

## Press information

### Patent 120 years ago for the "Goldschmidt process" / The original for rail joining – continuous success since 1895

Many inventions can be traced back to the scientific curiosity of Prof. Hans Goldschmidt. His most important invention was patented 120 years ago. The THERMIT® process turned out to be a major advance in the development of rail traffic because the process enabled the continuous welding of rail joints for the first time. Today the Goldschmidt Thermit Group is the global market leader for rail joining and thanks to its continued innovative drive is a recognized and successful global supplier of products and services for rails.

Today the well-known application of THERMIT® is characterized by the fact that one doesn't really notice it. The characteristic, regular clickety clack of unwelded rails still to be heard on some railway lines has disappeared from modern railway traffic. This is because today the rail ends are no longer screwed with fishplates, but are welded to be safer, more stable and durable. The THERMIT® welding process ensures the highest safety and today the fixed connection is also a basic requirement for comfortable rail travel. What is more: without THERMIT® high speed trains or rail traffic with extremely high loads would be unthinkable.

This development was initiated by Prof. Hans Goldschmidt, a pupil of Robert Bunsen, the famous chemist. On March 13, 1895 the Imperial patent office granted the patent with the no. 96317 for a "Process for the manufacture of metals or alloys of the same". The patent was based on the formula from Prof. Goldschmidt



which had been verified in experiments. The strong exothermic aluminothermic reaction set into motion by a so-called "cherry igniter" achieves temperatures up to 3,000° Celsius in order to melt the whole mix. As a result, it was possible for the first time to continuously weld rail joints, which represented a quantum leap in the development of the railways.

Prof. Goldschmidt quickly recognized the potential of his invention and developed it further for the purpose of welding to make it an industrial process which is why today the technology is also referred to as the "Goldschmidt process". While the original process was developed to extract pure metals, the THERMIT® process was soon mainly used to weld rails. As early as 1899 – for those days an extremely short period of time between the granting of the patent and its application – the first tramways in Essen were welded using THERMIT®, in 1904 the first railway lines for the Hungarian state railway in Budapest and then in 1909 the first grooved rails for tramways in Tokyo. In 1928 the process became the standard process used by the Deutsche Reichsbahn and a short time later nearly all the railway companies around the world started to introduce the technology.

The Goldschmidt Themit Group is today the global market leader for rail joining and a successful supplier of products and services for the construction, repair, maintenance and modernization of railway lines. Each year approximately one and a half million THERMIT® portions are manufactured in first class quality with more than 50 million portions produced to-date for use on railways all around the world. As a system supplier, the Goldschmidt Themit Group develops, produces and supplies all further components for the THERMIT® process such as refractory crucibles, reaction crucibles, machines and equipment.

Prof. Goldschmidt gave the company the imperial patent and also his passionate drive for knowledge. The THERMIT® welding process was continually improved. The constant further development of various patented processes today allows the continuous welding of almost all rails with different profiles and quality grades. This also includes special applications such as welding under extreme weather conditions or for special rails, e.g. SkV-Elite for flat bottom rails, High Performance Weld (HPW) for hardened rails or Themit® Head Repair (THR) for the thermite repair of rail surface defects. The flexibility of the THERMIT® process is decisive. The welding process can be carried out at any location without the need for large machines without intensive preparations and mainly without interrupting railway traffic. Therefore customers receive the highest quality and reliability and also save a considerable amount of time, materials and personnel. The THERMIT® processes meet the highest requirements and thus ensure maximum safety. The processes are approved in more than 80 countries and certified by all the large railway companies in the world.

The organizers of mega sports events also rely on this quality where THERMIT® is regularly used to achieve the highest performance for a smooth running infrastructure for passenger transport, e.g. the soccer world cup in South Africa and Brazil or at the Winter Olympic Games in Sotschi. And one shouldn't forget Tokyo 1964: then at the start of the games the first high speed Shinkansen bullet train started on time traveling over 500 km of continuously welded track between Tokyo and Osaka. Then there is the historic Marmaray tunnel project under the Bosphorus: here the products and expertise of the Goldschmidt Themit Group were used to directly weld and connect the railway networks of Asia and Europe for the first time – Goldschmidt even joins continents and cultures.

In the field, on the other hand, the Goldschmidt Themit Group is not only well known for the continuous welding of rails but also for other products such as high quality high-tech equipment for the inspection and measurement of rails. The latest development is the RAILSTRAIGHT APP: it serves as a control unit for the RAILSTRAIGHT precision measuring equipment of the Goldschmidt Themit Group for the measurement of straightness and corrugation of rails and rail joints and was awarded a prize for IT innovation with the title "BEST OF 2014" by the Initiative Mittelstand. The product range of safe, ergonomic and reliable tools and machines for rail construction and repair is also being continually expanded, for example, with the high performance GOLDSCHMIDT TOOLS which are specifically designed to meet the needs of customers.

The future thinking of the Goldschmidt family tradition is also confirmed by Karl Goldschmidt, the brother of Hans Goldschmidt. He recognized the lack of skilled employees in the commercial area and therefore 100 years ago he introduced in-service training and today the Goldschmidt foundation continues to promote young adults attending evening school on a part-time basis who wish to acquire a bachelor or master degree. Karl Goldschmidt is seen as an innovative entrepreneur with a social

conscience who showed great interest in the well-being of his employees. He was responsible for the establishment of the company's own health insurance fund (1896) and also a pension fund (1897). He introduced various social benefits and holiday days for employees and donated a recreation home.

The Goldschmidt Thermit Group is today represented by more than 20 medium-sized single companies and nine production plants worldwide. Since 2003 the companies are managed by a holding company which in 2004 moved its domicile to Leipzig. The closely connected, global group companies and their partners successfully serve the international growth markets for railways on all continents. The largest production location is Halle with two modern production lines for THERMIT® portions and crucibles and there are further plants in the Czech Republic, UK, South Africa, USA, Brazil, Australia and China.

The group offers a unique range of services for the construction, renovation, maintenance and modernization of railway tracks with a local presence, innovative technology, high quality level and extensive experience. In this way the Goldschmidt Thermit Group promotes, just like Prof. Hans Goldschmidt did, greater efficiency and safety and travel comfort on the railways. At the same time extensive investments are being made. This includes the start-up of the global Technology Innovation Center in 2014 which combines the worldwide innovation resources of the Goldschmidt Thermit Group. And today, just as 120 years ago, when Prof. Goldschmidt was granted his patent, it remains true that future thinking has a tradition at Goldschmidt.

### **About the Goldschmidt Thermit Group**

The Goldschmidt Thermit Group is a worldwide leader in the area of joint welding and the servicing and maintenance of rail systems. The roots of the company go back to the invention of the THERMIT® process by Prof. Hans Goldschmidt at the end of the 19th century. Today the Goldschmidt Thermit Group consists of over 20 medium-sized individual companies which serve the international growth market for rail infrastructure. The company has approx. 1000 employees and maintains an international network of production and service locations. In 2014 the group achieved a consolidated turnover of more than 127 million euros.

Further information is available in the internet at [www.goldschmidt-thermit.com](http://www.goldschmidt-thermit.com).

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