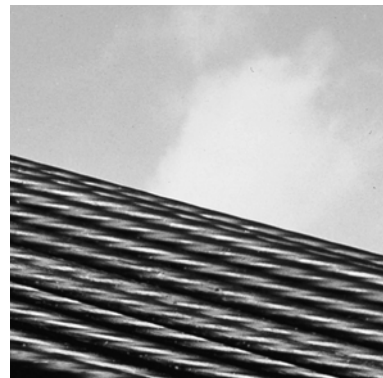
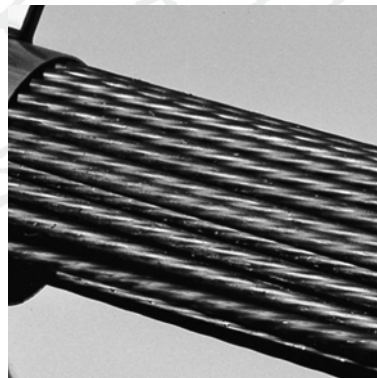


P R E S T R E S S E D
C O N C R E T E
T E C H N O L O G Y



Stressing of stay cables

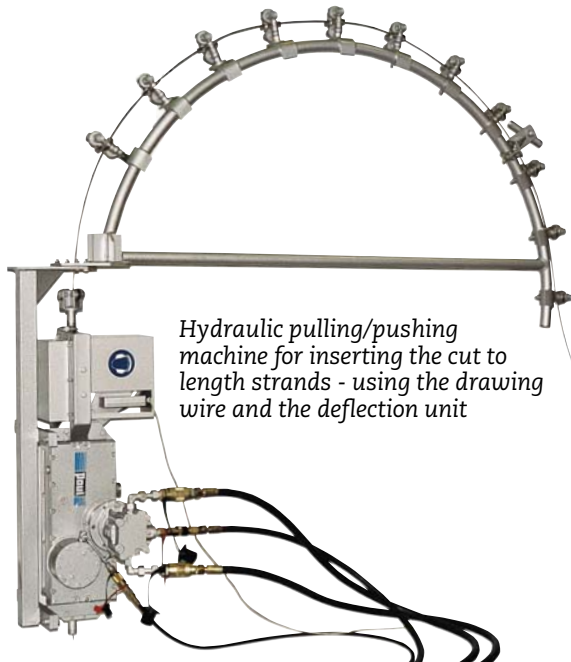
Stressing equipment -
with the greatest precision
and the simplest operation



Stay cables are either lifted/pulled up complete from the bridge platform to the suspension bridge tower or pulled in individually and locked in place with wedges. Depending on the procedure, all the cables are then tensioned with large multi-strand stressing jacks or are individually tensioned with single-strand stressing jacks immediately after being pulled into the stay cable ducts. We supply: equipment for preparing and assembling strands, anchor wedges, single-strand and multi-strand stressing jacks for tensioning and correcting stay cables.

SPECIALLY DEVELOPED INSERTION EQUIPMENT

Pulling in



Hydraulic pulling/pushing machine for inserting the cut to length strands - using the drawing wire and the deflection unit

The strands are inserted into the stay cable ducts by means of a hydraulic pushing machine which is mounted to a deflection device on the tower. The hydraulic pump unit is installed on an accessory platform nearby.

Using a drawing wire (prestressing steel 5.2 - 5.4 mm diameter) and a special coupler one prestressing strand after the other can be pulled up from the bridge platform to the anchor head in the tower, anchored with wedges and then tensioned. Special tools are available to open/close the coupler.

For this purpose the Paul range includes:

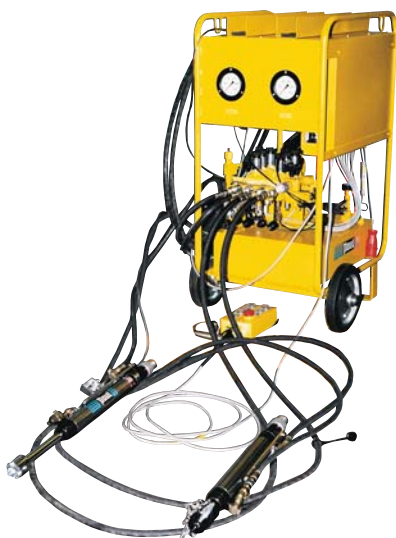
- the hydraulic pulling/pushing machine
- the hydraulic unit
- the special coupler
- the tool for releasing the pulled-in strand from the coupler.
- Cutter for outer strand-wires to expose the core wire.



Special coupler K16-10 for connecting the center wire of the strand to the drawing wire and tool for releasing the coupler

SINGLE-STRAND STRESSING JACKS

Stressing



Stressing machine, consisting of a high-pressure pump (3 l/min, 700 bar) and two 180 kN stressing jacks (reference and working jacks)

After the first strand is pulled in, it is over-tensioned to take account of the deformation of the bridge during stressing. All subsequent strands are likewise tensioned with a single jack to the same force as the first strand (reference). This force is checked with the assistance of an electrical load cell or is hydraulically-mechanically determined during the tensioning process of the subsequent strands. The force of the first strand diminishes with each newly pulled-in strand. By the end all the strands have the same stressing force. Paul single-strand stressing jacks provide for the correct execution of this process step. The stay cables must be corrected if applicable. This means that they are stressed or released with the assistance of large multi-stressing jacks.

ANCHOR WEDGES

Anchoring

After the drawing wire with coupler and strand is pulled through a tapered hole in the anchor plate, anchor wedges are attached to both ends of the strand and the strand is immediately stressed.

Paul anchor wedges provide the required stability and safety.



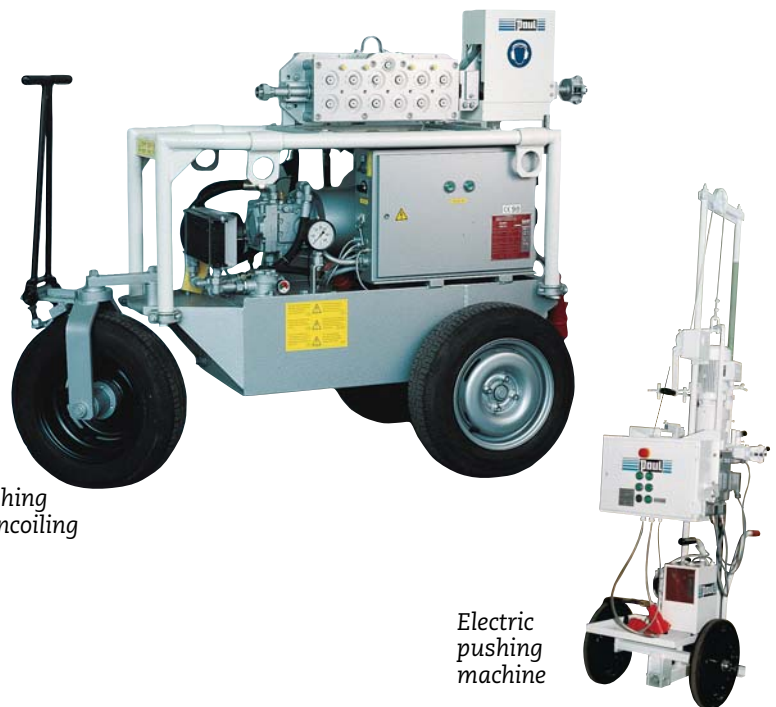
Anchor wedges for anchoring strands in the anchor plate

AUXILIARY EQUIPMENT

Uncoiling

Before the strands are pulled into the stay cable duct, they must be unwound from the coil and cut to length.

Hydraulically or electrically driven pushing machines from Paul are used to unwind the strands from the coil.



Hydraulic pushing machine for uncoiling the strands

Electric pushing machine

AUXILIARY EQUIPMENT

Cutting to length

Paul offers two alternatives for cutting the pulled-out strand to length:

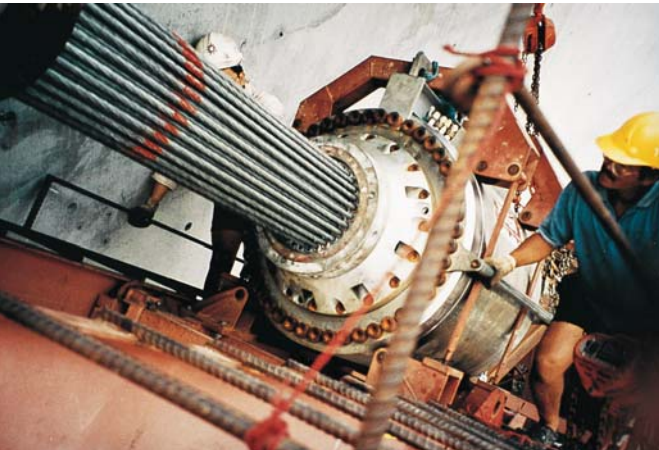
- the electrical cutting-off machine
- the hydraulic steel cutter

Hydraulic steel cutter 300 kN



MULTI-STRAND STRESSING JACKS

Joint Stressing



Multi-strand stressing jack TENSA M
15,000 kN (108 x 0.6") in use

On sites where the size and weight of large stressing jacks can be accommodated, cables are stressed in one pull. The big advantage: The building deformation does not need to be known in advance. After the cables are assembled, all the strands are stressed simultaneously with a TENSA M multi-stressing jack.

15,000 kN multi-strand stressing jack shown for size comparison



OTHER APPLICATIONS

Correcting the stay cable stress

The stay cables on already assembled bridges are corrected with special multi-strand stressing jacks with a small stroke length. The stress is reduced or increased by tensioning the stay cable and by slackening or tightening the stay cable anchorage anchor nuts. While doing so, multi-strand stressing jacks are placed on special support seats to enable the nuts to be retightened or shims to be inserted or removed between the anchor plate and the bearing plate.

6800 kN/61 x 0.6"
stressing jack for
correcting stay cables



TENSA M 3000 for a
multitude of applications

OTHER APPLICATIONS

Lifting and lowering heavy loads

The TENSA M stressing jacks that are mainly used for tensioning tendons can be used for lifting work (lifting and lowering) and as brake gear for incrementally launched bridges, by using special exchangeable interior parts.