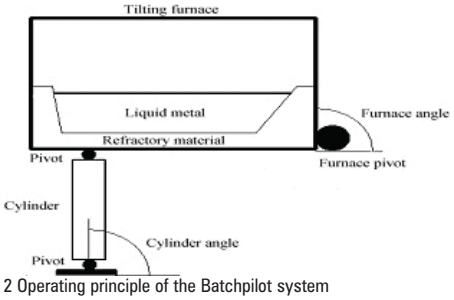
Alunorf benefit from adoption of Batchpilot system

Christof Buening and Philip Meslage of Aluminium Norf GmbH and Richard Courtenay and Michael Bryant of MQP Limited describe the advantages which have been gained by Aluminium Norf GmbH in the use of the Batchpilot system to measure furnace heel and transferred weight to an accuracy of +/- 200 kg.

1 Aluminium Norf GmbH plant at Neuss, Germany

Aluminium Norf GmbH, or as it is usually known, Alunorf, was founded in 1965. The company underwent a major extension in 1992, and is now jointly owned by Novelis Deutschland GmbH and Hydro Aluminium Deutschland GmbH. Alunorf, which is located on a 575,000 sq m site in Neuss in Germany, Fig 1, has over 2,000 employees, and a remelt capacity of over 900,000 tonnes per year. In the remelt department, aluminium scrap from all over the world is melted, together with Alunorf process scrap. The section has 13 casting pits, each with a melting and holding furnace, allowing slabs up to 8.7 m long and 2.2 m wide to be cast. The top piece weight is in the region of 30 tonnes. In the associated ingot processing area, the sheet ingots are sawn at both ends, and



2 Operating principle of the Batchpilot system

then the sides are scalped ready for the rolling process.

In the hot mill area, the sheet ingots are preheated prior to rolling and subsequently homogenised. Alunorf operates two hot mills, each approximately 400 m long. Several rolling passes reduce 600 mm ingots to between 2.8 and 9 mm. The finished hot-rolled strip is edge-trimmed and wound into coils.

Most coils subsequently require from one to six cold rolling passes to reduce the strip gauge to between 4.5 and 0.18 mm. The cold mill area houses five cold mills for this purpose. The cold-rolled coils are finally finished, according to the desired specifications. Approximately 80% of the products are slit to the required size, or rewound on the customers' spools. The finishing department is equipped with eight slitter units.

The main alloys produced are AA 3004 and A 5182 for can stock. Apart from materials for cans, the end products include strip for all kinds of packaging, automotive application, shipbuilding sheet, architectural gauges, and lithographic sheet.

Trial Programme

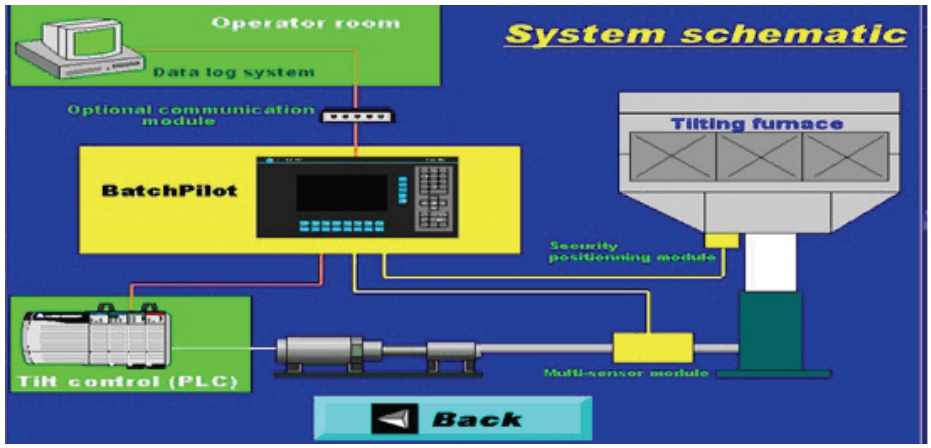
Within the melting department, Alunorf wished to optimise the number and sizes of slabs being produced per cast as a means of increasing production capacity. A comprehensive programme of work was therefore instigated aimed at examining the potential for using the Batchpilot system as a means of achieving better control of metal transfer weight and metal weight in the furnace.

Overview of Batchpilot Technology

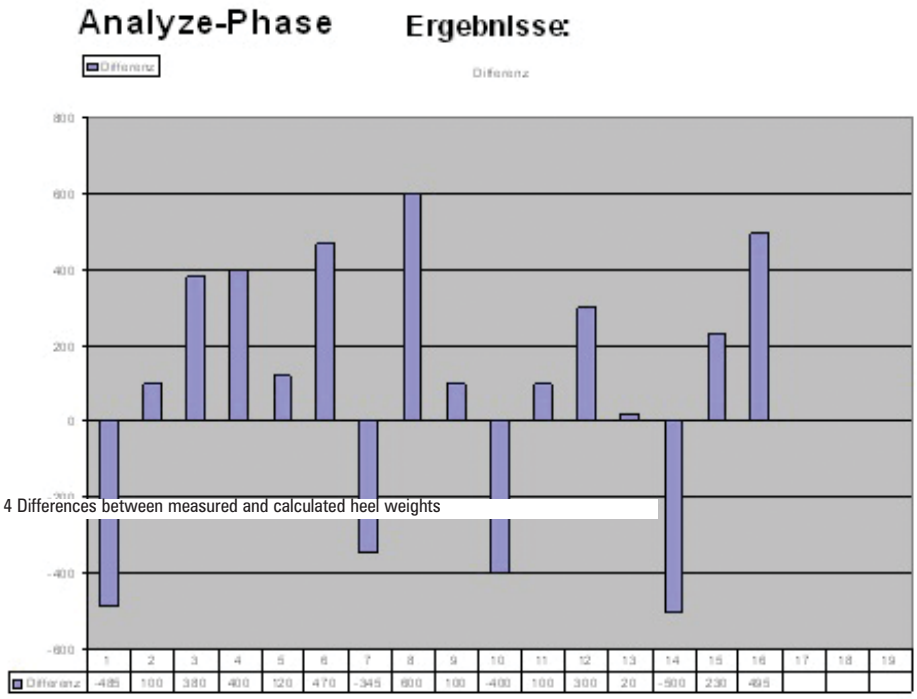
The Batchpilot system is a newly-developed casthouse technology for measuring furnace heel and transferred weight with an accuracy of +/- 200 kg. The system operates on the principle of measuring changes in the hydraulic pressure in the furnace main cylinder with the furnace tilt angle (Fig.2) Batchpilot has the facility to detect build up of dross on the furnace lining and to compensate for this in determining an accurate heel weight. In casthouses with a plc-controlled process system, Batchpilot can be readily integrated into the existing control system. (Fig. 3)

Furnace No.	SGA06	SGA06	SGA06
Charge No.	112714	112750	112674
1.Heel measurement	16.0 tonne	0.5 tonne	2.7 tonne
2.Heel measurement	16.2 tonne	0.8 tonne	2.7 tonne
3. Heel measurement	16.3 tonne	1.1 tonne	2.8 tonne
4. Heel measurement	16.5 tonne	1.2 tonne	3.0 tonne
5. Heel measurement	16.5 tonne	1.2 tonne	3.2 tonne
	Delta G = 0.5 tonne	Delta G = 0.7 tonne	Delata G = 0.5 tonne

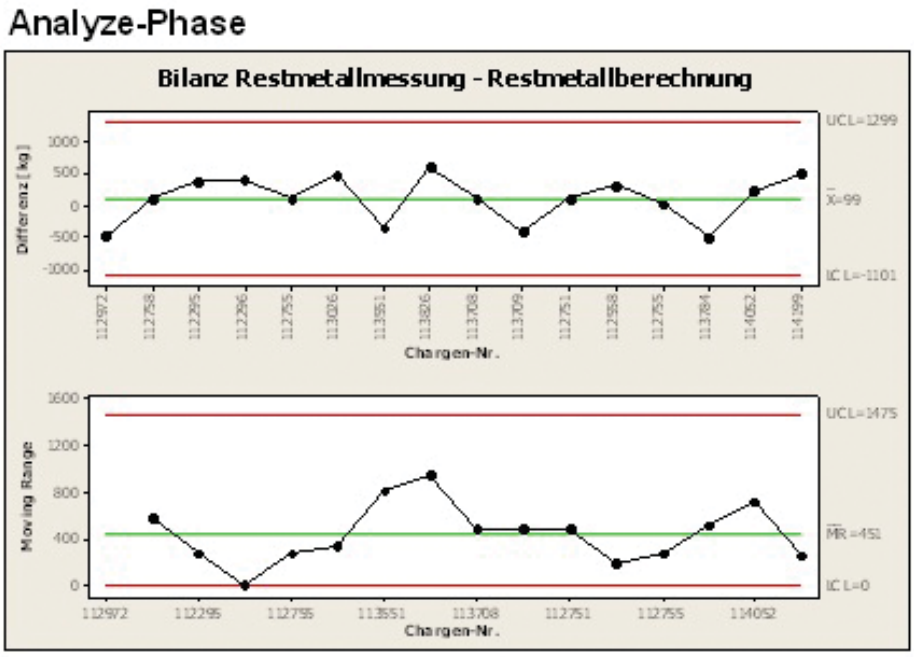
Table 1: Heel weight measurements with Batchpilot in First Phase work



3 Schematic showing Batchpilot integrated into a casthouse process system



4 Differences between measured and calculated heel weights



5 Statistical plots of measured heel weights versus calculated heel weights

Trial Procedure

An extensive programme of assessment and evaluation work on the Batchpilot system was carried out in two separate phases, at the Alunorf casthouse, Neuss.

First phase

In the first phase of the programme:

- Heel weight measurements were made to establish the inherent Batchpilot system accuracy and variation between measurements.
- To achieve this, three different furnace casts were used and the same heel weights measured five times each, on each of the three casts.
- The results are shown in Table 1.

The findings were:

- Delta G ranged from 0.5 to 0.7 tonnes
- The variation from the first measurements to the last (drift of measurements with time) was thought to be due to dross build up in the hearth, but nevertheless, still within the claimed accuracy of the Batchpilot system.

Second phase

In the second phase of the work:

- Heel weight, transfer weight, total furnace weight and slab weight were measured and calculated on 20 furnace casts. From these results, Fig. 4 is a plot of the difference between the measured full furnace weights and the calculated sum of slab weight and heel weight.
- Fig. 5 is a statistical plot of measured heel weights versus calculated heel weights.

Conclusion from Phase 2 work

- Batchpilot measurements are within 1% of the total furnace weights
- This agrees with the Batchpilot system specification which indicates an accuracy of 0.5 to 1.0%
- The overall conclusion is that the Batchpilot system can measure furnace weights at Alunorf to within +/- 250 kg

Benefits to Alunorf of the Batchpilot system

These are summarised by the Aluminium Norf GmbH Management as follows:

- Total furnace weights of around 45 tonne can, for the first time, be measured accurately
- Frequency of furnace cleaning is now more manageable due to immediate availability of Batchpilot measurements.
- Using Batchpilot measurements it is now possible to routinely cast three 1,650 mm slabs per cast. This was not possible before.
- Since the introduction of Batchpilot, there have been no "short cast slabs"
- Alloy changes are easier to manage, as the heel weights in the furnace are accurately known because of Batchpilot measurements.
- Overall production capacity at the Alunorf casthouse plant has been markedly increased by the introduction of the Batchpilot system.

Update

As a result of these successful evaluation trails, the Batchpilot system has now been installed on 11 of the 13 casting pits at Alunorf. Significant benefits are being achieved in increased production capacity and reduced costs.

Acknowledgment

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