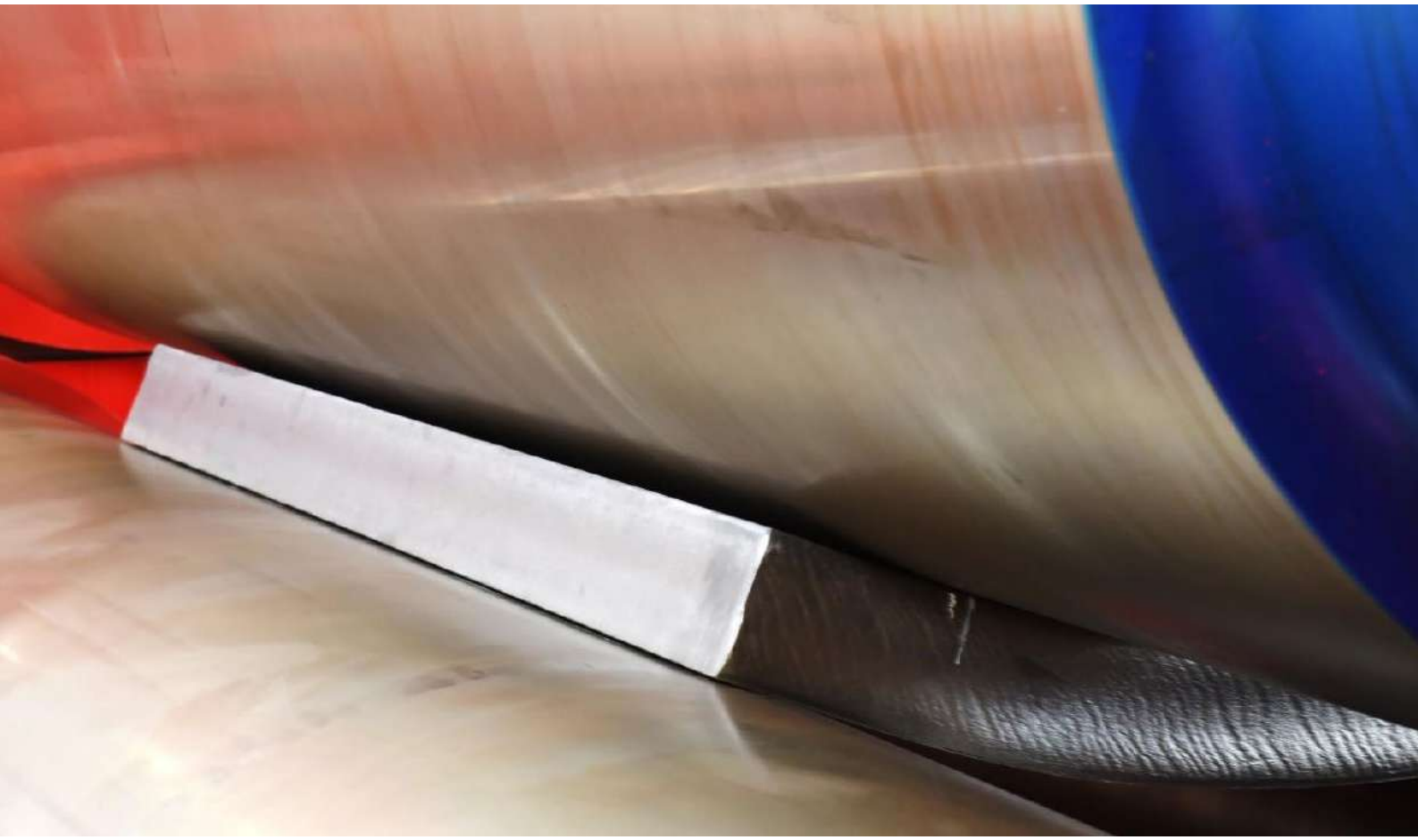
This arrangement features the side rolls rotation axis eccentric to their gearboxes: the side rolls can then **travel much closer to the top roll** thanks to the avoided interference between the hydraulic motors and the top roll cylinder shaft (**minimum gauge**).

With rotation controlled by the **motorized side and top rolls**, the side rolls **flat gearbox** enables the operators to pinch at the **appropriate tangent point**.

Thanks to this system, **the top and (pinching) side roll axis can almost overlap** while pre-bending, achieving **the shortest possible flat end** without compromises on machine capacity.



Minimum Gauge



Superior Re-Rolling Performance

Thanks to Sturdy and Compact Frame

The **frame** constitutes, effectively, **the back-bone of the machine**. All stresses during plate forming must be withstood by this critical component and, eventually, transmitted to the foundations.

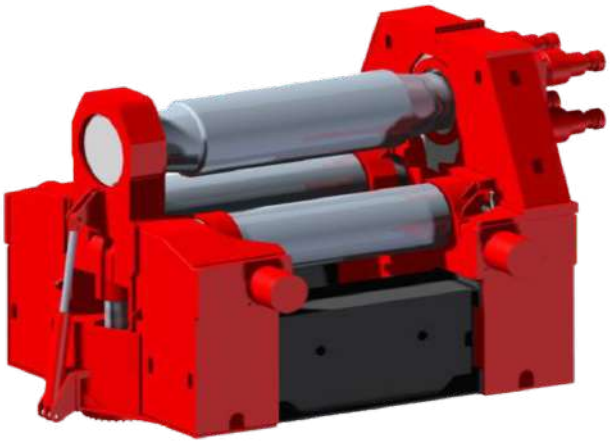
Davi machines feature the largest and most compact frame on the market, which allows to:

• improve the **rigidity of connection** to the ground as well as **machine stability**

• increase the available **side rolls stroke**, hence **increasing the maximum interaxis distance**

• construct a **much shallower pit**, due to reinforcement beams installed between frames (**intra-frame design**) rather than base platform

A larger interaxis distance allows for a **significantly higher leverage arm** while pressing down with the top roll, hence **maximizing the rolling** and, more significantly, **re-rolling performance of the machine**.





Superior Cone Bending Capacity

Thanks to 3 Tilting Rolls

Forming cones is always a challenge. However, thanks **to three fully tilting rolls** we will make this very demanding operation as accurate and shift as possible.

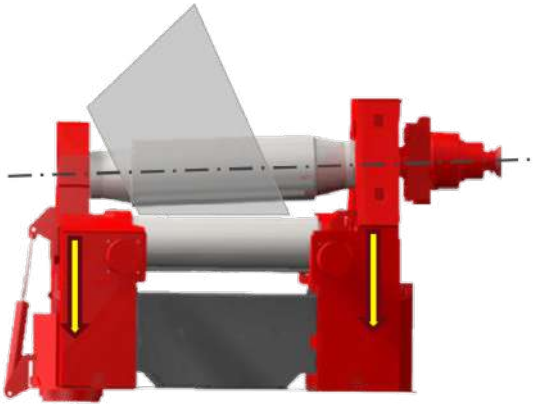


Davi pendular shaft-mounted gearboxes configuration allows for stress-free tilting of the rolls up to **100 mm (4")** every 3 meters (10 feet) rolls length.

In combination with the **three motorized rolls** as a standard, Davi MAV guarantees unparalleled performance in **continuous cones rolling**.

Moreover, in case of thick and very thick plates, Davi MAV will exhibit extraordinary cone forming performance thanks to the **Progressive Bumping Mode**.

In this mode and similarly to a press-brake, the cone will be formed bumping the plate step-by-step **with geometrical accuracy guaranteed by the exact positioning of all three rolls**.





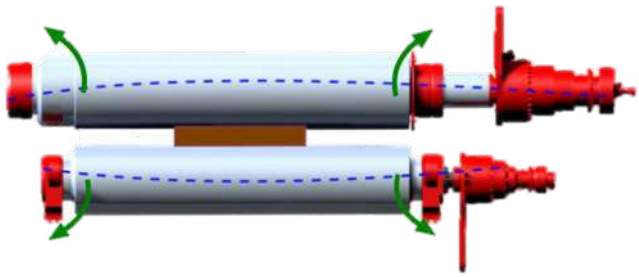
Improved Workpiece Tolerances

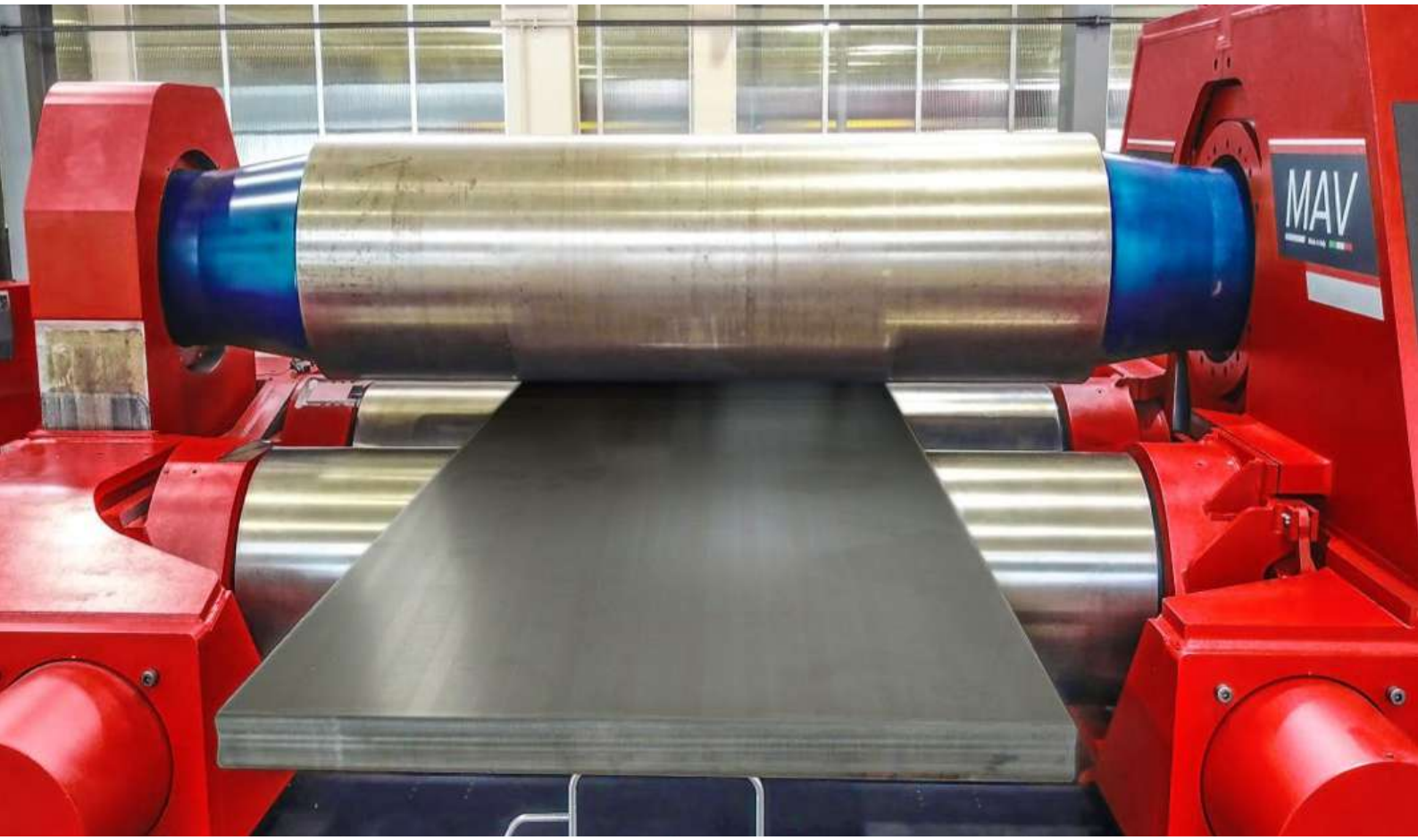
With Mechanical Symmetry

While forming, the load on the plate **must be as uniform as possible along the whole width**. If this condition can't be satisfied, the machine output will significantly deviate from the drawing and manual correction will be necessary.

As the forming pressure is provided by hydraulic cylinders installed at the two ends of the machine rolls, **the geometry of the machine and related** (frame and rolls) **deformation behavior greatly affect the loads distribution**.

For this reason, all Davi 3-roll machines are designed with **full mechanical symmetry, guaranteeing the best forces distribution** and, hence, **workpiece dimensional tolerances**.





Maximum Precision

With Hydraulic Symmetry and Side Cylinders Design

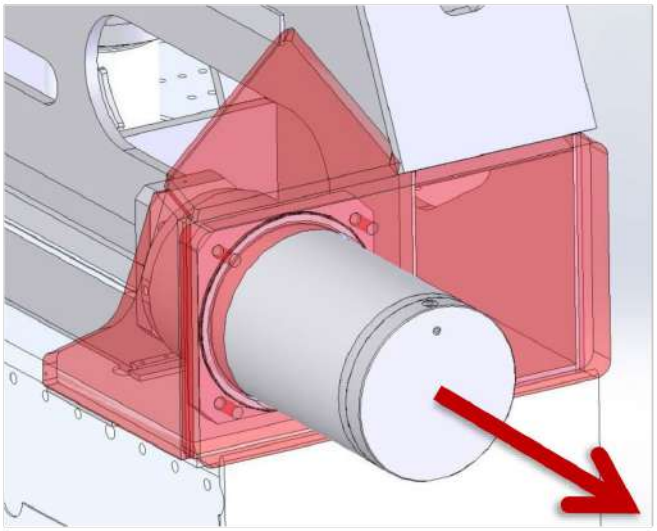
The direction and intensity of the forces generated by the hydraulic cylinders determine how the frame would deform under stress.

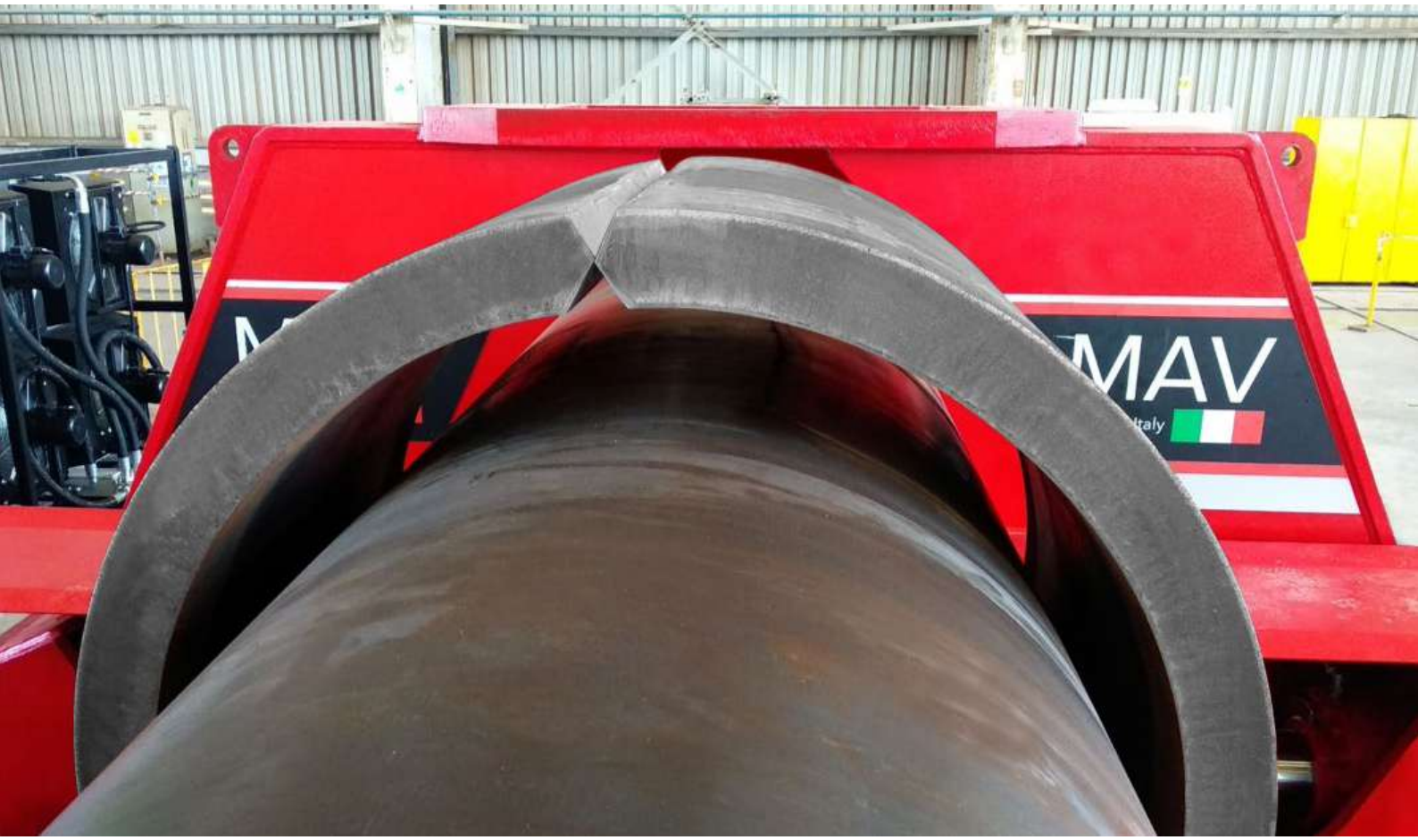
While forming small and very small diameters, the horizontal component of the bending force strongly prevails on the vertical one.

In this **situation the side rolls hydraulic cylinders push hard on the machine frame**.

Unlike other solutions on the market, Davi cylinder cans are **mounted inside the frame and kept in position by leaning on thick frame plates** rather than multiple bolts.

It is hence not necessary to limit the force available to the cylinders, thus **achieving the maximum performance rolling tight cans**.





Moreover, for the same load, **stretched structures would necessarily deform significantly more than compressed ones**.

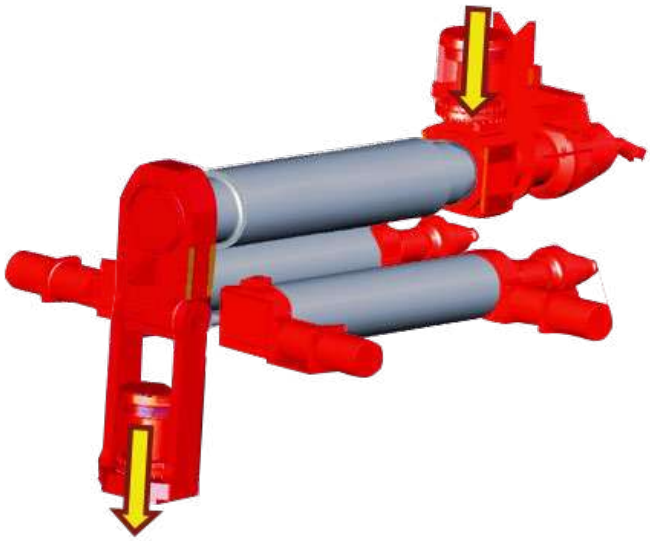
The different displacement at the ends of the machine would, by itself, generate a non-symmetrical geometry and hence load distribution. The relevance of this effect increases exponentially with increasing machine capacity, where available forces – and related deformations – are larger.

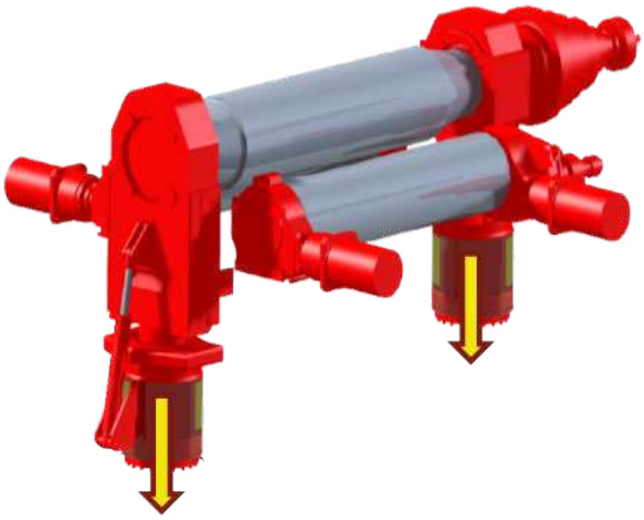
The **full hydraulic symmetry** is a **Davi exclusive feature** that, unlike other solutions available on the Market, **does not require a continuous actuation** of the electronically-controlled rolls parallelism system to the benefit of the **rolling accuracy** as well as **equipment durability**.

In fact, by exerting the **very same force** (cylinders with the same displacement) in the **very same way** ("**push-push**" or "**pull-pull**") at the two ends of the top-roll, Davi MAV guarantees a **perfectly even load distribution along the forming plate** to achieve the **best output in every condition**.

For this reason, **Davi high capacity 3-roll machines** unique design features a **perfect hydraulic symmetry on top of the full geometrical symmetry, with all cylinders having the very same displacement**; specifically:

below 3,000 ton pressing capacity – **"push-push"** configuration with two identical cylinders **"pushing" with the same force to the top roll**, for a simpler design **in combination with an extremely resistant frame**





above 3,000 ton pressing capacity – **"pull-pull"** configuration with two identical cylinders **"pulling" the top roll from below**, compressing the frame for **minimum distortions**

Best Rolls Parallelism

Thanks to Patended Servo-Tronic© System

The rolls movement is actuated by hydraulic cylinders installed at the two ends of the machine.

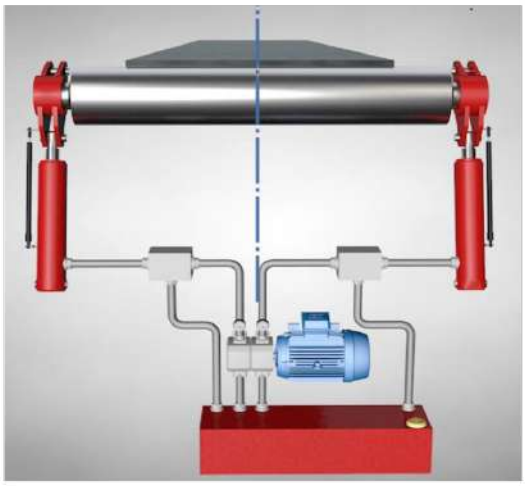
The patented **Servo-Tronic© system** keeps the machine's rolls **parallel at all times** thanks to its dual, independent but integrated, parallelism control system.

In fact, the oil feeding each roll cylinder is **mechanically kept at the very same pressure and mass flow** thanks to dedicated pumping groups and circuits supported by electro-valves **in charge of fine-tuning only**.

This way, even in case of electronic failure, the **rolls parallelism is hydraulically and mechanically maintained** and the machine **can keep operating with excellent results**.

The Servo-Tronic© allows for:

- **maximum accuracy** of the rolls positioning
- limited reliance on electronics with **reduced downtimes** in case of its failure
- **best geometrical tolerances** on the workpiece





Best Operability and Maintainability

Thanks to Multi-gearboxes Configuration

Majority of the torque generated by the hydraulic motors is **transmitted to the plate through the top roll**.

For this reason, the **gearbox connecting hydraulic motor and top-roll**, is necessarily one of the **most stressed components in the machine**.

For large capacity rolling machines, **special gearboxes with extremely long production lead time** would be necessary.

For this reason, for machines having pressing capacity **above 3,000 ton**, **Davi torque transmission system** features **multiple standard gearboxes connected to a single heavy-duty reduction gear** driving the top roll.

The system allows for:

• **eliminated downtime** in case of failure of one or more gearboxes, **since the machine can still operate at reduced torque**

• **improved maintainability**, with smaller gearboxes with much shorter delivery time





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