

## Thirty Years of Continuous Technical Progress at Aluminij Mostar Smelter

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### Abstract

The Aluminij d.d. smelter, located at Mostar, Bosnia and Herzegovina, started in 1981 with the 140 kA AP14 Pechiney cell design. The 256 side-worked cells were installed in two potrooms of only one potline. The cells were converted to center point-feeder cells in a hot-change operation during only nine months from September 2001 to May 2002. Each cell was equipped with three point feeders, two crust breakers, an ELAS process controller and network to a central control room for observation and adjustment of cell parameters [1]. Parallel to that, a new automatic alumina pot feeding system was installed to transport more than 220 000 tonnes of enriched alumina per year from four silos to the 256 pots. New crucible cleaning machine and new cell shell-straightening machine was bought. Total primary aluminium production was increased by 35 % with same number of pots because of amperage and current efficiency increase. New vibro-compactor and longer anodes were introduced, together with new anode baking furnace and a new additional rectifier in power substation. The challenging situation for smelters located in Southeastern Europe requires further optimizations in electricity consumption and other cost reduction.

**Keywords:** Aluminij Mostar, technical progress, smelter performance, smelter retrofit and modernization.

### 1. Anode Plant

At the beginning of 2001, the introduction of new technology in the factory, including changes to the pot header configuration in order to compensate for the negative effects of magnetic induction, changes in the cathode cores, changes in certain parts of the cathode part of the circuit and especially important changes in the construction of the superstructure of the cell, was agreed with the German company VAW, all in order to introduce a system of automatic point feeding alumina in the cell with a power boost up to 165 kA. For the same number of pots, now it was possible to increase the annual aluminum production to about 118 000 tons. However, in order to make full use of this new technology, many operations have to be carried out in all other parts of the factory. In the Anode Plant, the following was done:

- Modification of the coke and pitch handling plants,
- Installation of new dosimeter line,
- Installation of new firing system and anode baking control systems,
- Modification of both cranes in the anode baking plant,
- Extension of the furnace with 4 new chambers,
- Changes in anode scrap and rodding plants,
- New plant for coal treatment,
- Modernization of bath treatment plant,

In the anode rodding plant at the alumina and bath treatment line new grinder B09, metal

selector as well as alumina silos B30, "Glama" machine, anode shot peening machine, anode grinder C 2.1.1. at the anode scrap line, press for removing casting from anode rod plugs, casting cleaning device (rotating drum), stubs control and straightening device, electro-induction stub dryer, rod brush cleaner, and system "Arts" - anode scrap and shroud weight management system were installed.

The realization of this project was approaching the end in the year 2002 and other ideas for further improvement of the factory were already "on the way". Increasing the size of the anode may allow increasing the pot amperage. The solution for further production increase was found in the project for the construction of a new electrolysis plant, where the first phase of the project duplicates the capacity of the anode plant and at the same time makes further changes in the construction of the pot cathode in order to further increase the current in the existing electrolysis. This first phase has its own value and economic justification, even if it does not lead to the construction of a new electrolysis because quality anodes have their market in the world. Therefore, a feasibility study on the construction of electrolysis had been contracted by 2002 and was completed and officially presented in December 2003.

At the beginning of 2006, a contract was signed with Outotec from Germany for the first phase of the new electrolysis, which includes the expansion of the anode plant and further increase of the electrical power in the electrolysis for a capacity of 130 000 t Al per year. As early as September 2006, a vacuum vibro-compactor was tested. During 8 weeks, time needed for an old hydraulic press to be disassembled and a new one installed, anode furnace was filled with green anodes from the warehouse, which was previously expanded according to the plan. The new vibro-compactor increases the quality of green anode produced and enables the capacity of baked anodes to increase to 120 000 t per year. A few years ago, the maximum production of baked anodes in the old furnace was forced with the aim of creating as many anodes as needed for supplying the electrolysis for three months, at which time it was planned to tear down the old anode baking furnace and to build a new modernized furnace, for larger anodes and for higher production capacity [2].

In the period from March to 15 April 2008, the following was done:

- Dismantling the old machines and parts of plant,
- Installation of new equipment in the "green" part of the plant,
- Installation of the new cooling tunnel for green anodes,
- Installation of new cranes in the warehouse, adapted to dimensions and weight of the new anodes,
- Controlled pulling down of old baking furnace and building of new one,
- Installation of the new gas injectors, and completely new fire management system,
- Installation of the new baking anodes gas purification system with the new 30 meters high chimney,
- Outotec Densitrol (on-line green apparent density control at vibro-compactors) management program at the anode tower.

The new anode furnace was started on 15 May 2008. At the ceremony regarding the end of the works at the anode factory, the smelter management concluded the following:

*"Aluminum industry in the world is constantly evolving, and if Aluminij Mostar wants to keep up with the world companies, it must constantly invest in modernization and new technologies."*

After the 2016 plan on raising production to 100 % capacity, some capital investments were needed from the beginning of 2017. the following were realized: purchase, installation and commissioning of new control cabinets for "F dozers" for dry material dosing on an anode tower, modification of the "Glama", the machine in the anode rodding plant, and also a

development and production of the anode rod straightening tool as well as its commissioning and putting into operation.

## 2. Review of the Electrolysis Operation

The beginning of operation of the electrolysis is related to the 1980s. The planned electrolysis capacity was 92 000 tonnes/year with 256 cells in operation. It was built in cooperation with French company Pechiney, which during that period was the leading company in the aluminum industry. The predicted amperage of the pot line was 140 kA (AP 14). These were cells with a prebaked anodes and side worked.

Due to the war, between 1992 and 1997, electrolysis was out of operation. At the end of 1997, renovation of the cells started in collaboration with the San Ciprian factory. The reconstruction was completed in 1999. The remaining period can be divided into two parts: modernization 2001 – 2002 and period after that modernization.

### 2.1. Modernization in the Period 2001 – 2002

The modernization started in September 2001 in cooperation with VAW Aluminum Technologie GmbH [1]. The main task was to move from the side work to the cell point feed at higher amperage, higher aluminum production, lower specific energy consumption and thus better utilization. To achieve all of this, it was necessary to do the following:

- Hot cell reconstruction (with shorter interruption in power supply),
- Installing the automatic cell management system (ELAS),
- Installing two tanks with Al<sub>2</sub>O<sub>3</sub> breakers and feeders and a feeder for AlF<sub>3</sub>,
- Pneumatic transport of Al<sub>2</sub>O<sub>3</sub>,
- Extension of the dry gas treatment center,
- Modification of the compensation busbar,
- Changes in design of realigning of refractory materials,
- Installation of SiC sidewall and endwall blocks,
- Replacement of anthracite blocks with 100 % graphitic blocks,
- Changes in the anode assembly (increase in diameter and length of stubs, depth of the stubs holes, stub-to-carbon gaps, thickness of the yokes, etc.)

Because of using process modelling, the target for current was successfully set on 165 kA [3]. Table 1 gives production results for the period 1990 - 2005:

**Table 1. Production results of electrolysis for the period 1990 - 2005.**

| Year | Amperage (kA) | CE (%) | El. energy consum. (kWh/t Al) | Daily cell production (kg) | Net carbon consum. (kg/t Al) | Production Al (t) | No. of cells |
|------|---------------|--------|-------------------------------|----------------------------|------------------------------|-------------------|--------------|
| 1990 | 140.72        | 88.6   | 14 112                        | 1 004.60                   | 434.78                       | 93 630.0          | 256          |
| 1991 | 140.16        | 87.6   | 14 216                        | 990.02                     | 449.60                       | 91 868.3          | 256          |
| 1998 | 142.22        | 85.9   | 14 584                        | 985.12                     | 476.45                       | 38 106.4          | 120          |
| 1999 | 142.50        | 85.8   | 14 595                        | 985.25                     | 491.21                       | 68 365.8          | 256          |
| 2000 | 142.34        | 88.4   | 14 463                        | 1 014.19                   | 457.77                       | 94 718.6          | 255          |
| 2001 | 144.30        | 88.4   | 14 788                        | 1 028.47                   | 460.74                       | 95 638.2          | 256          |
| 2002 | 151.40        | 91.2   | 14 630                        | 1 112.90                   | 433.87                       | 103 302.0         | 256          |
| 2003 | 158.71        | 93.0   | 14 288                        | 1 189.80                   | 424.13                       | 110 817.2         | 256          |
| 2004 | 165.83        | 93.7   | 14 164                        | 1 252.88                   | 412.14                       | 117 096.4         | 256          |
| 2005 | 170.53        | 93.7   | 14 176                        | 1 287.43                   | 406.73                       | 120 142.7         | 256          |

## 2.2. Period after the Modernization

This period is reflected in certain positive and negative events:

- Increase the size of the anode
- Increase in amperage
- Shutting down one quarter of pot line in December 2008
- Re-start of one quarter in 2010
- Development and implementation of chisel-bath detectors started in 2011
- Shutting down one quarter of pot line in the period between 2013 and 2015
- Re-start of cells operation- since June of 2017

**Table 2. Production results of Electrolysis for the period 2006-2016.**

| Year | Amperage (kA) | CE (%) | El. energy consumption (kWh/t Al) | Daily cell production (kg) | Net carbon consumption (kg/t Al) | Production Al (t) | No. of cells |
|------|---------------|--------|-----------------------------------|----------------------------|----------------------------------|-------------------|--------------|
| 2006 | 172.040       | 93.5   | 14 116                            | 1 296.89                   | 409.99                           | 120 995.93        | 256          |
| 2007 | 172.237       | 93.6   | 14 083                            | 1 306.80                   | 399.42                           | 121 898.58        | 256          |
| 2008 | 175.830       | 93.5   | 14 135                            | 1 325.48                   | 406.26                           | 123 035.03        | 191          |
| 2009 | 184.844       | 93.1   | 14 013                            | 1 387.23                   | 427.63                           | 96 926.37         | 192          |
| 2010 | 185.192       | 92.9   | 13 890                            | 1 387.01                   | 427.65                           | 117 838.53        | 255          |
| 2011 | 186.065       | 93.6   | 13 791                            | 1 404.06                   | 418.29                           | 130 875.35        | 255          |
| 2012 | 187.330       | 93.1   | 13 812                            | 1 403.84                   | 424.82                           | 126 216.64        | 246          |
| 2013 | 187.692       | 93.0   | 13 885                            | 1 405.45                   | 422.86                           | 119 051.22        | 232          |
| 2014 | 184.548       | 92.2   | 14 089                            | 1 370.18                   | 429.55                           | 101 073.74        | 202          |
| 2015 | 183.014       | 93.8   | 13 834                            | 1 382.99                   | 419.66                           | 98 540.68         | 195          |
| 2016 | 182.926       | 93.9   | 13 817                            | 1 383.10                   | 413.41                           | 96 518.48         | 191          |

## 3. Process of Gas Treatment at ALUMINIJ d.d. Mostar

### 3.1. General Information – Technology in 1990s

- Number of electrolytic cells 2 x 128 = 256.
- Number of GTC centers (FTC) of dry gas treatment centers = 2 (FC-1 and FC-2).
- The number of filtration modules per center 8 (8 filters) and after completion of the upgrade one filtration module will be add (9 filters in total) will be installed per FC.
- Amperage in the electrolytic cells around 183 kA.
- Filtering area (1 filter) 96 filters with 29 - channel filter bags with filter area 1480 m<sup>2</sup>. Upgrading filters in 2008 with a 32 channel filter bags, the filter surface will be increased to 1584 m<sup>2</sup>.
- Projected gas flow per cell of 5400 Nm<sup>3</sup>/h ± 5 % (actual gas flow rate is 4400 - 4600 Nm<sup>3</sup>/h per cell.) By ending the FC upgrading project this ratio will be changed.

This is a process of dry gas scrubbing with Pechiney-Air Industrie technology. This process is based on the injection of fresh alumina into the Venturi-reactor filter. 99 % of gaseous fluoride is absorbed through the filter. Secondary alumina is then separated from the flow gases and collected together with the dust on the filter bags. The enriched alumina is then returned to the electrolysis process.

### 3.1.1 Dry Scrubbing of the Gases

The scrubbing principle is that the fluorine in the gaseous form (HF) is contacted with the reactive alumina in the filter reactor, and alumina adsorbs fluorine chemically as aluminum fluoride and physically to the reactive surface of the alumina. Supplying cells with fluorinated alumina was carried out from daytime silos of 140 t via special cranes intended for dosing of alumina in an electrolytic cell.

Gas volume flowrate from the cells was approximately 3000 Nm<sup>3</sup>/h per cell. The efficiency of dry gas scrubbing was 98.0 - 99.5 %. Fluorine content in the fluorinated alumina was up to 1 %.

### 3.1.2 Wet Cleaning of Gasses

A system of 40 flushers has been installed at the central passage on the roofs of the hall, so for every hall there are 20 flushers.

### 3.1.3 Water Treatment

The water of all flushers is collected and sent to water treatment. The purified water after the treatment goes to the reprocessing process of the gas, and the waste sludge goes to the landfill. After modernization in 2001 - 2002 this process is not needed any more.

## 3.2 Modernization of Gas Treatment Center in 2001/2002

After the restarting all cells, in cooperation with the German company "VAW Aluminium-Technologie GmbH" (2001 - 2002), modernization of the gas treatment center (GTC) was carried out as part of the Electrolysis modernization project (amperage increase from 140 kA to 165 kA, to increase aluminium production).

At the GTC, filtration centers FC-1 and FC-2 were also refined to increase their capacity both in terms of gas flow from the electrolysis cells and in terms of increasing the supply of electrolytic cells with fluorinated alumina.



Figure 1. Gas treatment centre - FC1.

The diagram shows the average gas flowrate from the cells in the period 1981 - 2017. The gas flow from the electrolytic cells till the modernization was about 3000 Nm<sup>3</sup>/h per cell, and after the modernization the average gas flow rate was increased from 4300 to 4500 Nm<sup>3</sup>/h per cell.

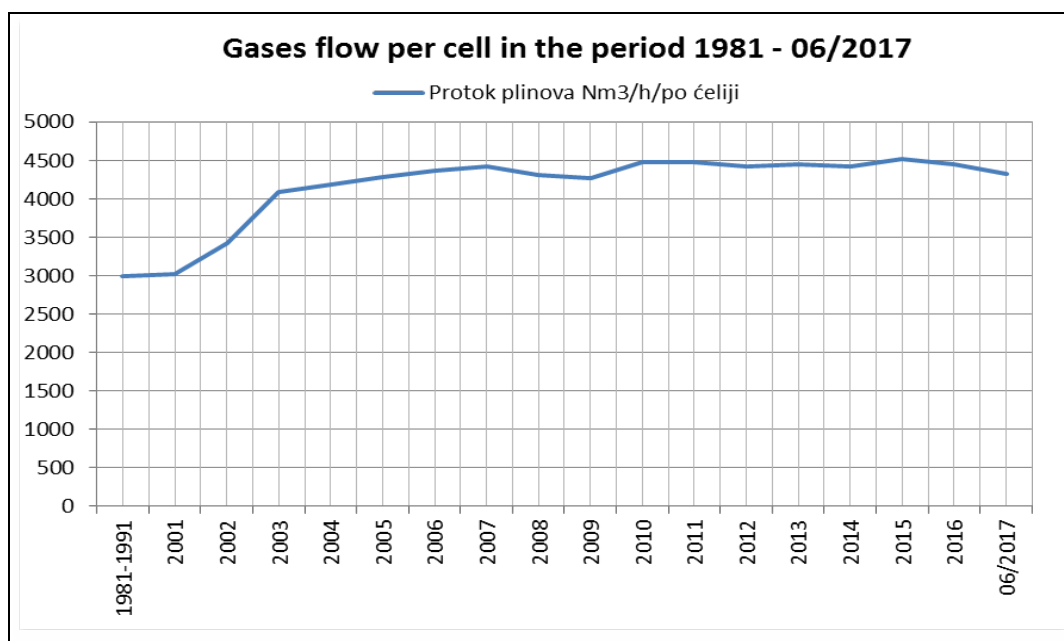


Figure 2. Gas flowrate per cell from 1981 to 2017.

### 3.2.1 Pneumatic Transport of Alumina

As part of the modernization, a new project for the supply of electrolytic cells with fluorinated alumina was made. The project was made by the German company "Möller, which is an automated system for the supply of cells with alumina [4]. A new way of supplying the cells with fluorinated alumina is through the opening on the conical mantle of the daily silos. In case of the alumina from the daily silos with a pneumatic transport system over a floating tank, the pressure vessels come into the buffers that are connected to the electrolytic cells (one buffer supplies two cells). The transportation capacity of the alumina towards containers of cells is 100 - 130 kg/min.



Figure 3. Alumina buffer.

### **3.2.2 Compressor Station**

For the needs of pneumatic alumina transport and point feeding alumina with pneumatic cylinders on compressed air, a new compressor station with five compressor aggregates ZR250-10 with MD 600W - Atlas Copco air compressors was built, a compressor capacity is 37.7 m<sup>3</sup>/min (oil-free compressed air).

### **3.3 Upgrading of the GTC in 2008 to Increase the Current to 185 kA**

The new project of upgrading filtration centers in collaboration with the French company Fives Solios achieved the following:

- Replacement of existing exhaust fans type VR56 S10 CO UK 1800 modified. Six filter fans have been replaced at each filter center with electric motors.
- Sixteen existing filter modules (eight per filter center) are fitted with new filter 32-channels filter bags.
- There is one additional filter module installed on each filter center, whereby appropriate handling of the alumina is changed. New filter modules are equipped with "32 channels" type bags. This part of upgrade of the plant is not yet in use.

### **3.4 Alumina Transport Plant for Filtration Center Supply**

With the project of upgrading of the gas treatment centers, modification of the alumina transport plant has been done by increasing its capacity for the supply of filtration centers and daily silos. This modification of the fresh alumina air-lifts, secondary alumina air-lifts and blowers was designed by the company - Alcan Engineering - ALCENG.

#### **3.4.1 Flow and Consumption of Fresh Alumina**

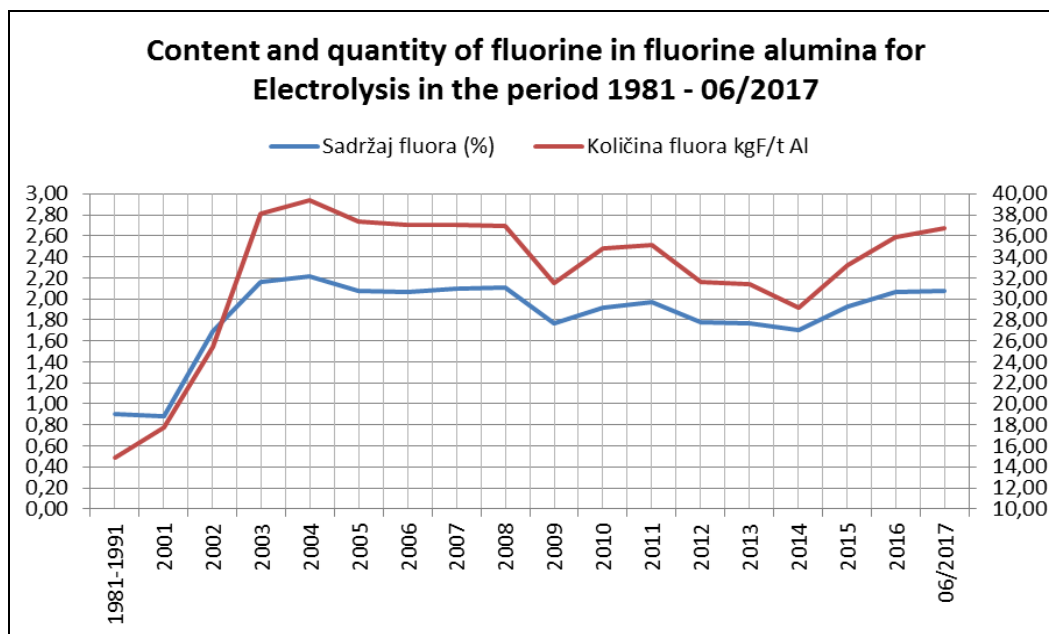
The calculated flow of fresh alumina by FC after modification of the alumina transport plant is 14.4 t/h nominal flow and maximum flow 20 t/h - the current average values of the alumina flow are about 13.5 - 13.8 t/h.

### **3.5 Gaseous HF Concentrations and the Amount of Fluoride Dust at the Entrance to the GTC (Filtration Center)**

- Measured values for total dust range from 300 to 380 mg/Nm<sup>3</sup>. The highest measured dust volume at the entrance to the processing center in the period is 569.9 mg/Nm<sup>3</sup>.
- The measured concentrations of the gaseous HF are about 105 - 226 mg F/Nm<sup>3</sup>. The highest measured fluorinated gas concentration at the entrance to the treatment center is 294 mg F/Nm<sup>3</sup>.
- The average values of the fluoride in the gaseous emissions from the cell ranges from 35 to 38 kg F/t Al.

### **3.6 Total Fluoride Content in Secondary Alumina**

The diagram shows the average value of the total fluorine content in fluorinated alumina and the amount of fluorine in the fluorinated alumina that returns to the electrolysis. The value of the total fluorine content in alumina increased after the modernization from about 1 % to more than 2 %. The average values of the amount of fluoride for electrolysis, after modernization, have increased and now amounts from 34 to 36.5 kg F/t Al.



**Figure 4. Content and quantity of fluorine in fluorinated alumina from dry scrubbers in the period 1981 – 2017.**

#### 4. Casthouse from 1997 Till Now

Casthouse in Aluminij d.d. can be divided into two parts: the hot and the cold plant.

The hot plant currently includes ten tilting furnaces: F1, F2 and F3 with the capacity of 25 t, F4 furnace with the capacity of 50 t, and F5, F6, F7, F8, F9 and F10 furnaces with the capacity of 40 t. The first two furnaces are used for continuous casting of aluminum wire, F3 and F4 for casting small ingots while the other 6 serve for casting slabs or billets.

The cold part comprises two identical plants for continuous homogenization, sawing and packing of billets and a plant for sawing of slabs.

In 1997, 7 furnaces were active in the Casthouse plant. That year, only aluminum slabs (22 % of production) and T-bars (78 % of production) were produced. Production of billets (2.5 % of overall production) and small ingots of 15 kg (12.9 % of production) was not started till the following year and the wire line started in 2003.

In 2001, the eighth furnace was put into operation, in 2003 the ninth furnace was put into operation and the tenth furnace was put into operation in 2013. T-bar production was stopped in 2004. The modernization of production lines will be explained in more detail, and in general, the introduction of *Lean* in the production process at the Casthouse has started, which is another great step forward, both for the plant and the factory.

##### 4.1. Wire Production Line Before and After

The 9.5 mm diameter wire is produced by continuous casting and rolling by *Clesim* technology. Only non-alloy wire, series 1xxx, is produced and is intended for processing by extraction in the production of electric cables.

The line was installed and put into operation in 1984. Then the wire was produced throughout the year (approx. 18 000 t/year). After the reconstruction of war destructions, the wire line was not operational until 2003. In 2008, a complete modernization of the electrical parts was

completed. New metal temperature sensors, sensors for emulsion temperature etc. were installed, and we started controlling the line with the PLC (Programmable Logic Controller) and complete equipment in electro cabinet was changed.

Rolling mills and other mechanical components remained as before. Metal level control is still manually operated over the float.

In new beginnings, the wire occupied 1 - 2 % of the total annual production, and today it accounts for 3.5 – 4 % of the annual production of Casthouse. The project of packing the wire is ongoing.

#### **4.2. Small Ingots Production Line Before and After**

The small ingot was continuously produced from 2 furnaces on the *Brochot* line. Those ingots weighed 15 kg. The metal level was regulated manually over the float. In 2012, the modernization of small ingots line was started. At the same time, a line for the ingots and a new furnace were ordered from the Austrian manufacturer *Hertwich*. The line was put into operation in February 2013, while the furnace started a little later, in the summer that year. It is, currently, the furnace with the largest capacity in the Casthouse (50 tons) and it is the only furnace that has no option of working on both, fuel and gas, but only gas. The furnace was first engineered for natural gas (CNG), and at the end of 2016, the fuel was changed and it started to work with propane-butane (LPG). The difference from the previous line is in the weight of the ingot, the weight of the ingot on the new line is 10 kg, and also manual control is replaced by computer (via PLC). The metal level in the mould is regulated through the laser, i.e. the laser performs level reading and the operator of the control panel can increase or decrease it. Also, knocking ingots from moulds is now much better, the new line has 2 hammer knockers that hit the end of the ingot and knock it out from the mould, while *Brochot* did it over the extractor. Small ingots have since 1997 an average of 12 % of annual production.

#### **4.3. Cooperation with Wagstaff**

Modernization in cooperation with *Wagstaff* enabled us to cast on all 3 casting pits, either slabs or billets. The last one was completed in 2007.

*Wagstaff* offered also their AutoCast system. The AutoCast system allows complete control and monitoring of casting equipment, optimizing conditions and reducing operator exposure to casting station. Maintaining more consistent casting practices and controlling of process parameters are the key of slabs and billets casting quality.

#### **4.4. Billets Production Line Before and After**

In 1997 billets were produced using *Pechiney* technology. The 6xxx series billets were only casted. All important casting parameters (casting speed, metal level, water flow) were regulated manually.

The billet production line was modernized in 2001 in co-operation with the American company *Wagstaff*. At that time, the complete line for the casting of the billets was modernized, and it started using *AirSlip* billet casting technology.

This modernization has replaced the manual control of casting parameters with computer (via PLC), which also enabled tracking parameters backward through history, which greatly helps when casting parameter analysis is required.

This technology has greatly improved the quality of billets (not just the microstructure but also the exterior appearance of the billets itself), and the share of billets in overall production is growing (1998 billets accounted for 2.5 % and in 2016 even 66.9 % of total production). It is also important to note that billet scrap has been significantly reduced by switching to new technology. In 2002, billets scrap amounted to 23.16 % while in 2016 it was 0.91 %.

#### 4.5. Slabs Production Line Before and After

In 1997 slabs were produced using *Pechiney* technology. All important validation parameters (casting speed, level of metal, water flow) were regulated manually. The modernization of the slab production line was carried out in 2004 in co-operation with the American company *Wagstaff*. Thereafter, a modernized complete line for the casting of slabs started using the LHC slab casting technology.

The modernization of the slab production line contributed the same as the modernization of the billet production line when it comes to the casting, monitoring and control parameters of the slabs themselves. Slabs accounted last year for 16.8 % of total production. Similarly to billets (Figure 5, next page), switching to new technology reduced scrap of slabs (before the modernization it was over 3 % and after it is reduced below 1 %), Figure 6 (next page).

#### 4.6. “Cold Plant“ Before and After

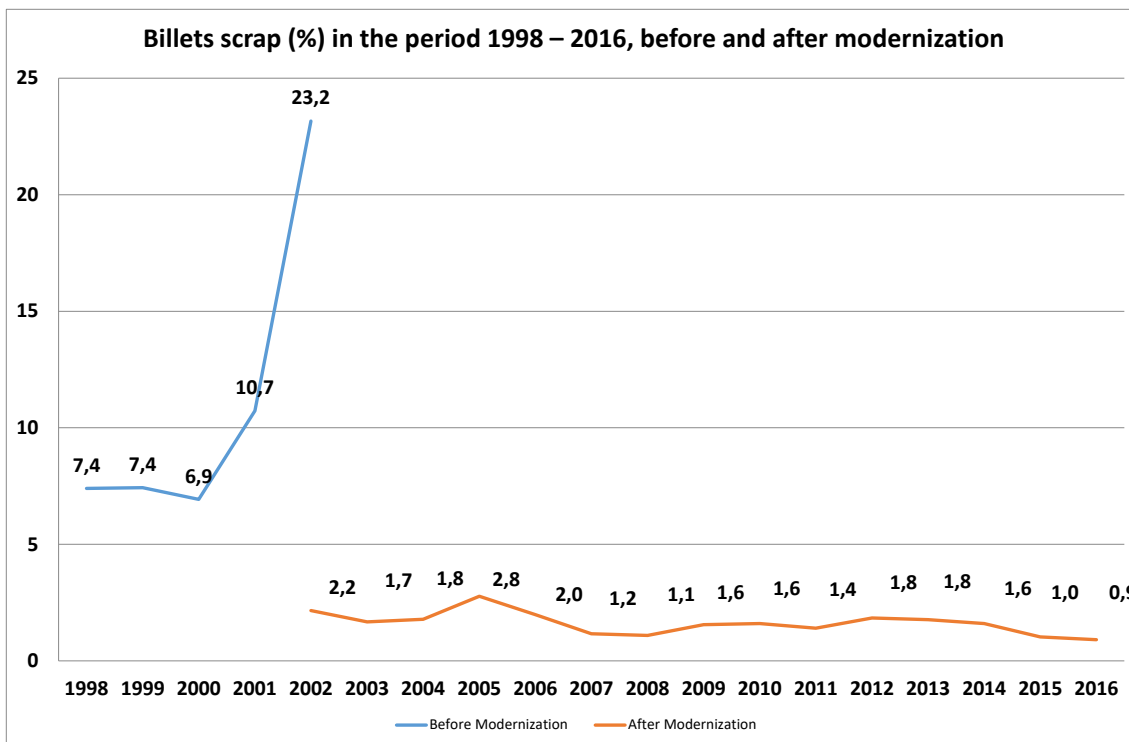
At present, homogenization and sawing of billets is carried out on 2 identical *Hertwich* continuous homogenization plants, which can be divided into two parts (part for homogenization and sawing, marking and packing of billets). The homogenization plant is divided into six units:

1. Billets laying system,
2. Input transporter for billets,
3. Ultrasonic device,
4. Furnace charging system,
5. Homogenization furnace – system of the transportation into furnaces,
6. Exit system after furnace,

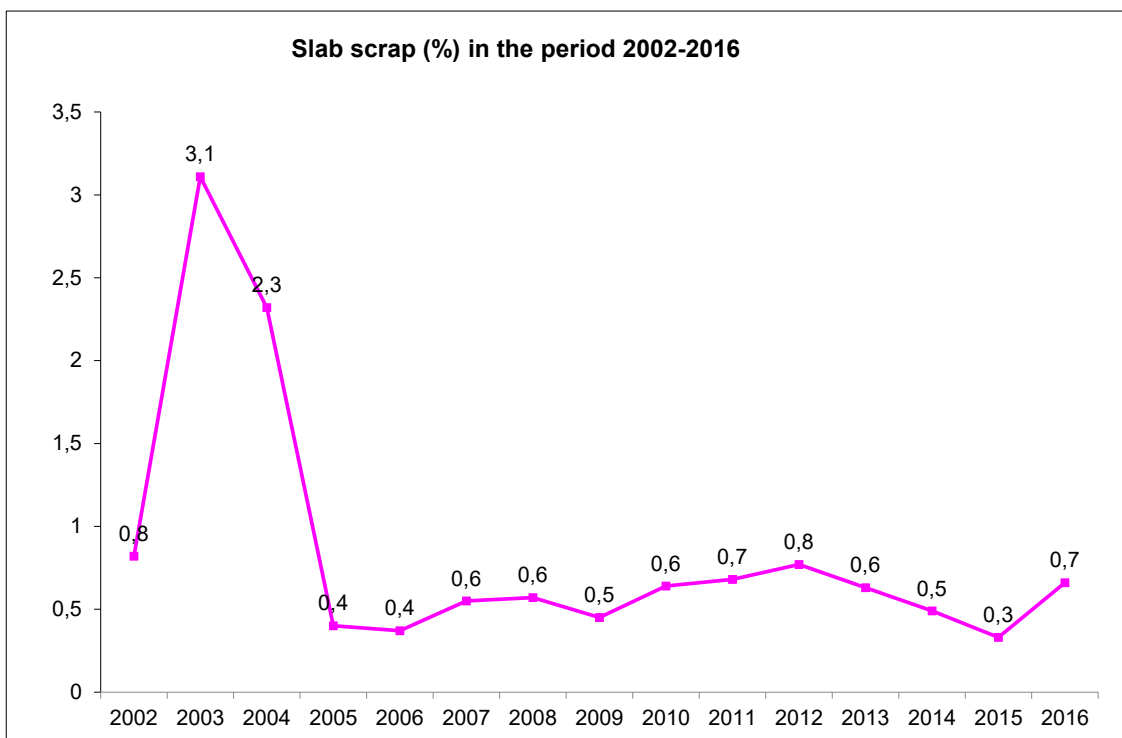
Sawing, packing and marking billets are carried out on a daily basis in the following order:

- Sawing (the billets are sawed to 7000 mm unless the buyer otherwise requests),
- Packing (the billets are packed in 3 to 7 pieces, depending on the diameter and the number of cast billets, packed on wooden beams with slots and bonded with a 32 mm wide steel band),
- Marking (the billets are marked with a waterproof ink-domino printer along the billet and a needle-stamp on each billet's "foot").

Earlier, the homogenization was separated from sawing. There were 2 separate plants, for homogenization (*Surface*) and sawing (*Wagner*) and railways between, which were used for transport. Previously, the billets, in the homogenization furnace, were stacked in vertical lines and today they enter the furnace continuously (1 by 1, depending on the cycle). The modernization of this plant has enabled day-to-day monitoring of key parameters of homogenization (temperature and time).



**Figure 5. Billets scrap (%) in the period 1998 – 2016, before and after modernization of the billets production line.**



**Figure 6. Slab scrap in the period 2002 - 2016.**

Slabs, also used to be sawed off, at the plant produced by *Wagner*. The blade was rounded (blade diameter 1800 mm, thickness 15 mm) and the speed at which it was sawed was max 1500 mm/min. Later, in year 2007, *Sermas* slabs sawing plant and marking unit was purchased. Sawing and marking manages a fully automated control line, consisting of three independent parts that are interconnected:

- Inbound trolley (inbound table and wagon),
- Sawing line,
- Outbound trolley (outbound wagon, micro-tick marking and labeling systems, storage ramp),
- *Sermas* uses a horizontal band for sawing of thickness 1.1 mm and maximum cutting speed is 2300 mm/min. For each cut, the weight of sawed piece is calculated by the PLC, and the label is printed. The label will contain information on the number of castings, alloy and weight.

## 5. Summary

For the last thirty years the smelter Aluminij d.d. Mostar is well known in this part of Europe. During that time it produced 3 million tonnes of aluminium and this year it celebrates twenty years since its startup after the war in Bosnia and Herzegovina. During this time a lot of knowledge, financial resources and efforts have been invested in it to be more productive, more efficient, safer and more environmentally friendly.

## 6. References

1. Volker von der Ohe, Conversion of the AP14 potline at ALUMINIJ d.d. Mostar from side to point feeding, *LightMetals* 2003, 387-391.
2. Miroslav Jakovljević, *Moja priča o aluminiju (My Story of Aluminium)*, 2011, <http://miroslavjakovljevic.iz.hr/wp-content/uploads/2011/12/Moja-prica.pdf>. (in Croatian).
3. Ch. Droste, I. Eick and M. Segatz, Process Modelling as a Key Factor in AP14 Retrofit at ALUMINIJ d.d. Mostar, *LightMetals* 2003, 367-371.
4. C. Duwe, K. von Geldern, The Moeller direct pot feeding system for a smooth and constant pneumatic transport of secondary alumina, to the electrolyte cells, *Proceedings of the 6<sup>th</sup> International Alumina Quality Workshop*, 2002, 228-232.