



### Volume 5. Wilhelmine Germany and the First World War, 1890-1918 Inside the Exhibition Hall of a Steel Works (1902)

Steel manufacturing was one of the main engines of economic growth in Wilhelmine Germany. Firms like Krupp, located in Essen, came to dominate whole industries and gained political power as their products became directly linked to military technology. Industrial capacity and technological sophistication were crucial to Germany's desire to achieve a more dominant role on the world stage. The country's industrial prowess translated into political influence insofar as it represented a real capability for military action.

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Among the structures at the Düsseldorf exposition, one catches the visitor's eye in particular: the exhibition hall of the Bochumer Verein für Bergbau und Gußstahlfabrikation [Bochum Association for Mining and Steel Casting]. Situated on the exposition's main avenue, this hall has three bays and is crowned by a spire. Upon entering this massive building, visitors first encounter marine transmission shafting of forged steel in the center bay. Manufactured for the Italian warship *Regina Margherita*, the transmission is 50 meters long and consists of four single-throw crankshafts, a pressure shaft and a propeller shaft. The last is 32 meters long, weighs a total of 86,000 kg, and has been forged from a single piece of steel. All the shafts have been drilled hollow; the bored core of the propeller shaft lies under the shafting and shows the superb condition of the inside material. The engine power transferred from shaft to screw is 10,000 HP.

Another behemoth on display is the stern post of a double-screw steamship, which gives the viewer the impression of standing before the fossilized remains of a gigantic prehistoric animal. This mighty colossus is a testimony to the achievements of modern steel casting. Due to transport considerations, this 15-meter-high, 87,000 kg stern post had to be assembled from several parts.

In addition, the Bochumer Verein is exhibiting marine shafts and heavy forged parts similar to those it manufactured in large numbers for the German navy and commercial fleet, as well as for foreign mercantile vessels and warships. Large forged parts for crankshafts and marine engines are among the other products on display.

One specialty of the Bochumer Verein is the production of train tracks from acidic Bessemer steel, a material employed by only a few other steel works, including Krupp in Essen. The Gesellschaft für Stahlindustrie [Society for the Steel Industry], which is a subsidiary of the Bochumer Verein, also uses this material in the production of train tracks, mainly for grooved streetcar rails. Among the exhibited objects of this type, visitors will find a number of interesting butt joints, designed to soften the bumps that occur when trains travel over track ends. A semi-circular arrangement of polished, nickel-plated rolled-steel sections of the most various type and size shows not only the great variety of steel sections available, but also the precise nature of

their execution. The different railway components produced by the Bochumer Verein – including tracks, fishplates, ties, and base plates – have been set up in tall columns, and the “frogs” of the crossings, some of cast steel, others with forged tips, are also displayed in groups.

Production output is as high for rolling stock as for the aforementioned railway parts. Wheel sets in which the wheel body is forged and rolled as a disk from steel ingot comprise an important line of production. The Bochumer Verein was the first to produce these in place of the spoke and iron disk wheels that are made by welding individual parts together. The wheel disks, which were subjected to extremely demanding stress tests, demonstrate the astonishing strength and durability of these products. For instance, the center hole of a wheel was expanded when cold from 153 mm to 231 mm by driving in tapered mandrels, without any sign of damage to the wheel. In another experiment, locomotive wheel rims were elongated by the heavy blows of a drop hammer, and the material’s robustness was brilliantly demonstrated. Small and large versions of both products – the wheel rim and the disk – have been arranged in attractive 10-meter-high towers on both sides of the central hall. One can also admire wheel sets made of cast steel or Siemens-Martin steel, ranging from the smallest wheels for narrow-gauge railways to the largest for huge high-speed locomotives. Industry professionals are particularly interested in modern spoked locomotive wheels manufactured in one piece from especially soft yet durable cast steel. [ . . . ]

The construction of train cars, which the Bochumer Verein began in 1896, has become an important line of production for the company. On exhibit are various open and covered freight cars, including those produced for the Shantung Railway, the Dutch Railway, and the Royal Prussian Railway. A variety of steel parts for mining equipment and other machines are also presented, including the 7,500-mm-long, 16,000 kg axle of a hoisting engine as well as a heavy crankshaft for the 1,500-HP gas-powered engine of a blast furnace.

A cast-steel working cylinder weighing an impressive 34,000 kg and destined for a 5,000-ton forging press demonstrates the capacities of the Bochumer Verein in the manufacture of press cylinders. The Bochumer Verein has been using these presses in its own plant for several years because the traditional steam hammer can no longer meet demands arising from the size of today’s shafts and other parts. In addition, the press leads to more favorable results than the steam hammer since it makes possible a constant, even compression of steel right to its core. This is shown by the bored core of the aforementioned marine shaft.

Of the remaining objects in the Bochumer Verein’s interesting exhibition, we would like to draw attention to a double-spoked magnetic wheel for a dynamo, a 16,500 kg, 3-meter-high cast-steel wheel with double helical teeth for a heavy rolling mill, and an 18,000 kg converter ring with a diameter of 4 meters. A 5-meter-long pipe with an inside diameter of one meter has been forged on the mandrel and partly lathed and partly left in an unfinished state to permit visitors to see the precision of the forging.

Source: Walther Däbritz, *Bochumer Verein für Bergbau und Gußstahlfabrikation in Bochum. Neun Jahrzehnte seiner Geschichte im Rahmen der Wirtschaft des Ruhrbezirks* [Bochum Association for Mining and Steel Casting. *Nine Decades of History in the Context of the Economy of the Ruhr District.*] Düsseldorf, 1934, p. 296 ff.

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