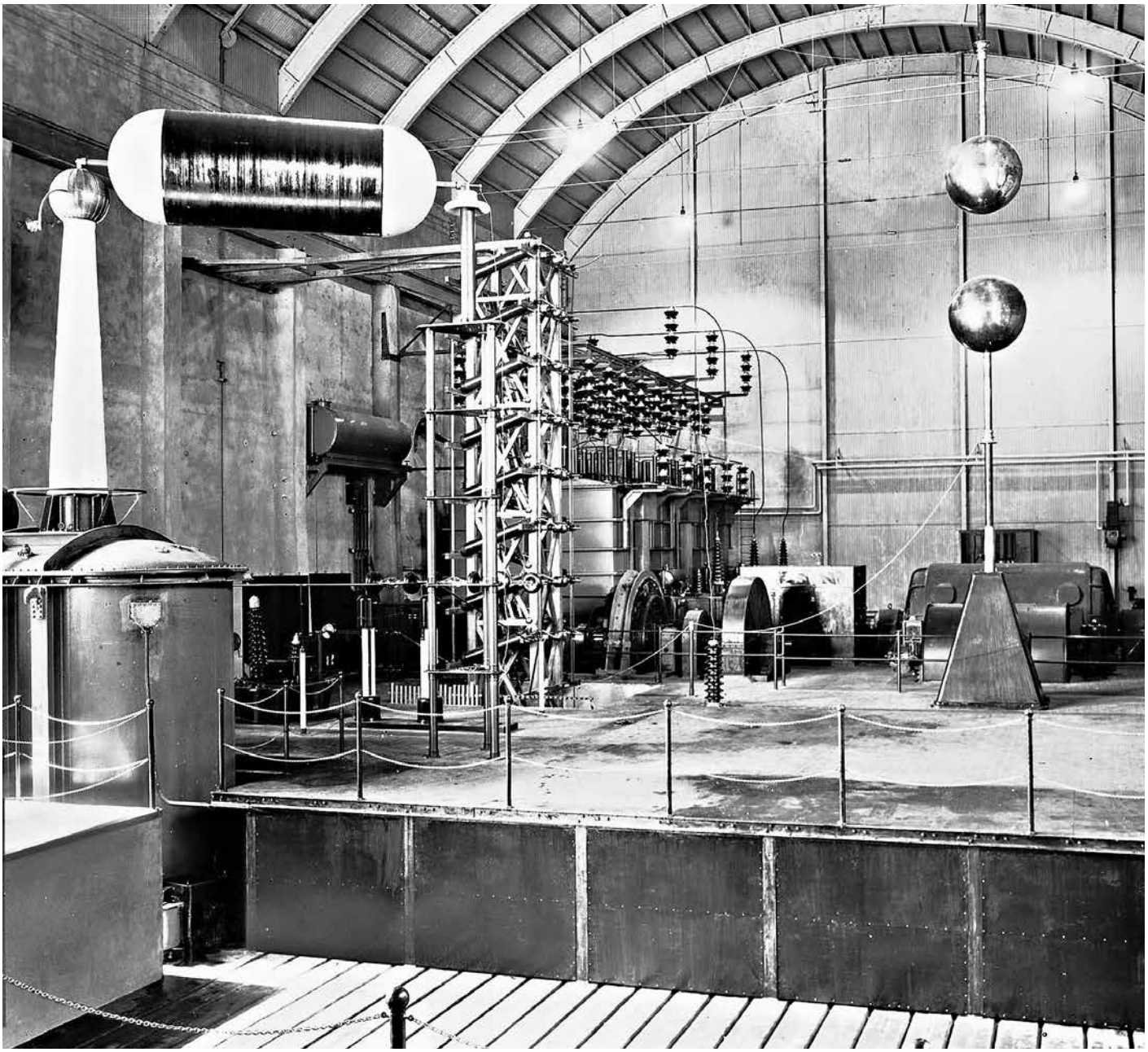

Brainforce one

100 years of ABB's first Corporate Research Center

ANDERS JOHNSON – Necessity, it is said, is the mother of invention. In the First World War, ASEA (ABB's Sweden-based predecessor company) found itself cut off from its materials suppliers. The company had to think hard and act fast to find alternative ways of meeting customer needs. It did this by establishing its Central Laboratory (as it was called at the time) in Västerås, Sweden, in 1916. An institution had been created that was not only to outlive the crisis from which it had emerged, but has successfully adapted to fresh challenges and changing paradigms throughout the following 100 years. Achievements include the world's first synthetic diamonds (1950s), the first electric industrial robot (1970s) and a series of landmark innovations establishing ASEA – and later ABB – as a pioneer and leader in HVDC. Today the center is working on several major projects in power and automation technologies that set out to increase sustainability.

1a Starting in 1949, ASEA launched a top secret project for the creation of synthetic diamonds. The first success was achieved in 1953 when a pressure of 8.4 GPa was maintained for an hour and the first diamonds were obtained. The project was kept so secret that results were not reported until the 1980s.

1b Early synthetic diamonds from the ASEA research center.

The center's initial task lay in materials research in order to find alternative materials as the First World War cut off established sources and disrupted supplies. The war ended, but the need for research remained.

The interwar period saw the Central Laboratory adopt a primarily supportive role for ASEA's manufacturing units. The laboratory typically took on challenges that were found to recur in many different parts of the company, such as questions relating to material strength and corrosion. But the lab also conducted qualified research and development, including into electrical insulation and high frequency furnaces.

During World War II, the Central Laboratory underwent major expansion. With supply channels once again disrupted and materials in short supply, the center returned to the development and testing of replacement materials.

In the 1950s → 1, ASEA began creating "a new science city" in Västerås. Several modern laboratory buildings were built in the Tegner neighborhood. In the early 1960s, the entire Central Laboratory was housed on the Tegner site, which is still used by Corporate Research today.

In the 1960s, the Central Laboratory had three main tasks: Firstly, material control. Secondly, workshop service and consulting; including new manufacturing methods, control of engineering processes and troubleshooting. Thirdly, research and development, including related materials problems, manufacturing, machine and device structures and systems → 2.

Achievements include the world's first synthetic diamonds (1950s), the first electric industrial robot (1970s) and a series of landmark innovations establishing ASEA – and later ABB – as pioneer and leader in HVDC.

Title picture
ASEA' s short-circuit test lab in Ludvika, Sweden (built 1930–33). The short-circuit tester in the background could develop a short-circuit power of one million kVA.

2 An early 1980s HVDC thyristor valve for the Inga – Shaba intertie project in Zaire (today, Democratic Republic of Congo).

3 ASEA's IRB 6 was first presented in 1974. It had 5 axes and a payload of 6 kg. Many of the 1,900 examples built are still in use today.

In the mid-1960s the laboratory was involved in 70 major research projects. The most significant of these looked into fuel cells.

By the mid-1960s the laboratory was involved in 70 major research projects. The most significant of these was concerned with the development of fuel cells for submarines. The project turned out to be too far ahead for its time and had to be shelved. In the 1970s attention turned to industrial robots → 3. As well as digital speed control for paper machines and rolling mills. In 1980 the center was pivotal in developing fiber optic sensors to measure the temperature inside transformers.

In 1988, ASEA and Brown Boveri merged to form ABB. One of the most successful development projects in the 1990s was HVDC Light, of which the first commercial installation was delivered to Gotland 1999.

Innovations of the 2000s with important participation by the Corporate Research center include:

- 2008: launch of groundbreaking vacuum tap changers for transformers.
- 2010: transformer for 800 kV ultra-high-voltage direct current (UHVDC)
- 2011: ABB demonstrates the revolutionary synchronous reluctance motor (SynRM).
- 2012: ABB announces the world's first circuit breaker for high voltage direct current.
- 2014: ABB sets world record with its new 525 kV HVDC cable.
- 2014: completion of a comprehensive project at the mine in Garpenberg making this the most efficient mine in the world.
- 2015: launch of two-arm industrial robot YuMi.

The following articles explore individual technology areas and achievements of the Research Center in greater detail. The celebrations of 2016 are as much about the future as they are about the past. As the center's centenary slogan proclaims, "the best is still to come."

In 1980 the center was pivotal in developing fiber optic sensors to measure the temperature inside transformers.

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