

Metal for the Military

The **Kaiser Wilhelm Institute for Iron Research** was founded in 1917, in the midst of the First World War. It was intended to become an innovation laboratory for the German steel industry but morphed into a knowledge center for military technology. Its history illustrates the risk associated with application-oriented basic research in times of economic and political crisis.

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Spring 1917. The telegrams are stacking up on Fritz Wüst's desk in the Steel Institute at Aachen University. The chemist, who specializes in alloys, is very busy. Germany is at war, and military officials consider Wüst's advice on how to improve heavy guns, rifle barrels and grenades to be crucial to the war effort. Given the bitter realization that the armaments being supplied to German soldiers are inferior to those of the enemy, the euphoria of anticipated victory that had prevailed in August 1914 has disappeared. The armed hardware battles being fought on the western front require supplies to be replenished rapidly, but German steel is more difficult to work with than French. On top of this, shipyards and submarine manufacturers, too, are "hungry for iron." This unforeseen industrial dimension of the war demands every last ounce of effort from the German coal and steel industry.

Fritz Wüst has been working on a memorandum for the establishment of a special institute for metal, alloy and iron research and has the full support of Friedrich Schmidt-Ott at the Ministry of Education and Research in Berlin. The steel industry as well, represented by the powerful Association of German Steel Manufacturers (VDEh), has long been demanding an industry-wide research institution and applauds Wüst's proposals. The new institute is to explore the entire iron smelting production chain in order to gain new theoretical and practical knowledge about iron ore and about iron production, processing and alloying.

The VDEh had been aware of the poor quality for some time, but the war had now turned it into a massive problem. Since the industrial revolution, German engineers had been looking to England, the pioneer in the development of metallurgical methods. Spurred on by the enthusiasm to found new companies, the steel barons on the Rhine and Ruhr Rivers had been cranking up mass production since 1871, but they had neglected the quality. The modest amount of industrial research that was being done was a company secret and provided no impetus for the industry as a whole to innovate, and the universities could offer little help.

The chemical industry had shown that things could be done differently. Not only was its discipline included in university curricula, but it also had research laboratories that were strong on innovation. Moreover, since 1912 it had had an institution whose knowledge was available to the industry as a whole: the Kaiser Wilhelm Institute for Physical Chemistry and Electrochemistry in Berlin. The steel industry, whose main problem was the low iron content of local ores, wanted to have something similar. More knowledge about the chemical and physical properties of these ores



Laying the foundation stone: Albert Vögler, steel industry representative and later President of the Kaiser Wilhelm Society, gives his talk at the celebrations in Düsseldorf on June 3, 1934.

would help to exploit them more efficiently and to develop new alloys that could be processed at lower cost and with less material.

However, the Ministry of Education also considered the closeness to industry to be a risk and involved the Kaiser Wilhelm Society (KWG) in the negotiations as a guarantor of scientific quality and autonomy. The Society had been founded in 1911 and tasked with promoting non-university research. It was agreed to align the statutes of the new institute with those of the KWG, funded by the VDEh via a special levy to be paid by the industry. The plan was successful, as the hefty profits that entrepreneurs such as Krupp, Thyssen and Stinnes had posted during the war meant that two pfennigs of the profit gained per ton of pig iron were deemed to be a good investment.

In June 1917 "at half-past four in the afternoon in Stahlhof, Düsseldorf" the Association of German Steel Manufacturers passed a resolution to establish the Kaiser Wilhelm Institute for Iron Research. The chairperson, Albert Vögler, emphasized that the institute was "devoted exclusively to peaceful purposes." This echoed the sentiments of those in the industry who were already thinking about the time after the war with great concern and were preparing to convert their production to a peacetime economy.

The contentious question of the location was postponed, and would keep Fritz Wüst, who was appointed Director, busy during the upcoming months. Vögler had at least managed to convince the ministry to establish the new institute in the industrial region of Rhineland-Westphalia and not in the research mecca of Berlin-Dahlem. Subject to these conditions, work began on April 1, 1918 on the premises of Wüst's university institute in Aachen. In 1920, the growing number of staff relocated to an engineering works in Düsseldorf – the Rheinische Metallwaren- und Maschinenfabrik.

Although long-drawn out negotiations had finally resulted in the city of Düsseldorf promising to provide a site at a central location in "a worthy neighborhood," which meant that none of Wüst's wishes were left unfulfilled, construction was delayed until 1934. Since the institute was directly dependent on the income generated by the industry, the economic crises of the post-war years had a direct effect as well. The Treaty of Versailles had put the main blame for the war on Germany and demanded hefty reparations, a share of which this industry, too, had to pay. In 1923, the Weimar Republic experienced its first big economic disaster in the form of

BERLINER TAGEBLATT of May 13, 1934

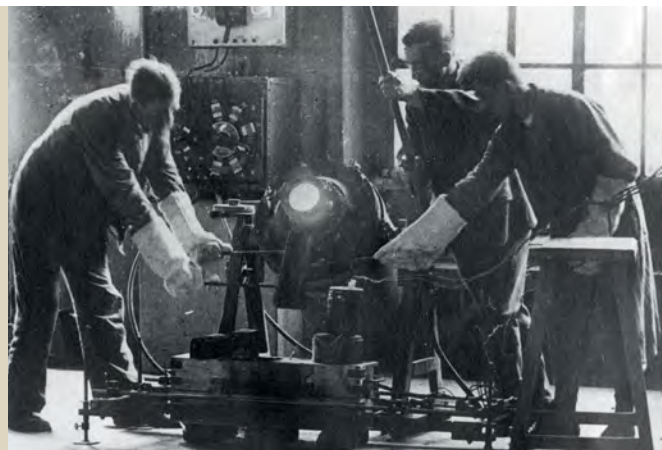
» Three million marks for "pure research!" For the spacious building for the new institute of iron research in Düsseldorf, for desk work and work at the microscope. But those doing hands-on work in industry are well aware that this "long-term bill" will eventually pay for itself many times over. [...]

inflation. And when French troops occupied the Ruhr Valley, this paralyzed scientific work for several months. In protest against the occupying forces, the German workers boycotted factories and conveyor systems, including the Rheinische Metallwaren- und Maschinenfabrik, and with it, the institute as its tenant.

It wasn't until 1925 that the situation temporarily improved. Research efforts expanded under Friedrich Körber, who had succeeded Wüst as Director in 1922. The five departments were dedicated to metallurgy, chemistry, physics, mechanical testing and metallography. As planned, the focus was on how the low-grade German iron ores could be enriched. These were the most important source of raw materials for the steel industry after the mines in Lorraine and their richer ores had been lost when the region reverted to France in 1919. From 1926 onward, the scientists – marked as most Germans were by the humiliating experience of national defeat – secretly worked for the German army as well.

The appointment of Adolf Hitler as Reich Chancellor in 1933 put an end to the first German democracy, whose weak powers couldn't defend it against a dominating nationalistic and conservative majority. The powerful industry in the Ruhr valley had also provided massive financial support for Hitler. Almost immediately after seizing power, the National Socialist state started a massive rearmament program – in part as a job creation scheme, but also to prepare for the next war.

Funds for the Kaiser Wilhelm Institute for Iron Research were now pouring in, enabling the institute to realize its long-delayed



Hard work: Staff in the metallurgy department working at the high-frequency furnace. The photo was taken around 1920.

building plans. The foundation stone was laid in summer 1934, and the opening ceremony followed soon after, in November 1935. At both events, the institute management – most of whom were members of the NSDAP – and their staff demonstrated their firm National Socialist convictions. The press reports conveyed how impressed it was with the event, which was a highly pretentious ceremony typical of the National Socialists. The "ringing of cast steel bells" by three members of the Hitler Youth was followed by the ritual hammer blows, struck by Minister of Science and Research Bernhard Rust representing the National Socialist state, KWG President Max Planck representing science, and Albert Vögler representing the industry.

Although the speakers differed significantly in their political pitch, they all praised the collaboration between science and industry for the national good. The musical accompaniment for the celebration was provided by the city orchestra, which played two of Adolf Hitler's favorite pieces: the overtures to the operas *Rienzi* and *Die Meistersinger von Nürnberg*. The celebration ended with the Horst Wessel Song, the party hymn of the NSDAP, and the German national anthem as a political avowal, before the invited guests sat down to a hearty stew.

A different spirit emanated from the building itself, however, as the architects Heinrich Blecken and Paul Bonatz had designed the cube-like clinker brick building in the style of the Bauhaus, which had already been closed down at this time as a result of pressure from the National Socialists. The designers chose steel for the offices as well – tubular steel furniture that avant-garde artists Marcel Breuer and Ludwig Mies van der Rohe had designed in the mid-1920s – thus demonstrating how versatile, flexible and modern steel was as a material.

Although the scientists continued to work on various aspects of metallurgical materials research at the institute, whose outstanding equipment made it one of the most modern of its kind anywhere in the world, most of what they did was for military purposes. As part of the war economy, the institute was placed under the command of the German Army Ordnance Office in 1940 and tasked with improving weapons, rifle barrels and tank tracks. It had already been advising the Ministry of Aviation since 1933.

After the building was hit by a bomb, research gradually relocated to the academy of mining (Bergakademie) in Clausthal starting in 1943. After the end of the war, the Americans imposed a work ban; it was lifted in 1947 and the reconstruction began – starting in 1948 under the umbrella of the newly founded Max Planck Society. This ultimately ensured the long-term research autonomy and political independence that had been deemed to be essential when it was founded.