

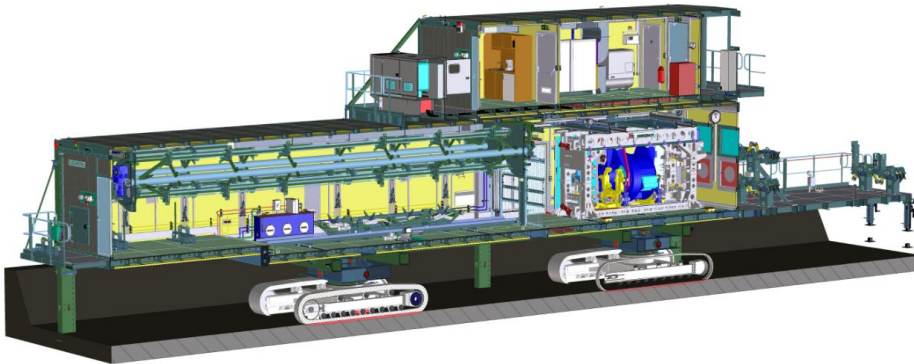
## Siemens is presenting the mobile factory - a mobile tube-laying platform for gas-insulated transmission lines (GIL)

### Technology

With the mobile factory, Siemens AG is developing a highly automated system for welding and laying of gas-insulated transmission lines (GIL). Thereby flexibility and cost-efficiency of underground power transmission shall be improved, whilst minimizing the environmental impact.

Two different methods are employed for laying GIL underground: either burying them directly in the ground or laying them in tunnels. In both applications the individual tube segments are welded together into a continuous section and then laid in a prepared trench or tunnel. In past projects, it was necessary to design and build a special project-specific assembly tent or other suitable structure for laying GIL, which meant increased costs and time expenditure. The mobile factory replaces the existing installation process. In effect, it is a mobile tube-laying platform that enables GIL lines to be laid flexibly at different locations more quickly and therefore more economically. Crawler tracks driven by four hydraulic motors are used to move the mobile platform along the trench or tunnel. Thanks to its modular construction, the mobile factory can be easily transported to the construction site by truck. It consists of two individual modules: the tube magazine with a welding platform and the so-called technology module. Both modules are independently supplied with services like electrical power, compressed air, hydraulics, and light.

Another novel feature of the mobile factory is the welding technique employed to connect the tubes. On the welding platform, friction-stir welding is now used to produce circumferential, materially bonded joints, replacing the tungsten inert gas welding (TIG) process used in the past. One of the advantages of this technique is fast welding of high-quality joints.



**Laying methods for buried GIL**

To lay the GIL tubes, the route is split up into different subsections of about 500 m. The tube laying route is opened up and the excavation work performed over this length and the mobile factory is positioned accordingly (Station 1). The pre-assembled pipe modules are then delivered from the prefabrication plant, transferred to the magazine, straightened, and welded into a section. As soon as a welded joint is complete, the tube section is pulled into the trench by means of a winch. The welding team can immediately continue working on the next joint. The magazine can be loaded in parallel to this process. Once the two phases have been completed from start to destination point of the tube section, the mobile factory is moved to the next station (Station 2) and the section already laid can be filled in. As mentioned before, the mobile factory can travel autonomously in the trench (with the crawler tracks). Once the new starting point is reached, the process can begin again (see Fig. 1).

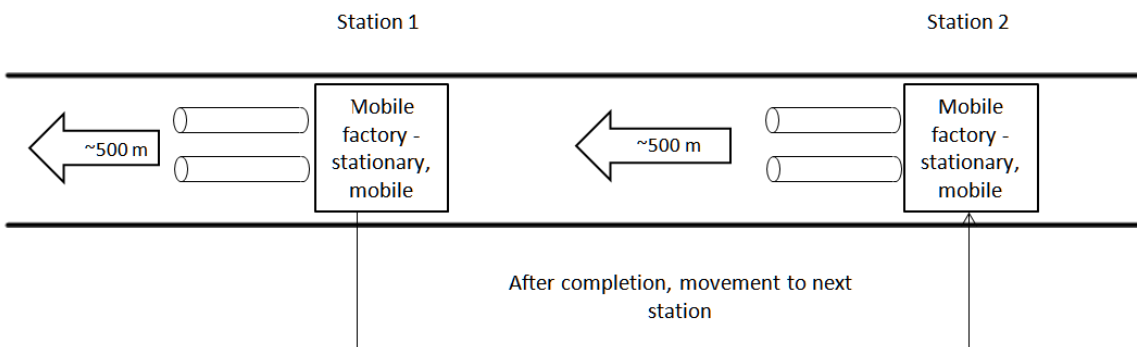


Figure 1: Mobile Factory

To install very long routes in a limited time, a large number of work operations can be conducted in parallel using several mobile factories. The entire route can be

divided into several construction sections and the number of mobile factories to be deployed in parallel is then determined. Time advantages can be leveraged using this modular, parallelized method of construction.



Denis Imamovic, Head of Power Transmission Lines, Siemens AG: *„With this technology we are proceeding further in developing highly automatized and high quality processes to be able to offer our customer cost-efficient solutions for underground high power transmission over long distances.“*

### Technical data

- External dimensions: 23m, 4m, 3.5m (L/W/H)
- Ambient conditions: -25° C to +55° C
- Pot. gradient: 8%
- Speed: 4 km/h
- Spindle capacity: 4 storage positions per spindle

### Advantages

- Storage of up to eight GIL tubes with automatic output for further processing
- Axial, horizontal, and vertical positioning of the tubes to up to 0.2 mm
- Optimal installation conditions thanks to self-sufficient container housing
- Automated, high-precision, circular welding of enclosure and conductor tubes
- Significant cost reduction when laying GILs over long distances
- Productivity increased by 100 per cent from two to three welds per day to at least six per day

For further information on CIGRE, please see

[www.siemens.com/press/cigre2016](http://www.siemens.com/press/cigre2016)

For further information on GIL, please see

[www.energy.siemens.com/hq/en/power-transmission/gas-insulated-transmission-lines.htm](http://www.energy.siemens.com/hq/en/power-transmission/gas-insulated-transmission-lines.htm)

For further information on Siemens' Energy Management Division, please see

[www.siemens.com/energy-management](http://www.siemens.com/energy-management)

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