ABB in primary aluminium
From mine to market
Demands for improved environmental performance and increased energy efficiency, price fluctuations and intense competition – these are the major challenges aluminium producers face today.

We can help you meet these business challenges by providing electrification and automation solutions that improve operating procedures and integrate existing plant equipment. Our experience is unmatched and our track record of supplying complete electrification solutions and subsystems to more than 60 aluminium smelters worldwide is unrivaled.

Whether you need a single product or a comprehensive electrification package, look to ABB as your single source.
Look no further than ABB. Our portfolio and expertise cover the full value-added chain, from your bauxite mine to the primary aluminium you market. We excel at integrating equipment, skills and services into a comprehensive customized solution that strengthens your entire operation. As one of the key market players in electrical generation, distribution and transformer rectifier systems, we can help you leverage process and business information by providing seamless access to power, control and instrumentation data.

**Power conversion and distribution**
We provide efficient and reliable power distribution solutions for bauxite, alumina and smelter operations. We offer the broadest range of high, medium and low voltage equipment for switching and distributing electric power. Our high power rectifier systems (with single unit ratings of up to 113 kA and 1750 VDC or 100 kA and 2000 VDC) and our FOCS 20–500 kA fiber optic DC measuring system are of the highest efficiency.

Our solutions are engineered for safety, flexibility and security to keep operations running day and night. We provide emergency power generation, industrial substations, harmonic current compensation equipment, switchgear and transformers. And, we provide you with state-of-the-art technology that meets today’s rigorous power demands.

When we design the smelter power conversion system, power quality and power plant smelter interfaces are key efficiency factors that we optimize. Our blackout protection (BPC) prevents potline trips and loss of production, and our Switchsync™ controllers ensure maximum power quality and minimal impact to the feeding power plant and power conversion station. ABB’s captive power plant-smelter interface increases power plant efficiency and reduces operating costs.

Our experienced infrastructure engineers will maximize your investment and save energy costs as a result of our innovative design of the power distribution system and our expert positioning of substations and electrical rooms. The location of the electrical rooms and substations is carefully selected, as cable lengths and the distance between electrical rooms and electrical consumers contribute directly to operating costs and power losses.

**Power Quality**
Aluminium smelters require huge amounts of electrical energy. Optimized power conversion systems and well-engineered power utility interfaces are essential for maximum energy efficiencies and power quality. Electrical energy accounts for 30 to 40 per cent of the aluminium production costs. ABB’s know-how, rigorous engineering practices and simulation software help reduce overall capital investment and aluminium production energy costs without compromising power quality.

**Process control and instrumentation**
Aluminium plants need integrated process control systems that provide plant-wide efficiency and maximum productivity. Our distributed control solutions provide easy access through a single point of entry to the process, production, quality and business information systems. They can be accessed by authorized users from the most remote location or corporate headquarters. We provide tailored distributed control solutions that use real-time data – enabling constant monitoring and analysis of your process for improved asset availability.

We also offer a complete range of instrumentation products for the primary aluminium industry, such as hydrogen analyzers, inclusion analyzers, melt cleanliness analyzers, as well as inclusion identification and quantification analyzers.

**Drive applications**
Our vast experience in the primary aluminium industry enables us to select the right motor for each drive application, from moving bauxite and producing alumina to feed the smelting process. As the world’s largest producer of industrial motors and variable speed drives, we draw on an extensive knowledge base that meets the needs of the aluminium industry.
From mine to market – a complete portfolio of solutions

Gas-insulated switchgear ELK-04
Power transformer
Protection
MV air-insulated switchgear
From mine to market – a complete portfolio of solutions

Collaborative production management solutions
Count on ABB to help you meet all your requirements. Our offerings include production management solutions, which allow you to drill down into your plant data with any chosen key performance indicator (KPI). Our award-winning optimization solutions are currently enhancing more than 400 processes worldwide, and are helping customers to make effective use of alternative fuels and materials. Our connectivity solutions enable you to view information between critical business systems.

Electrification and plant engineering
The efficiency of an industrial plant is not only determined by its critical mechanical and electrical equipment – planning and engineering also play an important role. We ensure the selection of the right technologies and products, their correct dimensioning and compliance with environmental requirements. All of this can lead to enormous savings in investment and energy consumption, as well as a significant improvement in plant profitability over its life cycle.

Supplied as an integrated entity, our solutions for plant electrical infrastructure include optimized substation and electrical room layouts, cable engineering, grounding systems, fire detection and protection, air conditioning and ventilation systems, communication systems and much more. Our electrification solutions are engineered for safety, flexibility, security and the highest operational availability to keep your plant running day and night.

Services
ABB has an extensive network of service centers all over the world to support your production assets. Our expert field engineers are available day and night to diagnose, repair, upgrade, install or perform on-site maintenance for ABB and third-party products and systems. Our preventive maintenance programs and life cycle support contracts, as well as our training programs, help you to reduce maintenance costs, improve operational reliability and increase revenues.

Plant modernization
Modernizing an existing plant to the latest standards, production and efficiency levels while maintaining production demands a different set of skills and competencies than building a greenfield plant. The challenges faced by each customer and plant make each revamping project unique in its complexity. Plant modernizations can only be successful when the customer’s partner and supplier fully understands the complexity of the primary aluminium production process, and has the experience necessary to realize these unique solutions within a strictly planned downtime schedule. This is where ABB stands out as the recognized world leader in the field.

Your benefits
We offer vast global resources and strong local presence. While getting the best technology on the market, you can profit from complete support through the life cycle of your installation – every day of the year.

We can help you to achieve production and energy efficiency and environmental compliance by ensuring product quality and process efficiency.

ABB’s core competencies
- Excellence in executing turnkey projects: from civil and electrical design to construction, installation and commissioning to long-term support
- Expertise in modernizing and upgrading critical equipment while maintaining production
- Meeting Smelter technology specifications
- Enhancing energy efficiencies and environmental performance
- Providing 24/7 service support to bring you peace of mind
- Expertise in power quality harmonic filter solutions
- Experience in leading successful negotiations with utilities to secure power quality requirements
- Offering a full range of conditioning, sensing and remote monitoring applications, using the latest automation and control technologies
- Conducting studies and making recommendations on major substation components
- Conducting studies on Transient Recovery Voltage (TRV) and Dynamic Switching Studies (DSS)
Maximize your energy efficiencies and improve your environmental performance

As a business, ABB focuses on developing world-class products, systems and services to lower our customers’ energy use, reduce their emissions and improve resource efficiency on a long-term basis. We take a life cycle approach to assess the impacts throughout the phases of a product’s life. Environmental impact can occur in all phases of a product’s life cycle, from raw material supply to manufacture, transportation, customer use and final recycling and disposal. ABB has been working for many years to manage our impacts, both those caused by our products and projects and within our own facilities.

Contribution to the Kyoto Initiative

Voluntary industry initiatives and continuous technological advances have ensured that the aluminium industry has significantly reduced its emissions of greenhouse gases by 45 percent between 1990 and 2005. Carbon dioxide emissions have been reduced by 10 percent in the past 10 years, and perfluorocarbon (PFC) emissions have been cut by more than 80 percent compared to 1990 levels.

Energy efficiency

Increased public concern for sustainable development and the environment has led to a debate about energy resources and the efficient use of energy. As aluminium processing is energy intensive, the industry is particularly concerned about the efficient use of energy for two reasons:

− There is no energy alternative to electricity in the manufacture of aluminium, and it represents a large part of production costs. The efficiency of aluminium smelters has shown a steady improvement since the 1950s, and electricity consumption has fallen by more than one-third over that period.
− Energy is “stored” in aluminium products and can be reused. Aluminium products can be turned into recycled aluminium, thereby reclaiming up to 95 percent of the energy used in primary production. The reuse of used aluminium products is thus both energy-efficient and cost-effective.

The aluminium industry is constantly researching new ways to use energy more efficiently. Energy consumption throughout the production process can only be reduced by technological development and upgraded systems equipment.

Powering your operation to profitability

Your competitive edge depends on the optimal integration of electrical, automation and mechanical systems. The challenge of building new plants or expanding existing capacity requires world-leading competence.

ABB provides that competence, offering vast global resources, industry-leading technologies and a complete scope of supply that ranges from engineering and commissioning to training and comprehensive long-term local support.

Modernizing an existing plant to the latest standards, production and efficiency levels while maintaining production demands a different set of skills and competencies than building a greenfield plant.
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