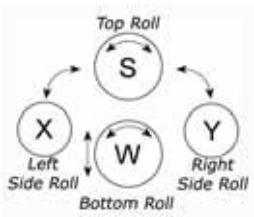
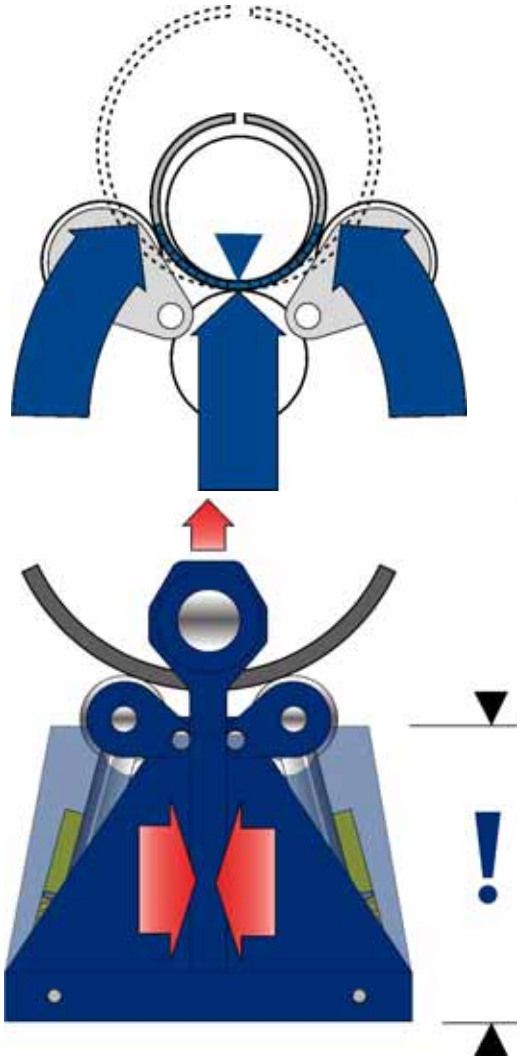


DAVI PLANETARY PIVOTING SWING GUIDES (Davi patent on 4 roll by 1988)

WHAT ARE THEY AND HOW DO THEY WORK?

Arms
The two side rolls pivot around a very heavy solid pin.

They pull from "inside"
The outboard pushing of the plate during the forming process is "retained" by the inside of the structure.

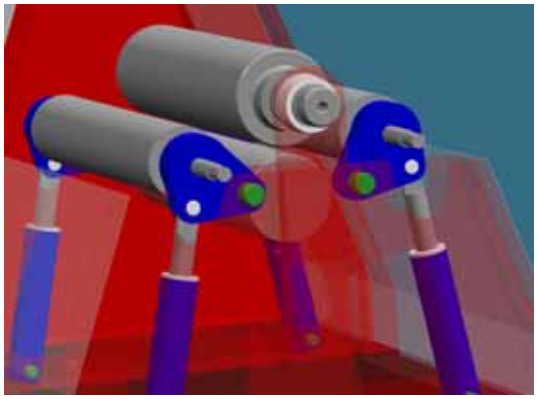


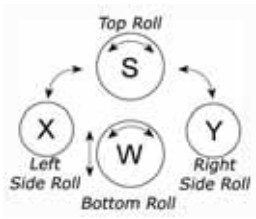
No Deflection at all
The structure "retains" the efforts by "traction", from the inside.

Heavy, Accurate and Friction-Free.
The movement is rigid and firm, but also "round", fluid and smooth, friction-free and totally accurate

Not affected at all by Mill-Scale.
Being free from any linear friction, they are totally mill-scale-proof (a terrible problem for any plate roll)

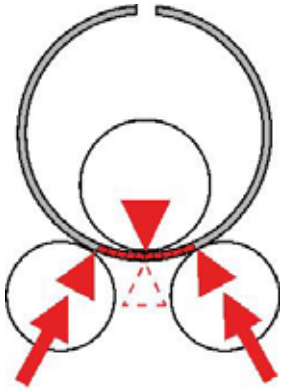
Born by the concept of the high efficiency planetary gears that power all the modern plate roll, the swing guides are today installed, besides on Davi, on the high-tech plate roll (German, American and Scandinavian) and on the angle roll, any brand.





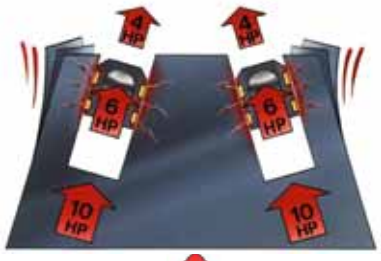
Rectilinear guides – OLD TECHNOLOGY – DISADVANTAGESS

WHAT ARE THEY AND HOW DO THEY WORK?

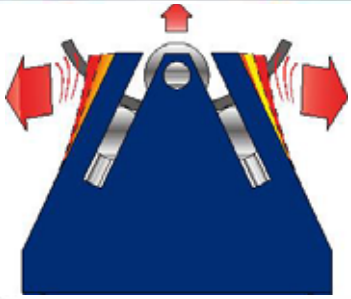


The rolls slide roughly on large and heavy linear ways that guide (resist) **by the outside** the plate outboard pushing.

They deflect
Pushed to the outside, they deflect, reducing the machine accuracy.

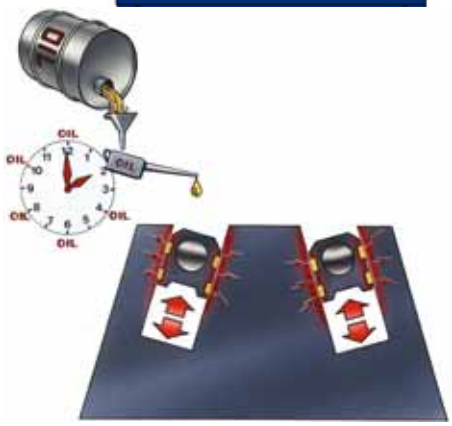


Too wide and tall
They are very high (to reduce deflection): they limit to roll cones, and they disturb the removal of the shells

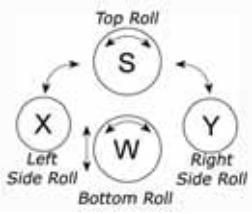


They need lubrication
Constant and heavy lubrication is required for the rough friction; but they worn-out however, time by time, loosing accuracy.

Some manufacturer still use them today, not to re-design all its range of rolls, to replace them by the more technological pivoting swing guides (installed, by the way, on all the angle roll…!, designed later).



Some highlights that limits as benefits, “selling” a plate roll by its weight, instead than by the benefits (friction-free, higher accuracy, mill-scale-proof and permanent lubrication) of the pivoting swing guides.



DAVI PIVOTING SWING GUIDES BENEFITS:

1) The Best prebending (shorter flat end)

DAVI Planetary Pivoting Swing Guides

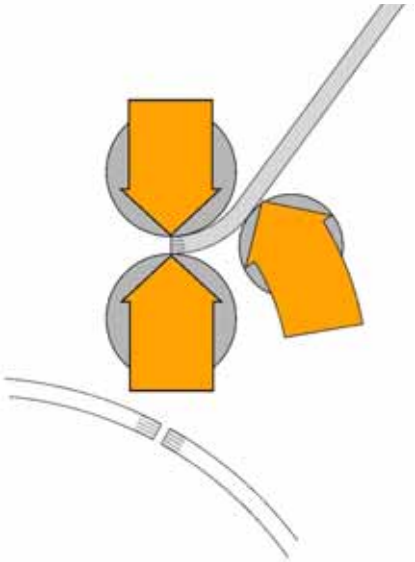
They allow to get the **absolute best prebending**.

The side bending roll “rounds” the edge of the plate from slightly more outside, converging toward the top roll:

- The edge is “prebent” by “elastic” rounding of its fibbers (and not “folded” as on the linear guides)

- It is rounded and radius-melted smoothly, blended, without angles, folders or straight parts (thanks to the elasticity of the wider section of plate formed)

- Flat end (prebending) virtually disappeared, reduced by 40-50% compared to the previous plate roll with rectilinear guides



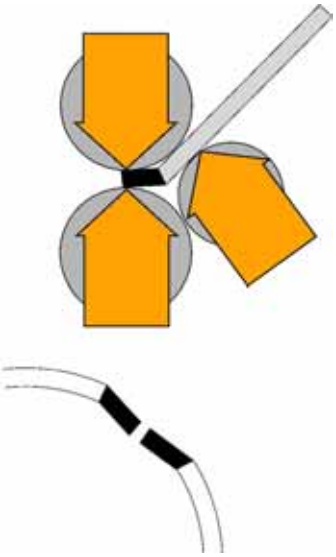
Previous Rectilinear Guides – OLD TECHNOLOGY - DISADVANTAGE

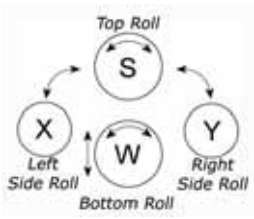
The rectilinear movement acts much closer to the clamping spot (not “wrapping” and “curving” the material):

- much tighter bending arm, that does not “round”, but instead “folds” the edge

- fibbers plastically “broken” and “folded”, rigid, by an angle, instead of “rounded” and “radius melted” by elasticity

- the straight edge is almost double than with the new pivoting swing guides!





2) Power available (machine performance)

DAVI Planetary Pivoting Swing Guides

Consistent Multiply of the power, on all the diameters, also in Prebending

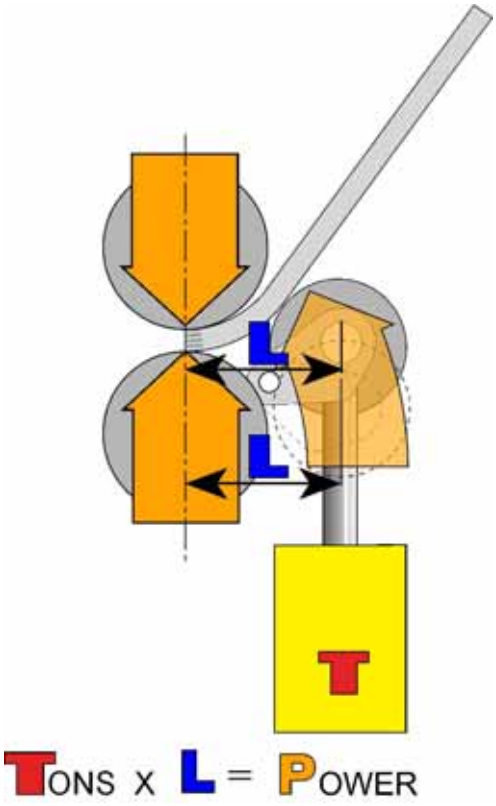
They allow to **increase the power** of the cylinders, thanks to the multiply of the power, allowed by the swing-pivoting leverage.

During the pivoting movement the roll raises up, but, in the meantime, also rotate and approach toward the top roll.

Such a geometry multiplies the power available from the hydraulic cylinder, thanks to the leverage effect and concentrate the maximum power just at the prebending area, allowing a shorter flat end (straight edge) – better Prebending.

Furthermore, that power multiply works all along the pivoting stroke of the roll (than, on all the diameters to be rolled), remaining the leverage consistent.

Thanks also to such a power multiply geometry, it is possible to get tighter minimum diameters and the flat end (prebending) is virtually eliminated, and however, 40-50% shorter than on previous plate roll with linear guides.

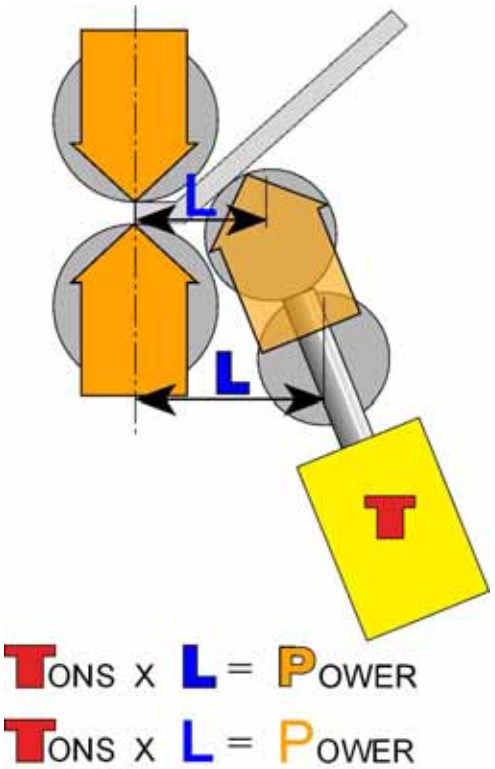


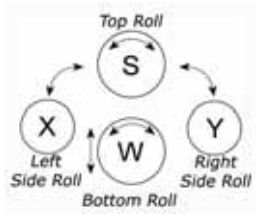
Previous linear guides – OLD TECHNOLOGY DISADVANTAGE

Less power on tight diameters and on the prebending area !

Because of the linear and diagonal ways, the power of the cylinders is fixed, without any multiply benefit of the planetary geometry.

Furthermore, being these guides diagonal, the power is higher where it is useless (at low position, on large diameters) where the leverage is longer, than at high position (where it is more required, close to the prebending area and on tight diameters), where, instead it is lesser, because of the shorter leverage.





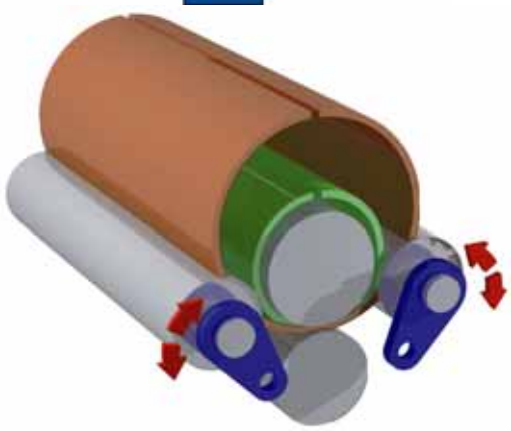
3) Tight diameters shells

DAVI Planetary Pivoting Swing Guides

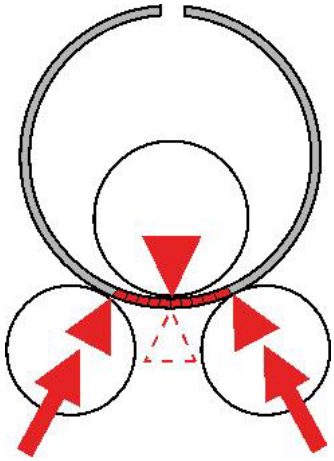
They “wrap” and keep “pressed” the plate around the top roll, along a longer section than on linear guides.

The plate, “stamped” on a much longer section, re-opens substantially less, under the spring back effect.

This allows to get parts rolled to a much tighter diameter (down to even less than 1.1 times the top roll diameter), a 30% benefit in tighter diameters on the Davi Pivoting Swing Guides, vs. the old rectilinear guides.



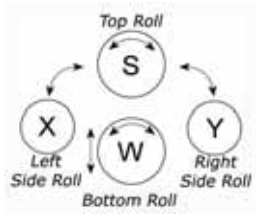
Previous Rectilinear Guides – OLD TECHNOLOGY - DISADVANTAGE



They “form” the plate on a much shorter section (because of their “tighter” geometry).

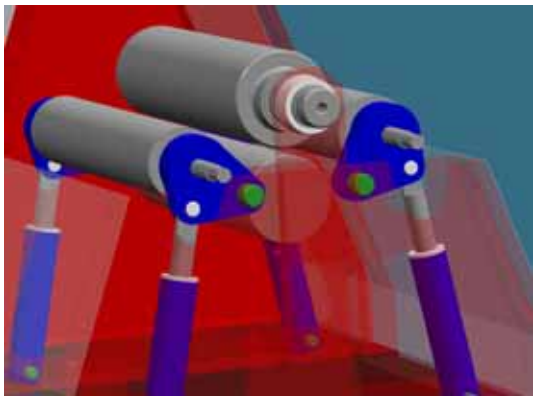
The plate, coming out from that short “stamping” section, re-opens substantially because of its spring-back.

Their “tight” geometry avoid to roll to diameters tighter than 1,4-1,5 times the top roll diameter.



4) Slipping-friction / Maintenance

DAVI Planetary Pivoting Swing Guides



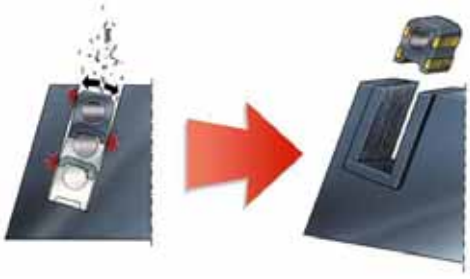
They completely eliminate the slipping sliding friction on the side rolls.

They don't require even any maintenance and lubrication.

They don't require any cleaning from mill scale, as well!!

They extend the life of the machine, and increase substantially its resale value.

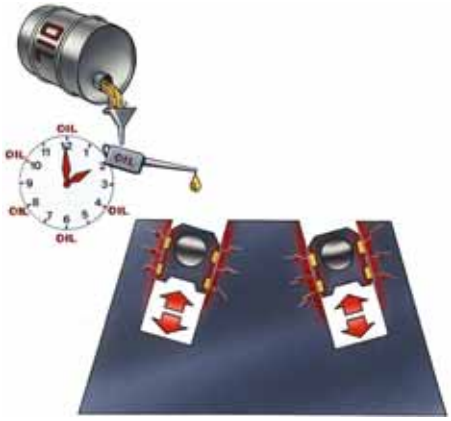
Previous Rectilinear guides – OLD TECHNOLOGY - DISADVANTAGE



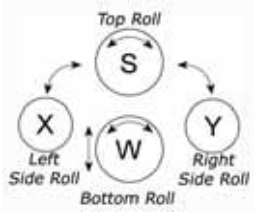
The heavy steel ways, where the supports of the rolls slip and slide, generate huge and rough friction.

They require constant and heavy lubrication to avoid seizing

They are submerged by the very abrasive mill-scale, to be removed almost after each plate.



They are however destinated to worn-out, getting play, loosing accuracy (as visible on any used plate roll).



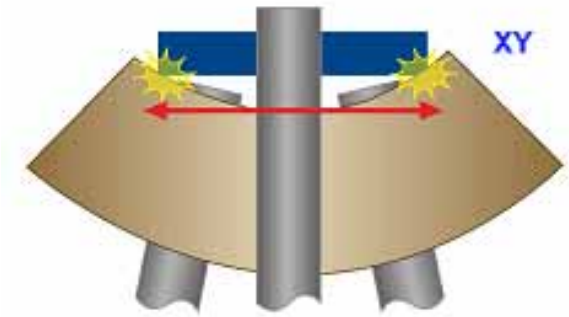
5) Tight diameter cones

DAVI Planetary Pivoting Swing Guides

Pivoting strong retained by the heavy centre of the structure, they allow to keep the frames (free of any outboard stress) lower than the rolls level.

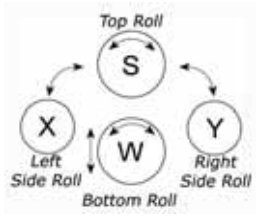
Low profile" frames, allows to roll cones close to the top roll diameter (impossible on plate roll with linear guides), being free from any frame disturb.

Previous Rectilinear guides – OLD TECHNOLOGY - DISADVANTAGE



Not to deflect too much outboard (their weaker part), the frames must be extremely heavy, and very wide and tall in dimensions.

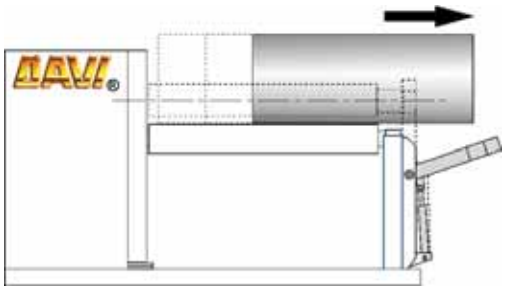
Impossible to roll cones with tight diameters: an important productive handicap compared to the swing guides.

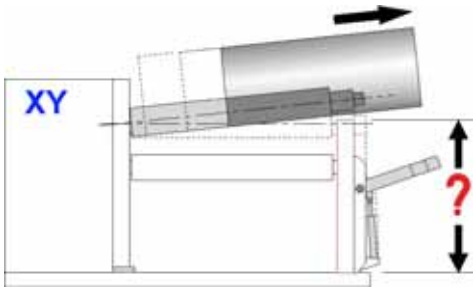


6) Removing of the closed shells

DAVI Planetary Pivoting Swing Guides

They can be easily horizontally removed, simply slipping them on the rolls (as the frames are lower, thanks to the low profile swing guides).





Previous Rectilinear guides –old technology- disadvantage

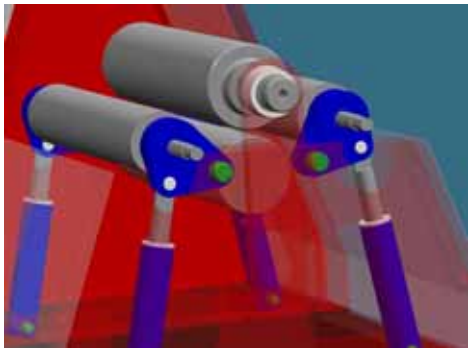
The shells must be removed difficultly tilted, not to collide against the high frames: long, expensive, unpractical and unsafe.

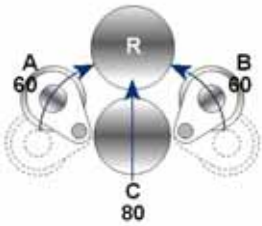
7) Top roll deflection

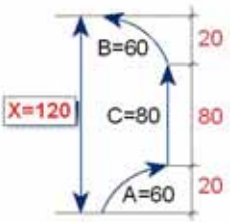
DAVI Planetary Pivoting Swing Guides

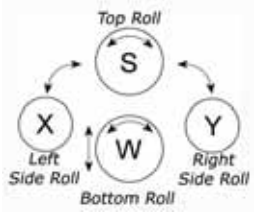
They push against the top roll higher and more outboard, with an optimal geometrical angle.

They self compensate substantially the pressure against the top roll, affected by a much lesser deflection (requires a very low crown).





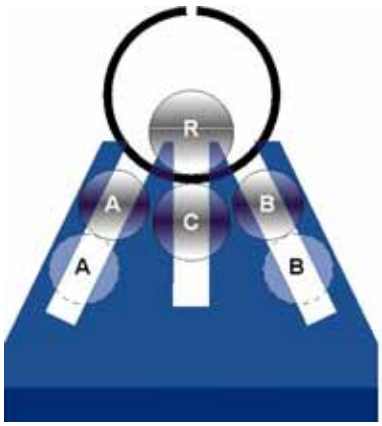


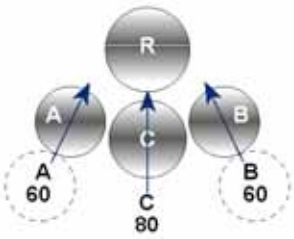


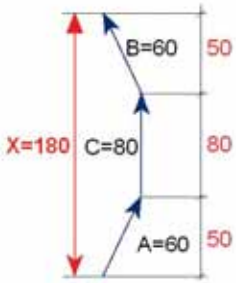
Previous Rectilinear guides – old technology- disadvantage

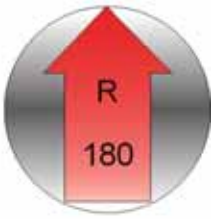
They press, instead, more directly “under” the top roll, with the worst possible geometry.

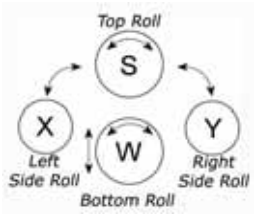
All their pushing acts just under the top roll, deflecting it a lot (they require very high crowns, with “hour-glass” problems on light thicknesses).











EST – ENERGY SAVING TECHNOLOGY
by using high efficiency transmission

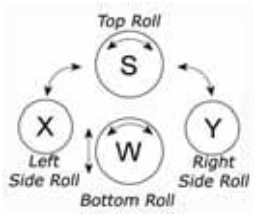
An always bigger attention is addressed to worldwide users, to reduce the energy consumption in their facilities. Some governments help the reduction.
High-energy consumption makes higher direct and indirect costs: i.e. the need to foresee electrical cabins at own expenses or to install further electrical panels

In line with this philosophy, on the DAVI plate rolls are mounted high productivity components, that combined with an advanced engineering, allows the substantial reduction of the loss of load, so it could be entirely be used in the rolling process with all its power.

The DAVI plate rolls require a much smaller installed power than before

This also thanks to:

- Elimination of the linear friction of the linear guides
- Less need of power thanks to the planetary swing guides that profits of the lever arm effect.
- Use of self aligning double crown spherical rolls bearings
- Use of **TWO hydraulic planetary motor-drives directly splined on the rolls shafts**

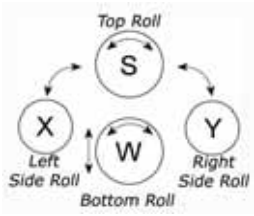


SERVO-TRONIC – electronic synchronized parallelism (*DAVI patent*)

Engineered with a first class American University, using only high performance electronic-hydraulic valves, it is the most accurate and reliable synchronizing parallel system ever installed, a brand new hydraulic system, high tech, extremely compact and top performing, assuring an absolute accuracy, on the same principle of the Synchronized Press Brakes. Installed on any CNC MCA models.

The results:

- **The highest parallelism** accuracy (not affected by torsion, as on any Torsion Bar).
- **The rolls are always parallel,** no need of setup or reset (required on the old Torsion Bar)
- **Designed** to virtually eliminate any risk of failures or machine-stop (common to Torsion Bar)
- **The rolls could be tilted at both sides**, (impossible on the old Torsion Bar).
- **Can compensate out of square shells,** due to bad squaring (impossible on Torsion Bars).
- **Instantly automatic return** to the horizontal position (after conical rolling)



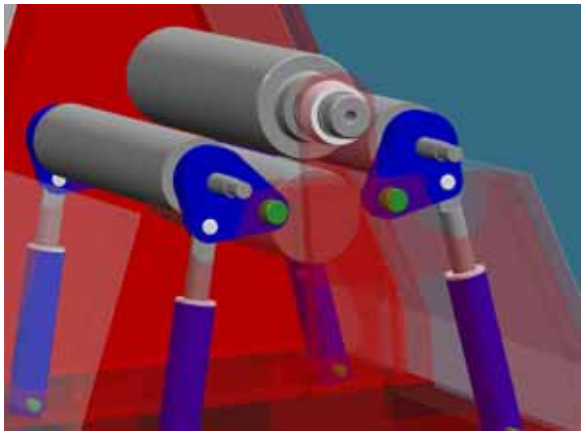
PLT – PERMANENT LUBRICATION (*DAVI exclusive since* 1985)

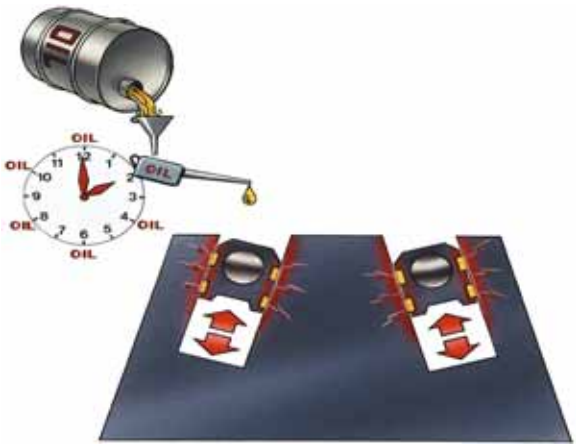
The ordinary maintenance of machines, always asks fastidious dead-times and if not made (for negligence or omission) often jeopardize the good working of those plants made to have a constant and accurate maintenance.

The DAVI plate roll, thanks to an aimed project and to the use of special lifetime pre-lubricated components, doesn't need lubrication.

The main benefits:

- **No need of ordinary lubrication**
- **Low (or null) maintenance costs and times,** more production time available.
- **Planetary swing guides** that don't need any lubrication and mill scale protected.
- **Watertight rolls bearings,** mill scale, rust and dust protected.
- **Elimination of premature wears** due to the missing of maintenance.





The machines shown on the pictures of the present quotation are only samples and can refer to other models, have a special design, or being equipped with special accessories.