



GOLDSCHMIDT

Smart Rail Solutions

ORIGINAL THERMIT®

THE BEST CHOICE FOR
YOUR RAILWAYS



BENEFITS OF THE ORIGINAL THERMIT® WELDING PROCESS

Flexible – less equipment needed for welding tasks on the track construction site • **Quick** – short shutdown periods and high track availability • **Economic** – efficiency through high capacity with low investment and maintenance costs • **Robust** – excellent process reliability for increasing track requirements



FROM INVENTOR TO GLOBAL MARKET LEADER

Around the world high speed trains, freight trains, heavy haul trains, trams and subways glide smoothly over continuously welded track. As the inventor and global market and technological leader in the field of Thermit® welding, for over 125 years, Goldschmidt has set standards for continuously welded track.



RELIABLE CONNECTION

An efficient and reliable railway infrastructure is an integral part of all sustainable mobility concepts. This requires reliable and long-lasting railway tracks. The Original Thermit® welding process enables the continuous welding of rails in a large variety of profiles and grades. Goldschmidt develops, produces and delivers all the required materials, tools and equipment required to carry out welding.



INNOVATION AND HIGHEST QUALITY

Our target is to meet all the requirements of our customers with innovative and reliable products of the highest quality. Original Thermit® is manufactured according to the strictest quality standards. Using our expertise and modern engineering, Goldschmidt ensures process reliability and therefore the reproducible high quality of our Original Thermit® welds. Numerous certifications according to international standards underline our competence.

A PROVEN PROCESS – FIT FOR THE FUTURE

The Original Thermit® welding process is able to handle all rail welding applications. Today it remains true that railway networks are the best way to transport people and goods in a reliable, comfortable, economic and ecological way.

SETTING STANDARDS FOR 125 YEARS

In 1895 Prof. Goldschmidt succeeded to transfer the reduction of metal oxides by aluminium into a technical application. This revolution was quickly used to enable the welding of railway track. All over the world railway projects depend on Thermit® welds and the continual improvement of Thermit® technology. In addition to the welding of railway track, the Thermit® process opens up further interesting applications today.



STEPS OF THE THERMIT® WELDING PROCESS

1. SET A GAP

A gap is set between the two rail ends which are to be joined by welding.

2. ALIGN THE RAIL ENDS

The rail ends are aligned such that the geometrical tolerances can be met after grinding the finished weld.

3. MOUNT THE CASTING MOULD

A refractory mould is secured around the weld gap and sealed.

4. PREHEATING

The refractory mould and sealant are dried using a preheating torch and at the same time the rail ends are preheated.

5. THERMIT® REACTION

The Thermit® reaction is initiated in the crucible.

6. CASTING

The liquid Thermit® steel runs into the refractory mould. Molten Thermit® steel pours in between the two rail ends which melt and fuse together in a welding process.

7. REMOVAL OF RESIDUE

After the Thermit® steel has solidified, weld residue is removed.

8. FINISH GRINDING

After the Thermit® weld has cooled down, a final grinding process is performed.

OVERVIEW OF

ORIGINAL THERMIT®

The history of Goldschmidt is characterized by high quality standards, a pioneering spirit and innovation. Since its invention the Thermit® welding process has experienced many historical milestones and over time has been continuously further developed to meet future requirements.

1895

The history of the Thermit® welding process begins with the granting of imperial patent no. 96317 for a “process for the manufacture of metals or alloys of said metals”. Prof. Hans Goldschmidt successfully used aluminium powder to reduce metal oxides in a technical application.

1928

The first welds on railway track were already carried out shortly before the turn of the century. In 1928 the Deutsche Reichsbahn approves the Thermit® welding process as a standard welding process for track. Soon almost all international railway networks followed suit.

90 million Thermit® portions

Continuously welded track is the key to efficient mobility and the guarantor of sustainable, safe and comfortable rail transport. With more than 90 million Original Thermit® portions sold since 1895, Goldschmidt has established itself as the global market leader.



Quality

Compliance with high standards and the continuous fulfilment of customer expectations are important conditions for the success of Goldschmidt. In order to maintain the high quality of our products in the long-term, we validate our manufacturing processes and quality inspections. Our Thermit® welding processes are approved by numerous railway networks worldwide according to international standards and are continually reviewed and further improved.



Thermit® is a mixture of aluminium granules and metal oxide which after an initial ignition has a strong exothermic reaction. With iron oxide this generates temperatures of approximately 3 000 °C. This enormous development of heat brings about a quick, self-propelled spread of the reaction throughout the whole mixture. The result is pure molten iron. However, for the joining of rails this Thermit® iron would still be too soft. Therefore, we add alloy additives to the Thermit® portion to produce steel with the right characteristics.

DARi

Various digital tools, measurement systems, software solutions, cloud databases, services and interfaces make our range of products and services more intelligent and more efficient - for a safer and more efficient network operation. A leading innovation that pays off for you!

Competence

Goldschmidt continues to improve the Thermit® technology to meet the growing requirements for continuously welded track. Your contact person for all technical requests regarding Original Thermit® is the Center of Competence Thermit®. Here in cooperation with our Technology Innovation Center, railway networks and track manufacturers, new welding processes and Thermit® portions are developed, approvals for Thermit® welding processes are realized, and Thermit® welds are examined and assessed.

EXTENSIVE SERVICE – SUPPORT AT ALL TIMES

Remote support is valuable but cannot replace personal and competent service at a local level. As a company with global operations, Goldschmidt offers you a close and trusting cooperation – regardless of your location.



PASSING ON VALUABLE KNOWLEDGE

Goldschmidt offers training for all Thermit® welding processes at its own training facilities and at customer locations worldwide. We provide basic training to become a qualified Thermit® welder and also offer routine examinations, advanced training and training for welding supervision personnel. Goldschmidt works closely together with recognized training partners around the world to maintain a consistently high quality. This enables the efficient training of numerous technical personnel worldwide from China and Russia to South America to become professional welders for the Original Thermit® process.





MUCH MORE THAN WELDING

Experienced application engineers at Goldschmidt support you worldwide with all your questions concerning railway track and assist you with the introduction of new products and processes. This includes quality assurance for the execution of Thermit® welds and the inspection of your railway infrastructure and its maintenance.

SMALL SELECTION OF BIG PROJECTS

Due to its flexibility during daily operations, Thermit® welding has become an essential part of future-oriented railway projects. You too can benefit from the many benefits of this process and our extensive experience as the inventor.



QUALITY HAS NO LIMITS

Using its international and experienced network of experts, Goldschmidt has the answer to all your questions when it comes to aluminothermic rail welding. Customers and business partners worldwide benefit from this global knowledge. High-speed trains, heavy load trains and light rail networks all run with low noise and low wear over continuously welded tracks welded with Original Thermit®. Here is a selection of projects.





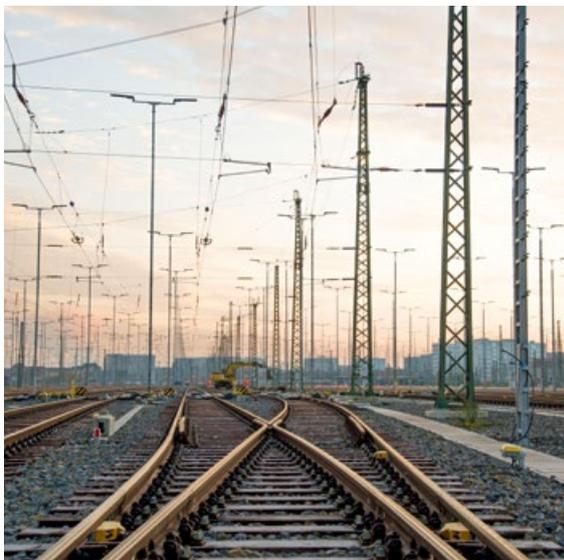
MARMARAY-TUNNEL

The Marmaray tunnel project joins the railway networks of Europe and Asia under the Bosphorus. The first trains went through the tunnel just one month after the final Thermit® weld was installed. The infrastructure project included the preparing of the 13.6 kilometre long tunnel, the extension and modernization of 63 kilometres of existing railway track, three new underground railway stations and the modernization of 37 further stations.



NEW SILK ROAD

In Russia the railway routes between China and Europe are being maintained and extended with Thermit®. The automated Smartweld Jet preheating torch is being used in the process. The torch has proven itself in the particularly difficult conditions of isolated areas of Russia and ensures an excellent quality and process reliability.



GERMAN REUNIFICATION PROJECT

On the high-speed rail route between Berlin and Nuremberg Goldschmidt supports the comfort of passengers and residents living close to the railway track through continuously welded tracks. Goldschmidt supplied all of the products required for the Thermit® welding process on Germany's largest track construction project.

THE DIGITAL FUTURE –

DATA OPTIMIZING

OPERATIONAL PROCESSES

Since the invention of the Thermit® welding process and continuously welded track, Goldschmidt has driven the development of railbound traffic. Today, this means that track related data is collected, stored, processed and analysed to continuously improve the operation of railways. With its digitalization initiative Dari®, Goldschmidt is pushing for the digital future of track.



A DIGITAL PRODUCT PORTFOLIO

Goldschmidt was the first company to provide digital tools and software solutions to support the execution of the Thermit® welding process, thereby setting new standards in process quality and transparency. Its track inspection tools and systems portfolio is the broadest in the industry not only in terms of technical functionality. Our capability extends from simple manual rail geometry measurement to fully automated high speed rail flaw detection. For the best measurement results, Goldschmidt uses a wide variety of technologies including video inspection, laser-based detection as well as ultrasonic or eddy current measurement systems. These technologies are made available in hand-held devices, as trolleys, or as complex onboard systems in trains.



CONNECTED AS NEEDED

Data collected from digital tools or measurement systems only realises its optimisation potential when analysed and used to improve track quality or track operation. For this, Goldschmidt has developed a variety of tailored software solutions. These include easy to use mobile apps that allow collected data to be quickly visualised and checked against requirements, but also expert systems for big data analysis of captured video using machine learning algorithms. In addition, there are cloud databases for special applications and of course, data collected by Goldschmidt tools or measurement systems can be made available through interfaces for any kind of customer specific IT solution.



DARi[®]

VISIONARY IDEAS NEED POWERFUL SOLUTIONS:
DARi[®] BY GOLDSCHMIDT.

With the diverse elements of our global digitalisation initiative Dari[®] – Data acquisition for rail infrastructure – railway infrastructure operators can manage their tracks in a **smarter, more effective and sustainable** way. Based on a thorough understanding of track construction and maintenance processes, Goldschmidt's **digital tools, measurement systems, software solutions, cloud databases, services and interfaces** are designed to provide optimal support for the relevant technical applications.

Experience new dimensions in track operations. **With Dari[®] by Goldschmidt.**

WE ARE

GOLDSCHMIDT

The Goldschmidt success story begins with the invention of the Thermit® welding process which today still defines the worldwide standard for the welding of rails. A global company group was established based on this expertise and passion for innovation which together with you will shape the rail-bound mobility of tomorrow.



FINDING SOLUTIONS TO BRING YOU FORWARD

Goldschmidt is a unique global network of experts for your railway track requirements and develops smart applications for the railway industry which are exactly matched to your requirements, ranging from the Original Thermit® portion to our digital Dari® products and systems.

Customers on all continents trust in the excellent quality, first-class engineering expertise and proven reliability of Goldschmidt, with the trams of the European transport companies running on the same know-how as the high-speed trains in China. Goldschmidt is your strong partner when it comes to the future-oriented planning and practical development of solutions for railway infrastructure projects according to your respective national requirements with local implementation.



SMART RAIL SOLUTIONS

Goldschmidt offers a comprehensive range of products and services worldwide for the joining of rails, modern construction of railway track, and inspection and maintenance of your track infrastructure:

**Original Thermit® • Insulated Rail Joints • Welding
Grinding • Inspection • Tools & Equipment
Road-Rail Vehicles • Digital Solutions**



SMART RAIL SOLUTIONS

Together with you, Goldschmidt masters the challenges of modern, railbound mobility – for safe, sustainable and long-lasting railways of premium quality. As with Thermit®, Goldschmidt is also a pioneer in maintenance, inspection and digitalization and continues to improve processes and extend the lifecycle of railway infrastructure. Goldschmidt benefits from its global expertise and cross-disciplinary thinking to create tailor-made local solutions for you. The global presence of Goldschmidt gives you access to its whole portfolio – with one goal: to lead your railway infrastructure into the future.