

## AL06 - Production of Premium Grade P0404 Metal at Mahan Aluminium

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### Abstract



Customers consistently demand high purity metal and Mahan Aluminium (MH), a unit of Hindalco Industries Limited and a part of Aditya Birla Group (ABG), took this as a challenge to produce high purity metal beyond the regular grades & established itself as a quality conscious unit. Mahan metal is categorized as equivalent to “Good Western Metal” by some of our major customers. For production of high purity metal to meet customer’s demand, the chemical composition is the major attribute that controls the product quality and adds extra value to the aluminium production. Raw materials, cell process and regular operational works play important role in the production of high metal grade. To compete in the global market as a preferred supplier of metal, good product quality, consistent metal purity, new product development, good packaging, and timely delivery were essential prerequisites. To achieve this high metal grade production, a cross functional team was formed and they worked in coordination with various departments. Mahan products have reformed the views of Global customers for Indian Aluminium by continuous quality improvements in all products. Our new initiative “Make in India” for manufacturing of Aerospace and Defense products encouraged us to foray into this premium segment. These segments are currently dominated by West & Middle East smelters. With continuous product quality upgrades, we have an opportunity to enter this segment and be a partner in nation building.

Mahan team took this challenge as an opportunity in the form of new product development & production of P0404 grade sows and ingots. The methodology adopted for achieving this goal consists on understanding of customer requirements, analysis of factors affecting hot metal purity, brainstorming, raw material selection & blending to produce high purity anodes. Dedicated pots to produce P0404 grade metal, shuttle planning, process improvements, monitoring and feedback enabled us to consistently produce P0404 as well as and even a higher purity grade, namely, P0303. This new product has enhanced our product portfolio and meet our clients’ expectations while showing the world that Mahan has the capability to produce high premium grade metal on a consistent basis.

**Keywords:** Metal Purity, Premium Grade Metal, P0404, Mahan Aluminium, Hot Metal Purity.

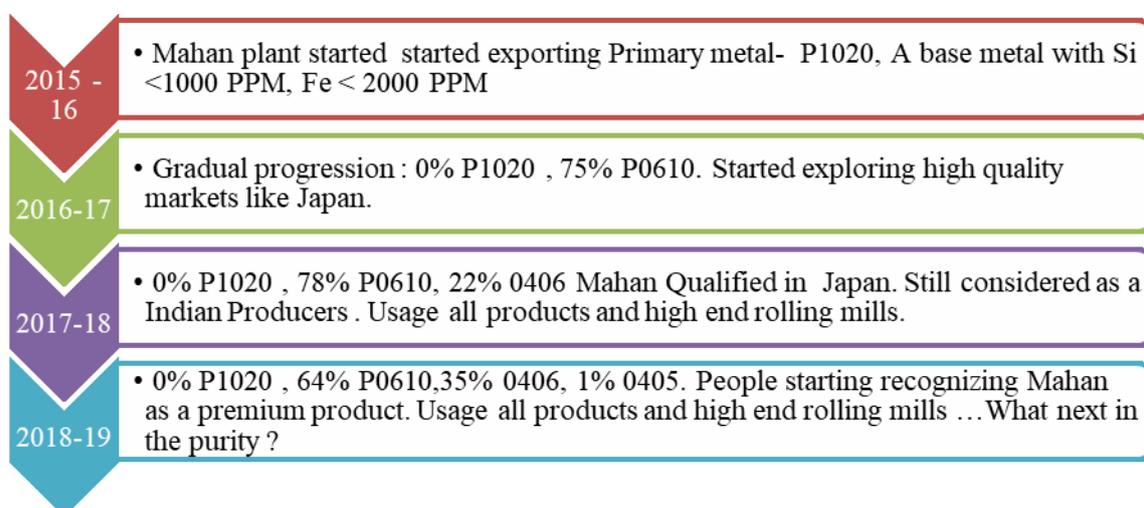
### 1. Introduction

Mahan Aluminium is an integrated aluminium smelting complex which uses globally proven smelter technology AP36 from Pechiney, France, while its integrated carbon plant uses technology from Solios and the captive power plant uses BHEL technology for each of its 6\*150MW units. Both smelter and CPP commenced operation in April 2013 and reached full

capacity in Aug-2015. The Plant was commissioned in a record time of 27 months, a benchmark time for Greenfield project execution in India. Mahan Aluminium is an ISO 9001, 14001, 45001 & 50001 certified unit & its primary products are LME registered. Within a short time, Mahan has established itself as the preferred choice of the world’s leading customers of primary aluminium. Over 40 per cent of total production is exported to various countries such as USA, Japan, Korea, Mexico, Israel and others.

Delivering high quality grade metal has been the primary goal of Mahan Aluminium smelter, which has a direct impact on the customers and at large the face value of the organization. The P0404 metal grade comprises elemental impurities such as silica < 400 ppm and iron < 400 ppm. The source of Si and Fe in metal is primarily from raw materials like alumina, anode, cover mix, AlF<sub>3</sub>, etc.

Figure 1 shows that while Mahan was continuously producing high purity metal, it kept on adding new grade products in its portfolio.



**Figure 1. Evolution of metal purity at Mahan Aluminium.**

Demands from customers were coming through marketing on capability to produce P0404. Since this metal grade is used in aerospace & defense equipment, this gave us an opportunity to enter into premium market and take Hindalco Mahan into new horizons as no other plant in India was producing P0404 premium grade metal and so Mahan took up this challenge to enter into league of premium metal producers.

**Table 1. Chemical composition of different metal grades.**

Nomenclature	
P0404	Al- above 99.85 %, Si- 0.04 % max and Fe 0.04 % max
P0405	Al- above 99.85 %, Si- 0.04 % max and Fe 0.05 % max
P0406	Al- above 99.85 %, Si- 0.05 % max and Fe 0.06 % max
P0610	Al- above 99.85 %, Si- 0.06 % max and Fe 0.10 % max
P1020	Al- above 99.70 %, Si- 0.10 % max and Fe 0.20 % max

## 2. Challenges

The following challenges were faced while improving metal purity:

- Alumina received from two different suppliers, namely, Utkal and Muri:

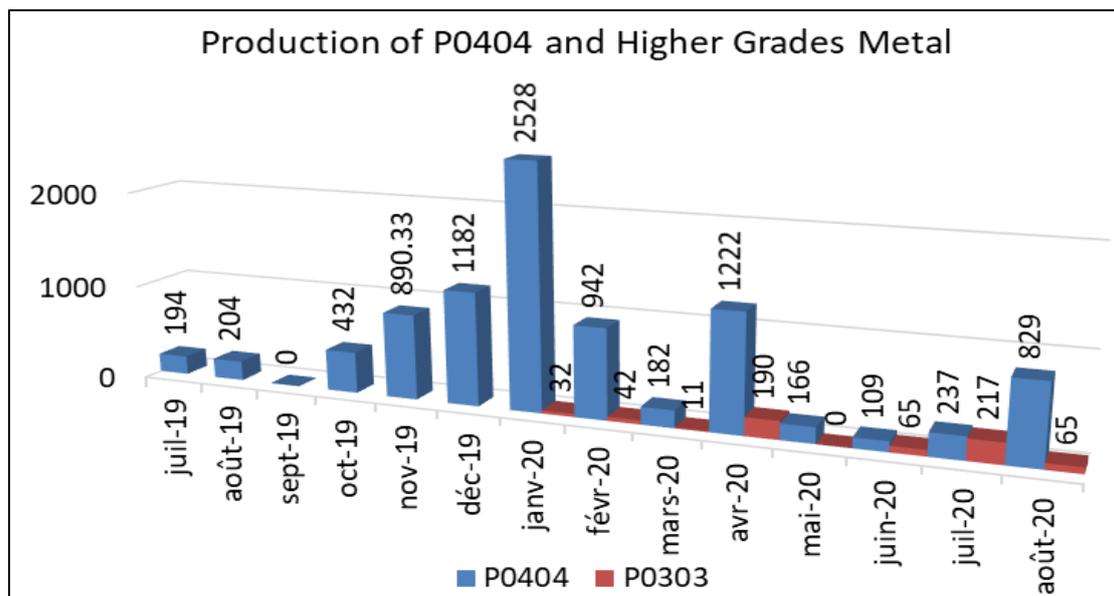


Figure 7. P0404 & P0303 monthly production (tonne).

## 7. Financial Benefits

The financial benefits of continuing P0404 metal production are shown in Table 3 below.

**Table 3. Financial benefits.**

From April-2018 to March 2019		
P0404 Production (tonne)	Premium Obtained (\$)	Actual Gain (\$)
5980.45	70	418,632
Investment or Cost Incurred	NIL	

### 7.1. Non-Financial Benefits

- Customer satisfaction;
- Product portfolio enhancement;
- Deeper penetration of Hindalco brand in exports market;
- Mahan has entered in the league of premium metal producers in the world;
- Developed first time in India as an import substitute;
- Capability to produce high premium grade metal on a consistent basis;
- Supporting “*Make in India*” initiative by enabling Aerospace and Defense manufacturing.

## 8. Acknowledgements

We would like to extend our sincere gratitude to the following leaders of Mahan Aluminium: Mr. Ratan Somani (Unit-Head), Mr. Senthil Nath (Head Smelter), and Mr. K. K. Pandey (Head Reduction) who were spearheading this project and made it successful.