

## New pelletizing plant at LKAB Ready for next upturn



LKAB was able to establish a record in the very first year of production with the new pelletizing plant MK3 at its Malmberget iron ore mine in northern Sweden. The plant capacity utilization of 92.2% meant that MK3 was in all probability the most productive pelletizing plant ever built.



# New Pelletizing Plant

## IS READY FOR NEXT UPTURN

In November 2004, the management of LKAB decided to invest SEK 2.6 billion in a new pelletizing plant (MK3) at its Malmberget iron ore mine in northern Sweden above the Arctic Circle. The decision to raise LKAB's annual production of pellets by about 2.5 million tonnes to a total of 25 million tonnes was made in order to maintain market shares with some of its important international customers as well as to be a stable supplier to Scandinavian steelworks.

*By Kenneth Olsson and Kjell Svahn, Photos LKAB*

### Project executed in record time

With the increase of its annual production of pellets in mind, the management of LKAB attached great importance to the quick realization of the project, not only because of the return on investment but also to meet the enormous worldwide demand for steel at that time. After a rigorous competitive process, ABB was awarded the contract for the supply of the complete electrical equipment and process automation systems. The contract for the new pelletizing plant was shared by the ABB mining group in Sweden, and the Centre of Excellence for Minerals Processing at ABB in Switzerland which has extensive experience of the execution of major mineral processing projects around the world.

The key factors for this decision by LKAB were (a) the long-standing working relationship, customer orientation and quality service of ABB Sweden and (b) the know-how of ABB Switzerland with regard to such large plants. ABB Switzerland was responsible for planning and coordinating the technical solutions for the pelletizing plant and ABB Sweden took charge of the concentration plant and the loading and unloading station.

Together they completed this project in a record time of only 18 months from the date of award. As a result, LKAB obtained the complete electrical and control scope from one supplier.



**The raw pellets are formed in the balling plant of the new installation at LKAB's Malmberget.**



**View of the new pelletizing plant MK3 in Malmberget.**

ABB was responsible for the complete project management, engineering, customer training, erection supervision and commissioning. State-of-the-art products and systems from ABB are found at every turn in the new MK3 pelletizing plant:

- High-voltage switchgear for the expansion of the 145 kV substation at Malmberget
- Medium and low-voltage switchgear
- Low voltage filter equipment
- Medium voltage power compensation equipment
- Emergency power supply system
- MNS INSUM intelligent low-voltage distribution and MCC's
- Electric motors and drive systems including low and medium-voltage drives with a total of 140 frequency converters to increase the efficiency of large process fans
- Instrumentation for flow, level, pressure, temperature measurement etc., all connected to intelligent bus systems

- Upgrading of the existing process control system for the ore concentrator, which separates iron ore concentrates and tailings
- Equipment for the railway loading/unloading station close to the Malmberget mine
- Industrial IT control based on AC 800xA automaton system with 22 800M controllers for the process control

The AC800xA automation system and the intelligent peripheral units provide LKAB's new pelletizing plant with state-of-the-art technology, ensuring higher productivity and better quality of the products.

### Focus on energy efficiency

In the environmental field, an important goal for LKAB for many years has been to improve energy efficiency and lower energy costs. Here, electric motors can be a major consumer of electrical energy in bigger plants. A pelletizing plant, for ex-

# at LKAB

ample, needs a large number of motors for driving mills, pumps, fans, etc. It is estimated that LKAB today has some 15,000 electric motors in its facilities, with the majority being supplied by ABB. Electric motors in fact account for around 90 per cent of LKAB's annual electricity consumption of some 1.7 TWh.

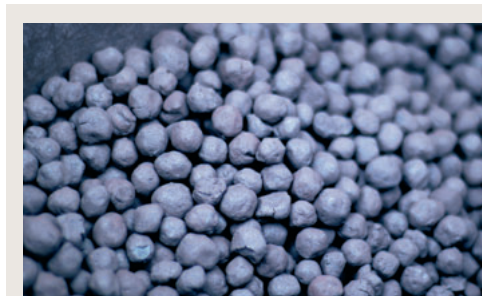
About ten years ago LKAB decided to purchase only high-efficiency electric motors. Even if the purchase price may be higher, the lifetime cost of a high-efficiency electric motor is substantially lower than for a conventional motor. As an example, it can be mentioned that the cost of the energy consumed by a 37 kW motor over two months can be as high as the price of the motor itself.

Today, LKAB has replaced most of its electric motors up to 160 kW with high-efficiency machines and is no longer rewinding older motors up to 160 kW. Further, LKAB now requires suppliers to provide guarantee values for their motors.

ABB has been a major supplier of high-efficiency motors to LKAB for their various facilities and they are also included in the delivery for the new pelletizing plant. Recently, ABB added a new range of high performance motors for 11-160 kW to their series of high-efficiency process industry motors. No other range of motors with such a high efficiency exists on the market today.

## Focus on cooperation

ABB has had long-standing relations with LKAB over the years, supplying such a diverse range of products and systems as complete mine hoists, drive systems, electric motors, control systems, equipment for port handling systems in Narvik and Lulea, ore train locomotives and underground trans-



## Record in the first year

LKAB was able to establish a record in the very first year of production with the MK3 pelletizing plant in Malmberget. The CEO of LKAB, Ola Johnsson († 2009), told a Swedish trade journal that the plant capacity utilization of 92.2% meant that MK3 was in all probability the most productive pelletizing plant ever built.

port systems. Another example is the complete modernization of the process control system at LKAB's Svappavaara concentrator and pelletizing plant that was revamped by ABB over a three-year period up to 2006. This project also included the installation of new frequency converters and intelligent motor control centres.

At the special request of LKAB, a completely new way of working, 'Partnering', has been adopted for the pelletizing plant project. As a consequence of this new method, the customer and ABB worked closely together in a joint project planning organization. This required more active participation of all those involved in the project. For instance, the parties involved worked with open reporting of the costs, and with incentives instead of penalties. "This is a great challenge, but at the same time it opens the way to a new business culture. The partnership model with its open co-operation was in fact one of the reasons why ABB was awarded the contract," says Petter Oscarsson, former head of Swedish sales at ABB AB, Metals and Mining. "The execution of such a major project in a comparatively short time has required comprehensive re-

sources. ABB has been successful in this project as has been demonstrated in earlier projects. The strong local competence and the co-operation between the local ABB organization and the Centre of Excellence for Minerals Processing in ABB Switzerland with their experience have played a vital role here."

## From the mine to the pellets

The ore is extracted from the mine under the plant at a depth up to 1,000 m. The size of the underground mining area is impressive and the length of the underground roads in the mine would stretch from Malmberget to Skelleftea. The material from the mine is then comminuted to powder in the grinding plant after which the iron is separated in a wet process in the concentration plant. The liquid mass is then dewatered in a filter before the spherical pellets are produced in the balling plant. In a final process, the balls are heated in a furnace, which triggers a chemical reaction. The end product is a high-quality pellet of 66.8 % iron (Fe). The pellets are easy to transport and resistant to oxidation. They are transported from the plant to the coast by rail and from there by sea to customers around the world. Since the new plant came on stream, it has helped LKAB achieve a still higher quality and increase the value added of the iron ore products.

## Ready for next upturn

The economic crisis started last September is still prevailing over the world. The decline in demand for iron ore products persists. However, in the long run, the crisis will come to an end and the world will need steel when the turnaround comes. LKAB will by that time no doubt be well prepared and ready to continue to deliver the world's most environmentally-friendly iron ore products. ■



**S800 I/O in electrical room (left), the central control room of the iron ore pelletizing plant (right).**

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