Thru-tube
The new generation thru-tube is designed for the following configurations:
• A TERMAN slave arm and motion module.
• An MT 200 slave arm and motion module.
• An MT 200 slave arm and standard master arm.

Accessories
• Handling and installation lifting device.
• Motion module storage trolley.
• Tongs and jaws parking and disconnection fixture.
• Maintenance toolkit.
• Wrist joint disconnection tool.

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La Calhène is an equipment manufacturer specialized in material to protect human beings in a hostile environment, protect a product against the surrounding environment, and protect the environment from hazardous products. Its customer base is half in the nuclear field and half in the pharmaceutical field.

In the nuclear sector La Calhène supplies 4 product lines: remote manipulators, transfer systems (the DPTE® range, standard and special applications), Glove Box ports, and shielded casks for transfer / transport. La Calhène supplies to 5 market segments: nuclear fuel manufacture, spent fuel recycling, radiopharmacy, laboratory / university / units of research, and dismantling / decommissioning / sanitation.

On the basis of its long experience in the nuclear sector, Getinge La Calhène developed a set of solutions and equipment for the pharmaceutical industry, in particular for isolators and sterile transfer systems (DPTE® and DPTE-BetaBag®).
A computer-assisted master-slave manipulator

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**No Mechanical Connection**

The TERMAN TAO combines the «cold» side of the MT 200 TAO with the TERMAN new generation slave arm. This combination provides all the advantages of the TAO computer-assisted systems (force feedback, electrical transmission, remote piloting), with the benefits of a rigid, long-lasting precise slave arm, and robotic mode throughout the working volume.

**Motion Module**

The TERMAN TAO motion module is the same as that of the MT 200 TAO, which is compatible with all generations of La Calhène thru-tubes (MT 200 range).

**An Ergonomic Work Station with Force Feedback**

The poly-articulated master arm used haptic technology. Operator effort is multiplied by a homothetic coefficient in the slave arm, which reduces the physical effort required to lift and move loads. The offset function has been greatly simplified by integration into the master arm; this improves ergonomics.

**Mobile Workstation for Enhanced Operator Safety**

The operator can work in direct vision (via the hot cell window) or with camera vision anywhere within 200 m of the hot cell, thanks to the electrical link between the master and slave arms. Greater distance means reduced dosimetry. The TAO systems (MT 200 and TERMAN) open new perspectives in cell design, where conventional large shielded windows may no longer be necessary.

**Maintenance Gains**

Substantial economies can be made in the maintenance costs of this robust and durable system:

- The Terman TAO has a MTBF (Mean Time Between Failures) of 1000 hour, according to a mixed reference cycle (factor 4 compared to present systems).
- Considerable reduction in the volume of nuclear waste.
- Reduction in spare parts consumption.

The slave arm wrist joint and the tongs can be disconnected inside the hot cell.

**Robotic Mode**

Repetitive tasks not requiring force feedback can be done in playback in robotic mode, reducing operator strain and improving speed and precision.

- Repetitive processes are robotized.

**A New Generation Design**

The TERMAN slave arm is cable-less, with only mechanical transmissions, based on a rotating bars transmission design for enhanced rigidity and much longer motion reach than any existing remote manipulator.

**Exceptional Slave Arm Working Volume**

Manipulations are amplified since the TERMAN can reach the top of the hot cell. Hence the work zone is trebled compared to that of a standard master-slave manipulator:

- Telescopic slave arm, extending from 1480 mm to 4010 mm.
- Lateral motion (X) from -255° to +255°.
- Wrist joint rotation (Azimut) from -720° to +720°.
- Infinite rotation of the jaws, maximum jaw opening 90 mm (screw / unscrew mode).
- Maximum load capacity 20 kg (manufacturer’s test value), with no motion restrictions.
- Lifting capacity at hook is 80 kg in a work volume consisting of a 15° cone starting from the shoulder.