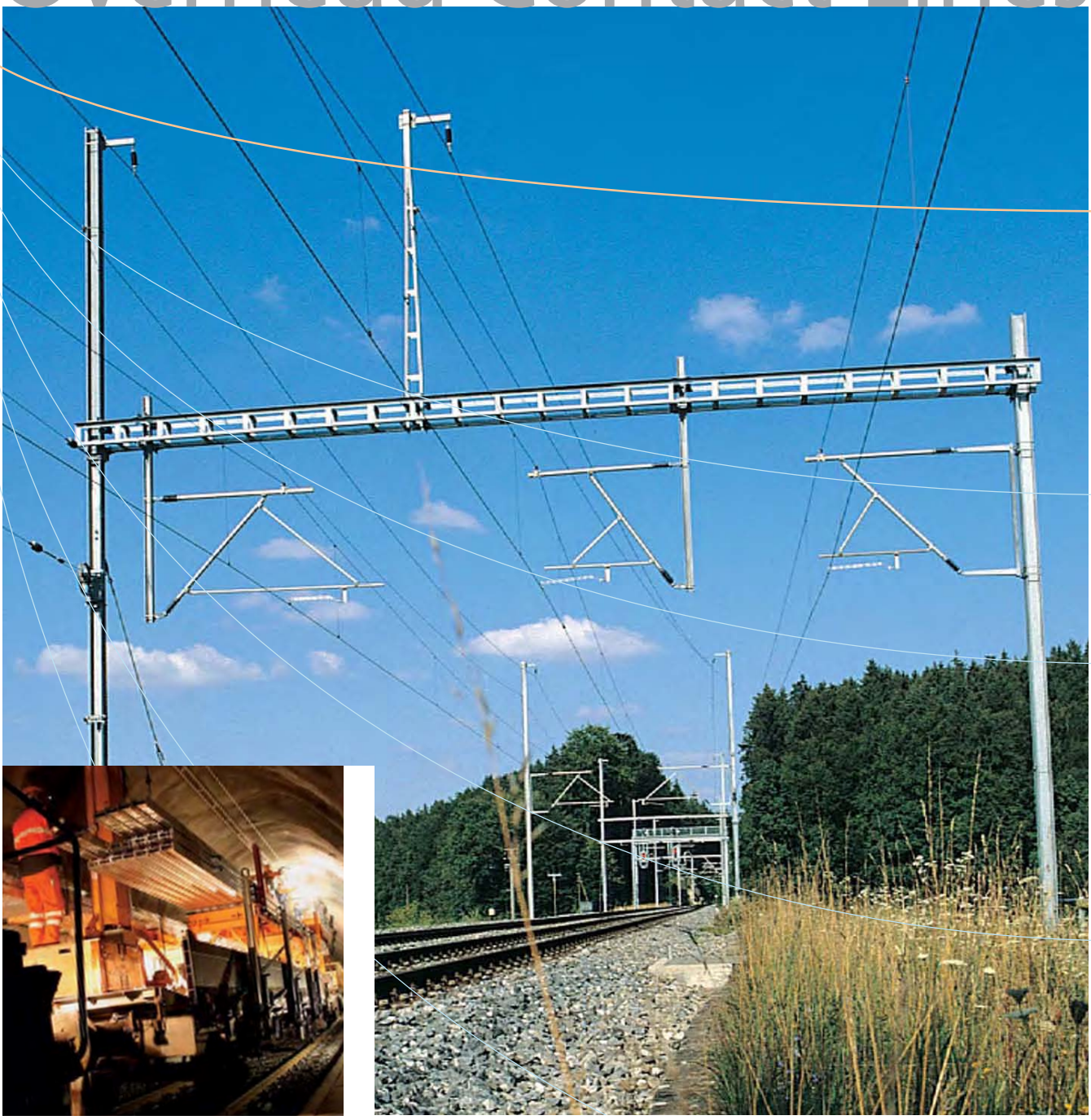
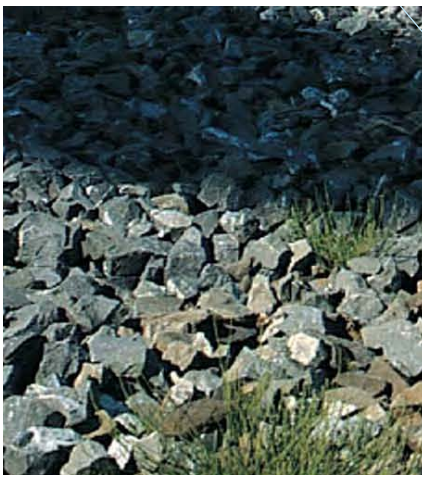
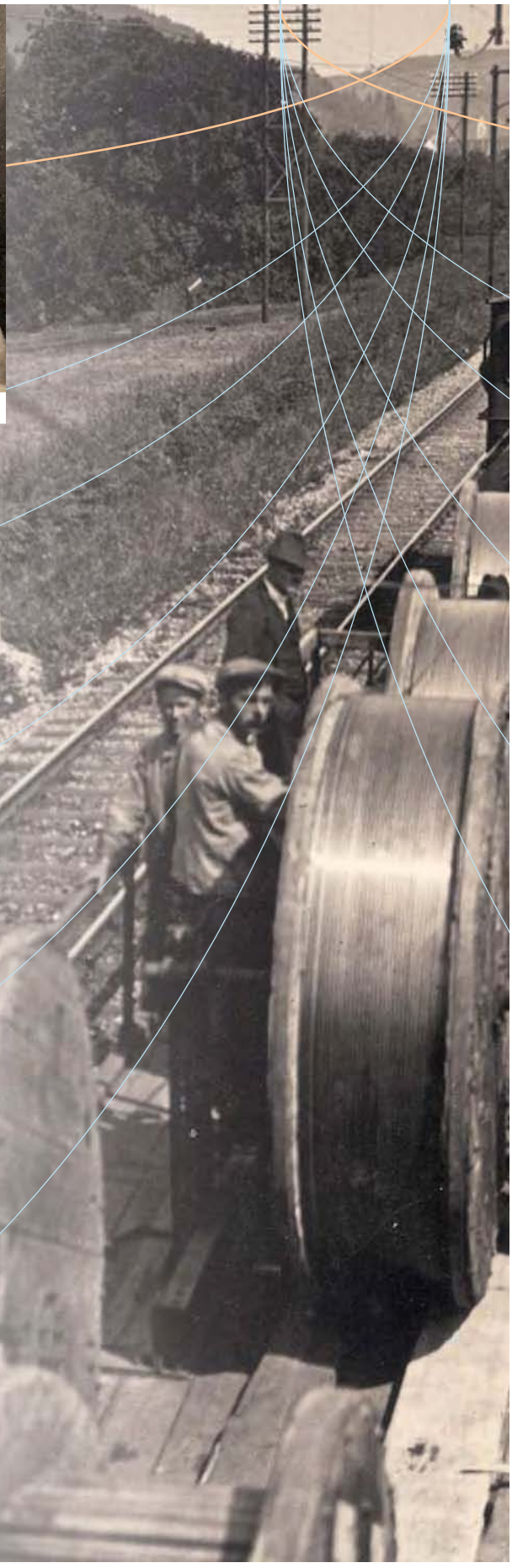
Overhead Contact Lines





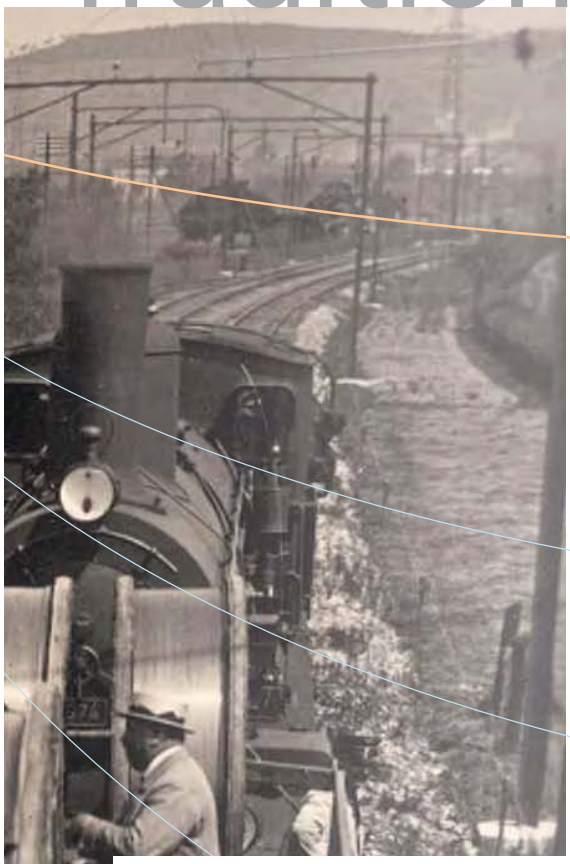
Furrer+Frey®
Overhead contact lines



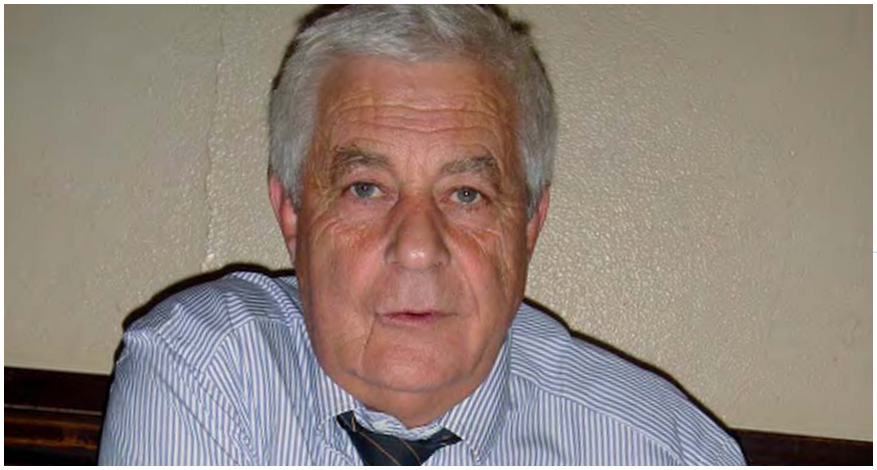
It all began in 1923. Emil Furrer and Arnold Frey founded the company Furrer+Frey. They had learned the overhead line business as engineers and recognised early on that overhead contact lines for railways is also an interesting area of activity. At the end of the fifties the pioneers devoted themselves exclusively to overhead contact lines.

We have accumulated our experience from the building of overhead contact line systems over the years, passing it on from one generation to the next. As ever the installation teams are the capital of our company. Continuous training, a high level of availability and wide professional knowledge characterise our teams.

Tradition



Hans Jörg Furrer entered the company in 1947 and after the withdrawal of the Frey family soon continued to manage it under his own responsibility. The constant growth of renewal and conversion work helped the company to gain importance. Management and infrastructure were adapted to the increasing activities.



On completion of studies the 3rd generation continued to follow the calling of the firm. In 1985 Beat Furrer took over the management of the healthy family enterprise. Supported by its qualified personnel Furrer+Frey take an active part in the development of the market and also ventures its first small steps abroad.

After a few years' experience in the building trade Rico Furrer decided in 2007 to enter Furrer+Frey. Together with our colleagues we are endeavouring to achieve a totally 4th generation management responsibility and reach our centenary year.

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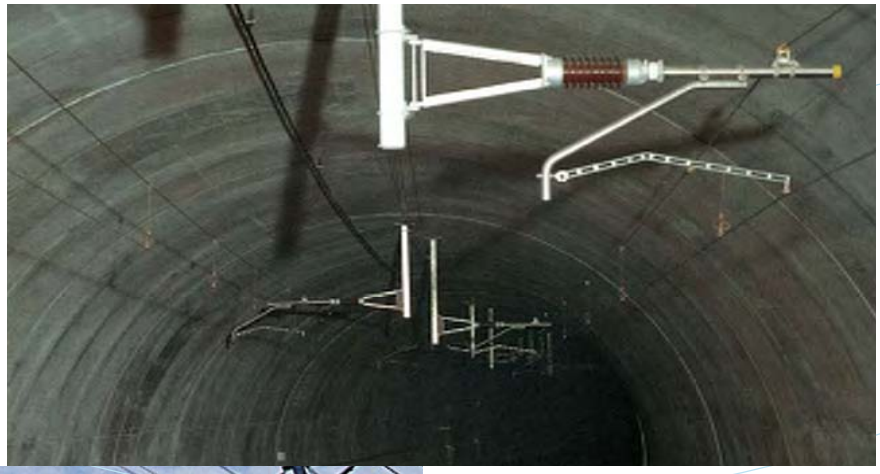
Experience

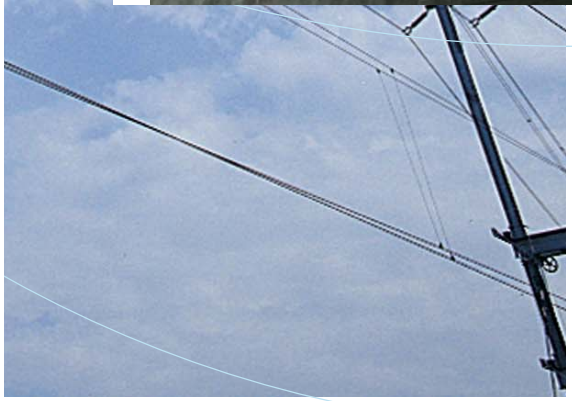
Due to its topographic situation Switzerland offers transport companies a wealth of railways in a single network. Rack and pinion railways, regional railways, flat railways for high speeds. Suburban railways and tramways round off the pallet. Furrer+Frey are familiar with all types of overhead contact lines.

Without customers there's no company. Our conviction grows daily that it is not just our qualification which renders possible the decades of collaboration with our customers. Care and observance of delivery dates will continue to be our keywords for completing work entrusted to us in the future.

Over recent years, overhead contact line systems FL 200 and FL 260 have developed to become a standard and have recently also found approval abroad. Characterising this overhead contact line system is the small number of components, a suitable planning tool and its resistance to corrosion.



In a touristic environment, we consistently place a high value on light and elegant design. So even today inclined overhead contact lines are built. The lower masts and the large distances between supports are impressive.



Tunnels represent a special challenge for electrification, especially with high speeds which render aerodynamic effects noticeable. Furrer+Frey has equipped the Zimmerberg tunnel with a new overhead contact line system, permitting operation at 200 km/h.

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Increasingly, special requirements are putting us to the test. The mounting of 56 m long crossbeams imposes high logistics demands not only in production but also for installation. We welcome such challenges to prove that we can be relied upon.

We build overhead contact lines for urban railways and also for trolleybuses. For this we have special equipment.

The secret of overhead contact line planning is not just in projecting new installations on free sections. For many years we have replanned existing systems, assembling a large body of specialist knowledge. The close contact between in-house engineers and our installation teams leads to optimal solutions.

Universalism

In principle we do not want to disturb railway operation. Where possible our components arrive preassembled at the construction site and are presorted in the right order. If the environment permits we erect fully assembled masts using a helicopter. For the rest we rely on our planning teams.

Qualified installation personnel and appropriate equipment form the basis for efficient working on construction sites. Work safety is a serious concern for us. We run fitter training courses, our specialists give instruction on our machines and we also provide an emergency standby team.

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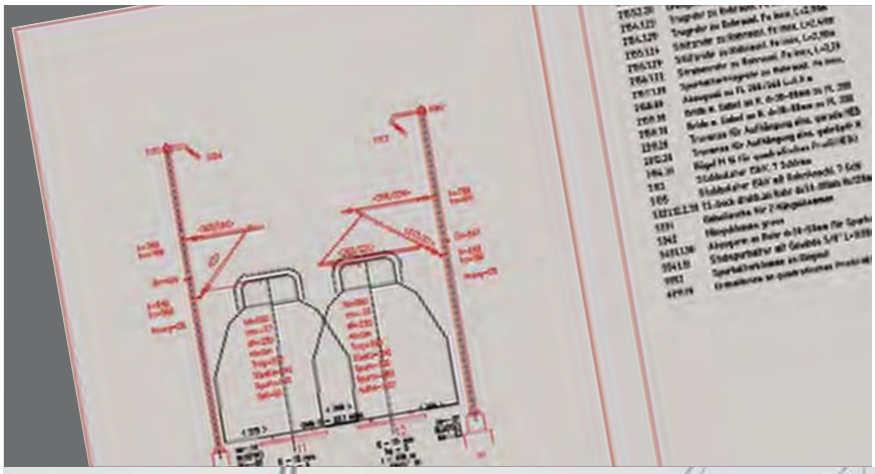
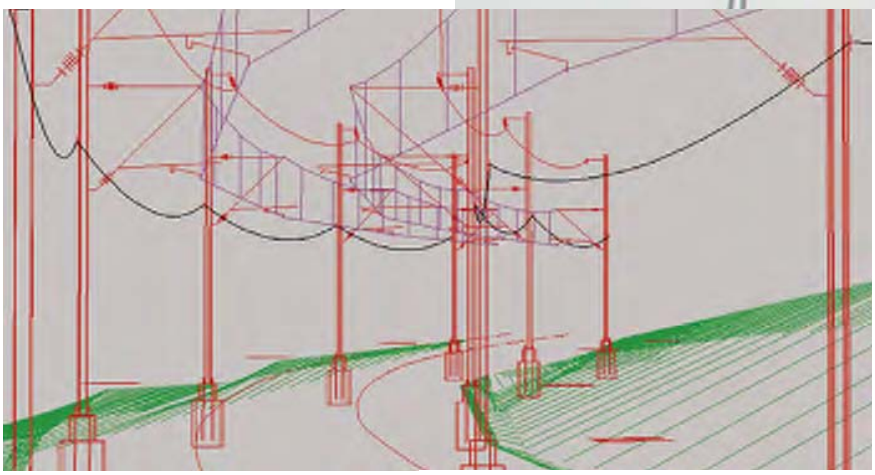
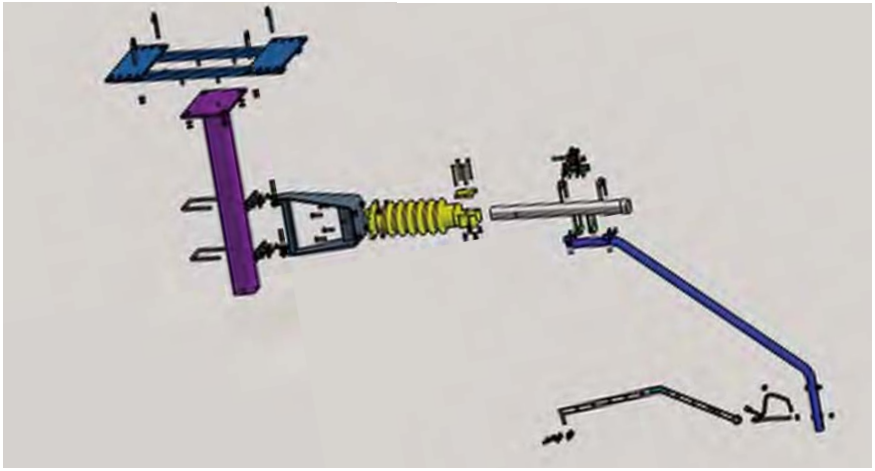
Through careful spade-work we think through the installation process step by step, aiming as far as possible to optimise it. Data represented in our offices in paper form passes to material procurement as ordering documents and to the construction site as installation instructions. Not a single screw is omitted during nightwork. Time is too valuable.





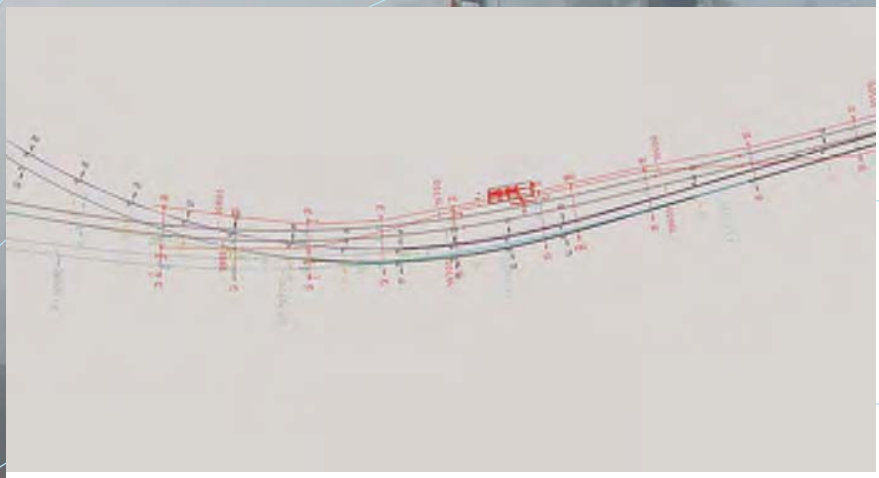
On-screen work is eased by representing overhead contact line components spatially. Overhead contact line systems are widely distributed line construction sites. The visual recognition of system parts before and after a transverse profile in progress contributes to the quality assurance of the planning. The joining up of components is also tested beforehand on the computer.



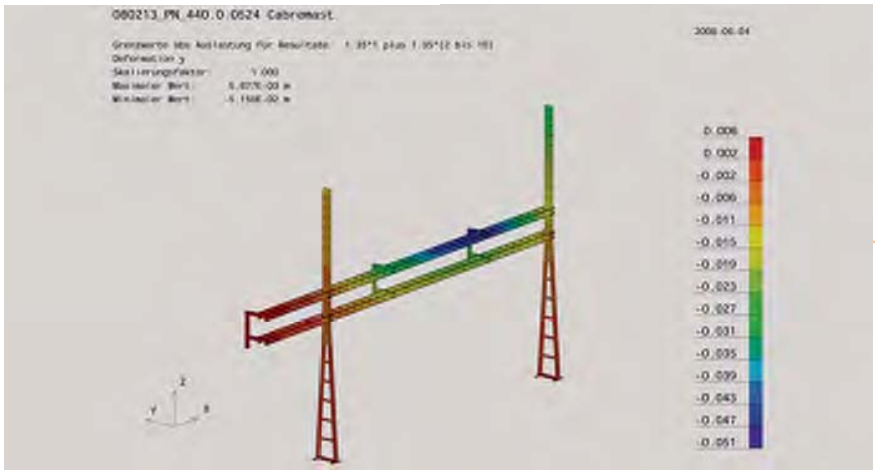
Design

We often lack planning documents of adequate quality, especially when having to renew systems installed by us 60 and more years ago. By aerial photos and laser scanning we create the digital basis upon which we can construct our projects. Even the foundation sites are stated in regional coordinates.

For the planning work we have the very latest tools. The extensively parametrised components are stored in a database. Based on this database is the 3D project planning tool ELFF which we have developed and brought to perfection over recent years.



Requirements imposed on approvals for components and overhead contact line systems increase continuously. Our structural and electrical engineers are able to provide the verifications required by regulations and specifications or elaborate approval applications for entire systems.



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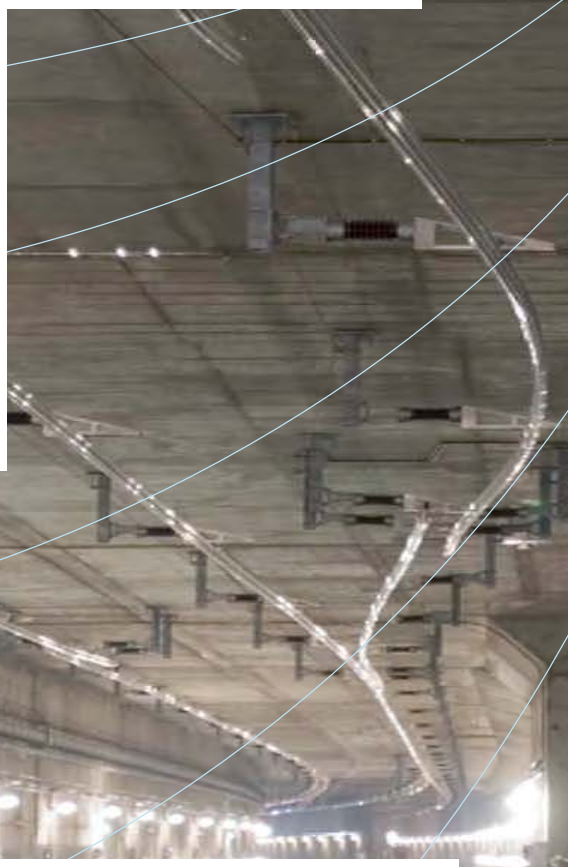
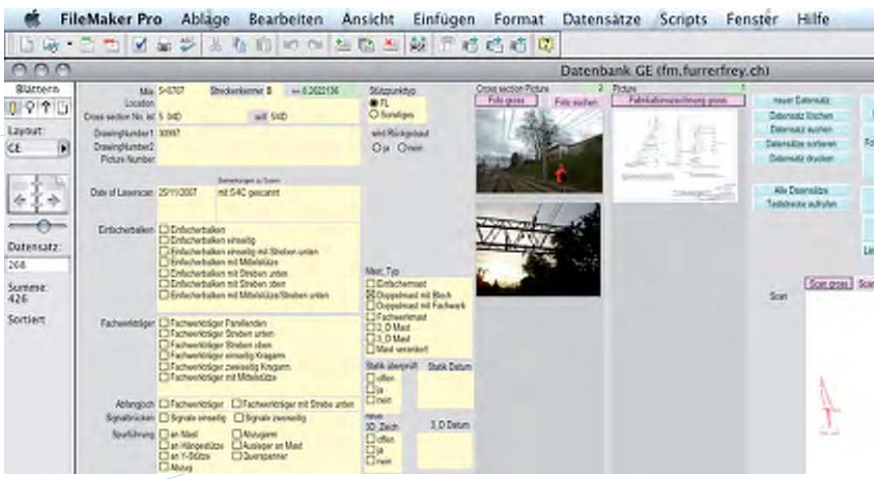
The reliability of overhead contact line systems is never high enough. So what is the answer? We found one solution with the conductor rail which has been perfected after many initial tests to become a real alternative to the overhead contact line. It is suitable for speeds > 200 km/h and has proved successful on systems totalling more than 500 km in 15 countries.

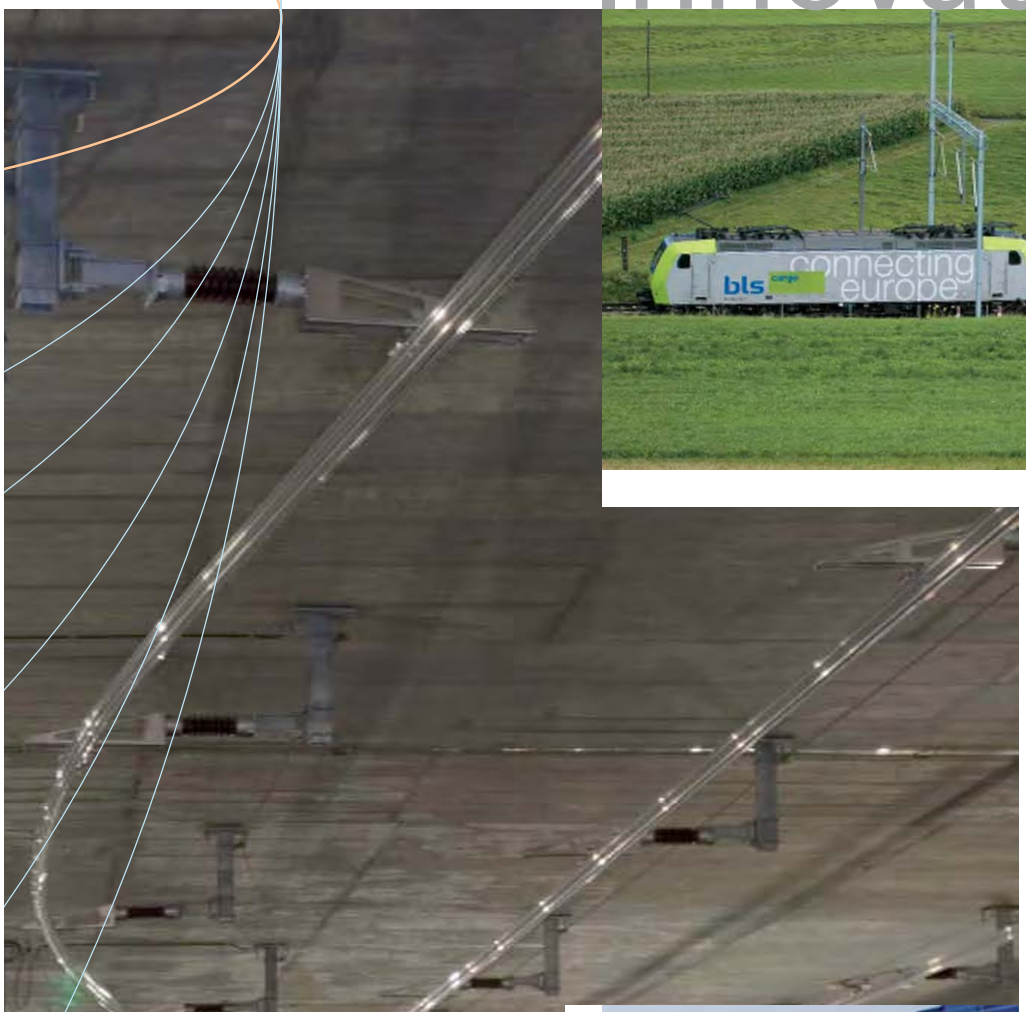


We have developed the third generation of conductor rail profiles and want to know whether the solutions sketched on paper will withstand the forces occurring in practice. For this we go to our test room, containing various items of test equipment.

Major projects require data management which is clearly laid out. Different characteristics can be assigned to each supporting structure. Values, images, scans are combined in a document. From these, search criteria can be employed to interrogate all kinds of representations, as in the example, the upper and lower edges of each supporting structure.



Innovation



Ever more frequently our customers require proof of a performance executed without gaps. With the overhead contact line this ends with the measurement of overhead line heights, stagger and the contact force at the current collectors. So that we can measure regardless of track and place we have developed the measuring container. We also measure with voltage applied.

Our interdisciplinary style of thinking leads to new solutions.

Today conductor rails are used in all sorts of systems. Maintenance on vehicles with roof superstructures is increasingly common in our maintenance workshops. The conductor rail is swung aside for free access. Movable bridges are fitted with conductor rails because no bracings are required on the bridges.

The use of new materials which – as well as high strength – possess insulating properties has resulted in new components in overhead contact line construction. For example, our product range for contact wire suspensions for tram systems.

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Furrer+Frey constantly endeavours to enhance safety with railway safety control systems and optimise operation sequences. At present our engineers are working on the certification process for the overhead line voltage testing system (OLSP). The technical safety requirements for its utilisation in systems according to SIL3 are satisfied and approved by the TüV.

The local safety control system (OSE) satisfies all operators' requirements with regard to safety. Check lamps indicate the switching status of the overhead contact line. Thanks to touch panels and displays at the main control cabinet, the OSE provides an excellent overview of the system status. In addition, switching cycle frequencies can be saved and interrogated with regard to system maintenance.

Assembly personnel expressed the wish for an ideal rope pulley for overhead contact line construction. It is used for holding ropes and small cables and must be able to be opened quickly and without tools, locked and at the same time be light and robust. Today our competitors and railways are using the rope pulley, too.

Development

We want to know what is going on and all our developments and components are tested before being placed in operation. This procedure ensures that our customers receive only tested systems and they can rely on a high degree of reliability and low life cycle costs. We also provide safety verifications.

We use a fire test to verify that the conductor rail has a 3x longer withstand time than the overhead contact line.

The durability of the utilised components is one thing. On the other hand we only want to fit devices which satisfy all safety requirements. These include verification that vehicles with roof superstructures used on our customers' railways will not overturn.

Furrer+Frey's experts are recognized by the authorities.

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Logistics

All logistics activities in relation to our construction sites are organised and executed through the workshop.We have pioneered the use of telescopic working platforms on railway waggons.

Since the founding of our company we have remained faithful to our original location. We have of course adapted our facilities to the needs of the worldwide market. The fact that we are close to the city centre and the local public transport systems is well suited to Furrer+Frey AG's area of activity.

The store and workshop on the other hand have together been relocated. We had to take into account the increasing extent of our range of material and the constantly growing stock of machines. In Thun we are connected to the world of railways by our own siding.

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Export

Our activities in the export trade led to the establishment of subsidaries in Rome, Algiers and Hongkong. In addition we work together with reliable partners worldwide. The activities in the domestic market and abroad lead to extra experience which finally is to the benefit of our customers.

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