

10 Years of TRIMET France: A Success Story

Loïc Maenner

Managing Director

TRIMET France, Saint-Jean-de-Maurienne and Castelsarrasin, France

Corresponding author: loic.maenner@trimet.fr

<https://doi.org/10.71659/icsoba2024-kn002>

Abstract

It has been now 10 years since the German family-owned aluminium producer TRIMET took over the historical French production sites of Saint-Jean-de-Maurienne and Castelsarrasin from Rio Tinto.

Throughout this period, a strong industrial plan has been executed and over 200 million euros have been invested in increasing potroom production and recycling, diversifying casthouse products, reducing logistic costs, improving environmental footprint, energy efficiency, electrical consumption flexibility and operational performance.

At the same time, a solid human resources development plan has been implemented, with 480 new recruits over the period including 160 new positions, the creation of an in-house apprentices program, and a particular focus on safety and job training.

The strong and consistent actions taken over the last 10 years have allowed to put both sites on the track of long-term sustainability and have enabled them to successfully deal with the multiple crisis that have arisen during the period.

Keywords: TRIMET France, French aluminium, Recycling, Environmental footprint and sustainability, Recruitment.

1. TRIMET France: Two Centenary Sites at the Forefront of Technology

The company TRIMET France is made of two plants: the Saint-Jean-de-Maurienne smelter (Savoie) and the Castelsarrasin casthouse (Tarn-et-Garonne). Together, the two plants employ 630 people and produce around 150 000 tonnes of value-added products every year.

The Saint-Jean-de-Maurienne smelter started in 1907 (Figure 1), its location being due to the development of hydroelectric power generation in the Alpine valleys. Today, it is one of the oldest aluminium smelters in the world still in operation. There were five other aluminium smelters in the Maurienne valley, all of which closed at the end of their technical or environmental life. The Saint-Jean-de-Maurienne smelter is the one that has been expanded and modernised several times (Figure 2). It has benefited from synergies with the neighbouring Pechiney LRF research centre, where all AP cell technologies were developed. The current smelter's two potlines are semi-industrial demonstration lines for AP18 technology ("F-line", 60 cells, started in 1979) and AP30 technology ("G-line", 120 cells, started in 1986). The smelter produces its own anodes in the carbon department, whose installations and equipment (paste plant, baking furnace and rodding shop) date mainly from the 1980s. In the early 2000s, investments were made in the casthouse to develop production of electrical wire rod, which has since accounted for 2/3 of the production. Today, the casthouse operates three rod mills, two DC-casting pits and one ingot line. Alumina is supplied to the smelter by trains departing daily from the port of Marseille, where TRIMET has two silos and unloading facilities.

The Castelsarrasin casthouse started in 1856, even before the invention of aluminium production, and produced a variety of metals in its early years. For many years it belonged to Pechiney Rhenalu as a rolling plant. After the rolling mills were shut down, it joined the Saint-Jean business unit in 1999, due to technical synergies, since its only remaining production was mechanical rod.

Like most ex-Pechiney sites, the plants were successively taken over by Alcan in 2003 and Rio Tinto in 2007. During the 2009 economic crisis which led to a sharp fall in aluminium prices, F-line was shut down and G-line was kept running at 100 cells, resulting in a total reduction in production capacity of 30 %.



Figure 1. The smelter in 1910.



Figure 2. The smelter today.

2. The Takeover (2013)

Saint-Jean-de-Maurienne has been supplied for around 30 years by a long-term electricity contract signed by Pechiney with French energy supplier EDF in 1984. This contract was to expire in 2014 and a new agreement had to be found. In addition, the small-scale, high costs smelter was no longer in line with Rio Tinto's strategy, and decision was taken to look for a new owner or alternatively shutdown the smelter. This decision has caused considerable concern and awareness in the community where the smelter operates, due to its significant impact on the local economy (Figure 3).

The process took around 18 months and in March 2013 Rio Tinto entered into exclusive negotiations with the German family-owned aluminium producer TRIMET. Founded in 1985 as a trading company, TRIMET has gradually grown by taking over distressed assets for which major aluminium producers saw no future.

An agreement was reached between all parties in July 2013 (Figure 4) and TRIMET France was created in December 2013. The agreement included an electricity supply for 10 years from EDF, which became a 35 % shareholder in the company to ensure a fair sharing of risks and profits.



Figure 3. The mobilisation of local elected in 2012 to attract awareness.



Figure 4. Binding offer July 2013.

3. First Priority After Take-Over: Back to Full Production (2014)

When the Saint-Jean-de-Maurienne smelter was taken over by TRIMET in December 2013, 30 % of production capacity was idled since 2009, and the plant was producing less than 100 kt/year. The 60 AP18 cells in F-line had been shut down on metal pads and protected from damp, but no work had been undertaken since then. As it was not possible at that time to short-circuit the whole line, each individual cell was short-circuited and the electric current continued to flow through the line.

The first priority has been to resume production in order to reach full capacity as soon as possible. In addition to the F-line, several workshops had been shut down and had also to be restarted:

- AP18 green anode production line in the paste plant
- AP18 anode rodding shop
- Slab casting pit in the casthouse

When the line was shut down in 2009, a redundancy plan was implemented to reduce the workforce by 30 % (from 580 to 420 employees) and adapt it to the new production scope. The production teams had to be reconstituted and trained to prepare for the return to full capacity.

After preparing the cells and carrying out the necessary equipment refurbishment, restarting took place within 10 months, the first cell having been started only 5 months after take-over (Figure 5). 25 cells were newly refurbished, the others having been started on metal pad after gas burners preheating. A restart success rate of 90 % was reached, duly celebrated in September 2014 with a visit of minister of economy Emmanuel Macron (Figure 6).



Figure 5. F-line restart in 2014.



Figure 6. F-line restart celebration.

4. Industrial Development of the Plants (2015-2021)

Once the smelter had returned to full production capacity, a strong multi-year investment plan was implemented across the smelter to improve its performance and competitiveness. More than 200 million euros were invested in assets over this period in addition to 100 million euros in pots relining.

Investments were mainly in the following categories:

- Improving safety and working conditions
- Improving environmental performance
- Maintenance investments, including some backlogs related to the lack of visibility in the years leading up to the takeover
- Improving operational performance, focusing on the few historical weaknesses of the Saint-Jean-de-Maurienne smelter
- Reducing costs, particularly those associated with raw materials logistics

- Energy efficiency and power consumption flexibility

4.1 Investments in the Carbon Area

The focus has been on the quality of the anode, which is essential for good cell performance. The following investments were made to improve the overall quality of the anodes:

- Extension of the baking furnace from 40 to 46 sections to improve baking quality (Figure 7)
- Installation of an anode slotting machine
- Increase in the diameter of the stubs on the F-line and G-line to reduce the current density in the stubs
- Increase in the length of the G-line anode to reduce current density. This expansion required the installation of a system for rotating the anodes before and after loading them into the baking furnace
- Modernisation of automation (hardware and software) throughout the paste plant, automated anode storage and rodding shop
- Replacement of our oldest baking furnace tending machine with a new state-of-the-art crane (Figure 8)
- Installation of a butts shot-blasting machine to reduce sodium content (Figure 9)



Figure 7. Extension of the anodes baking furnace (ABF).



Figure 8. New ABF crane.

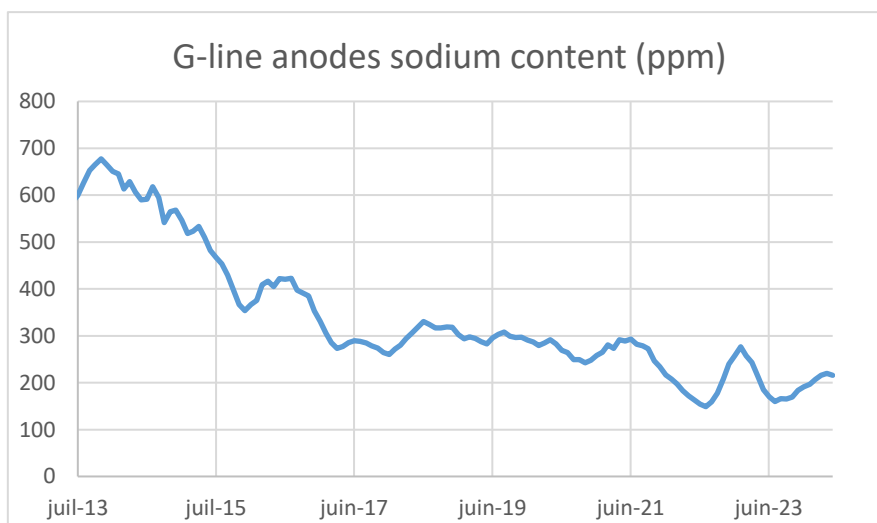


Figure 9. Evolution of G-line anodes sodium content.

4.1 Investments in the Potroom Area

4.1.1 Consumption Flexibility

As an electricity-intensive industry, we see it as our responsibility to provide flexibility services to the electrical network to help it cope with contingencies or manage peak hours [1]. In France, we were among the first to develop and offer the services described in table 1 to the French grid operator RTE. Implementing these services required investment in the substation automation system and the development of energy recovery plans for potrooms.

Table 1. Different types of flex-power services offered to the grid.

Service	Potroom power involved	Maximum duration	Warning delay
Interruptibility	100 %	1 h per activation	5 seconds
Fast reserve	50 %	4 h per day	10 minutes
Primary reserve	15 %	24 h per day	continuous

In order to keep the potroom running and to be able to offer these flexible products reliably, a programme to renovate 6 out of 8 transfo-rectifiers has been carried out, over a total period of 2 years.

4.1.2 Alumina Logistic Costs

Because of its historic location in the heart of the French Alps, alumina logistic costs have always been a handicap for the Saint-Jean-de-Maurienne smelter compared with smelters located by the sea. Nevertheless, a number of investments have enabled to reduce costs by making our alumina logistics more reliable:

- Construction of an additional alumina silo in Saint-Jean-de-Maurienne (Figure 10) to double storage capacity on the site (from 15 to 30 days' consumption)
- Investment in a dedicated wagons fleet (made of aluminium, of course)
- Modernisation of our alumina unloading facilities in Marseille (silos, sucking pipes) and addition of a mobile ship unloading truck (Figure 11)

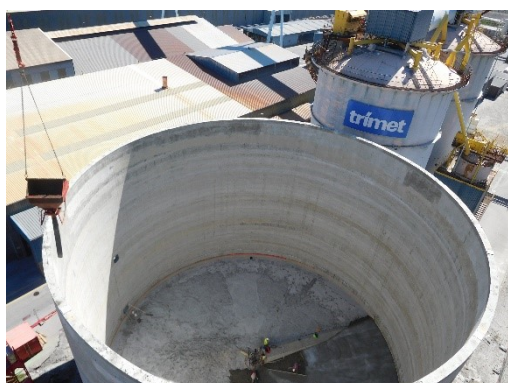


Figure 10. Alumina silo in construction.

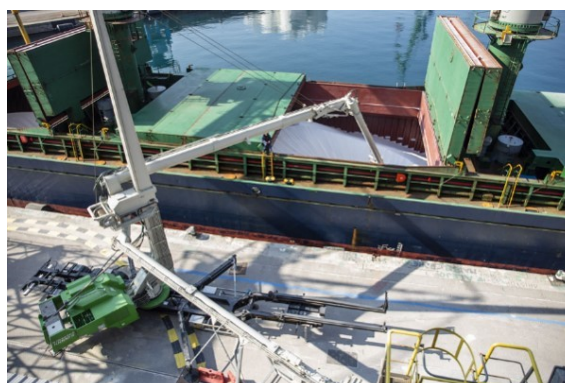


Figure 11. Alumina unloading truck.

4.1.3 Environmental Performance

In order to ensure that our total fluoride emissions respect the limits of our operation permit, which are aligned on the best European references, several investments have been made in our gas treatment centres (16 filters):

- Widespread use of star bag filter technology to reduce pressure loss and improve throughput
- Installation of continuous lubrication on all filter axis to reduce filter breakdowns
- Installation of a gas cooling device on the main duct

Several investments have been made to reduce our Greenhouse Gas (GHG) emissions, such as the installation in both potlines of chisel contact on all alumina feeders to reduce anode effects. This has enabled us to achieve anode effect frequencies well below 0.10 AE/cell-day on a sustainable basis.

4.1.4 Operational Performance and Metal Quality

Following the need for electrical and mechanical renovation of the four 30-year-old pot tending machines (PTMs) of G-line, a major investment programme was carried out on this line:

- Extending the building and installing a crane transfer gantry (Figure 12)
- Construction of a PTM maintenance workshop
- Construction of an off-line potlining workshop (Figure 13) and associated pot transfer crane. Potlining had taken place on-line since the line started up in 1986
- Purchase of two tapping cranes to be able to shut down each PTM for several months
- Electrical modernisation of the 4 PTMs

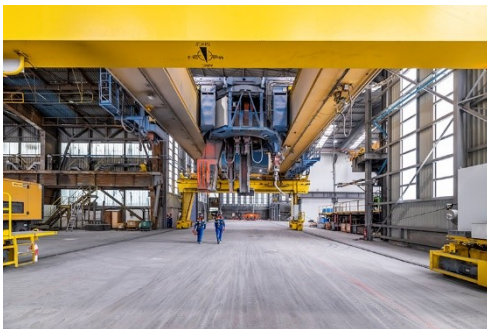


Figure 12. New cranes transfer gantry.



Figure 13. Off-line potlining workshop.

Major investments have also been made in all the potroom transport vehicles, such as the investment in a bath-tapping vehicle enabling the bath to be transferred from one line to another, and the replacement of the anodes and metal transport vehicles (Figure 14).

These investments have significantly improved operational stability, resulting for example in a much lower and more reliable iron content in the metal produced (Figure 15).



Figure 14. New metal transport vehicles.

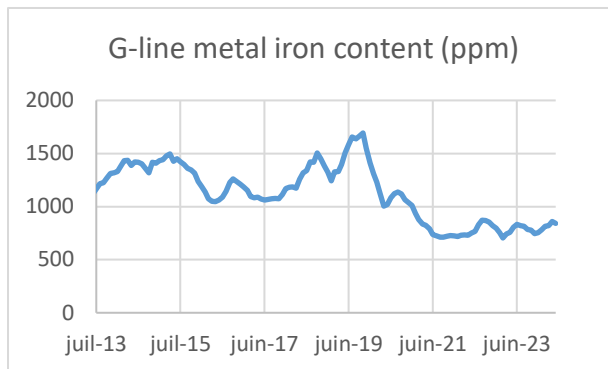


Figure 15. Evolution of G-line metal iron content.

4.2 Investments in the Casthouse

As an autonomous company, TRIMET France could not be satisfied with its two historical value-added products, rolling slabs and wire rod. In order to diversify its production and develop synergies with the Group's other casthouses, a 10 t/h small-form ingot line was commissioned. Initially, in order to enter the market quickly, the ingot line was installed on the same furnaces as the slab casting pit. In a second phase, the line was moved to another existing building and connected to two new 60-tonne furnaces equipped with regenerative burners and electromagnetic stirring system. Since its commissioning, almost 200 000 tonnes of primary foundry alloys have been produced on this line (Figure 16).

A major program has also been carried out to improve slab quality:

- Modernisation of metal distribution in the pit
- New state-of-the-art saw
- Mobile Rotary Flux Injector (RFI) for furnace treatment
- Robotic potroom ladle skimmer (Figure 17)

Finally, the casthouse has been fully equipped with specialised furnace treatment vehicles to replace less suitable conventional forklifts trucks.

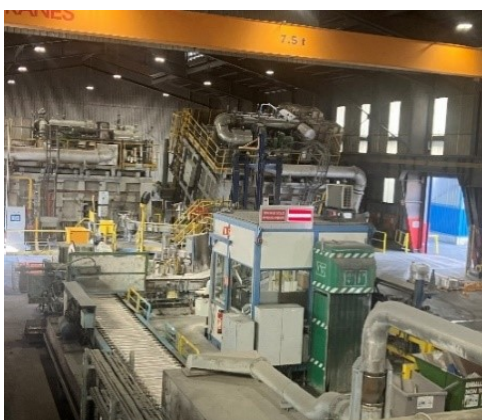


Figure 16. New ingot line and its two furnaces.

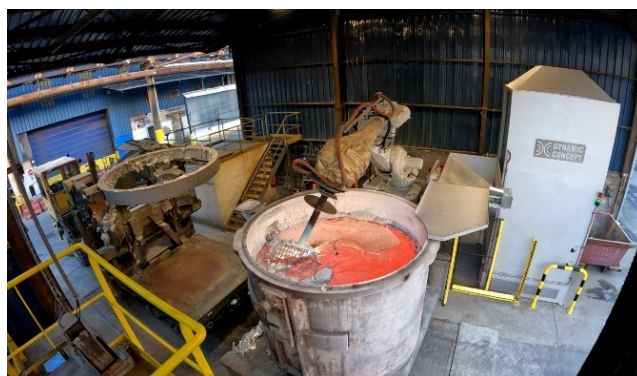


Figure 17. Robotic ladle skimmer.

4.3 Investments in Castelsarrasin

As a casthouse dedicated to mechanical wire rod products, specific investments have been made on the Castelsarrasin site to prioritize high product quality, in addition to continuous improvement on safety and operational reliability. In particular, two state-of-the-art electrical heat treatment furnaces were installed to replace ageing gas furnaces (Figure 18).



Figure 18. New heat treatment furnaces Castelsarrasin.

5. Human Resources Development

Alongside the solid investment program, a major effort was made to develop human resources.

Constructive relations with the unions enabled more than 25 agreements to be signed during the period. A new profit-sharing agreement was put in place, exclusively linked to safety and financial results. The Castelsarrasin collective agreement was amended to bring it into line with the Saint-Jean-de-Maurienne agreement.

Over the last 10 years, 480 people have been hired, including 160 new positions linked to the return to full capacity and the need to set up autonomous organisations (finance, procurement and supply chain). This means that 75 % of current employees were not present at the time of the takeover in 2013. To ensure better recruitment and training of new operators, a specific apprenticeship programme called Cap'Alu was launched (Figure 19). To date, 115 apprentices have experienced the programme, 90 % of whom have been taken on. On top of this programme, more than 300 000 hours of training have been provided over the period, focusing on safety and technical training.

The Covid-19 pandemic was of course a difficult period, but it was well managed in collaboration with the works safety committee. All the measures taken meant that no serious cases were recorded. Work organisations were strongly reviewed to reduce contacts and deal with absenteeism (including a temporary switch to 12-hour shifts for production teams), and the in-house medical team was heavily involved in vaccination and contact inquiries.

A renovation program of the washrooms, lockers and break rooms was carried out all over both plants to improve working conditions. As well, major efforts are constantly being made to improve safety performance, with the aim to balance action plans between safety at work and process safety, and between material and behavioural improvements. Despite a positive general trend, the variability of safety results from one year to the next remains too high.

Finally, key milestones were duly celebrated with employees and their families, such as the restart of the F-line in 2014, the smelter's 110th anniversary in 2017 and the TRIMET's 10th anniversary in 2024. It is also worth mentioning with pride that the TRIMET France football team won the TRIMET cup in 2019 (Figure 20).



Figure 19. Cap'Alu inauguration in 2014.



Figure 20. TRIMET Cup winners.

6. CSR Strategy

In recent years, Corporate Social Responsibility (CSR) has become an increasingly important part of TRIMET France's strategic agenda. The company has been rated “Gold” by Ecovadis, a CSR rating body, since 2018. Both plants were certified to Aluminium Stewardship Initiative (ASI) performance standards in 2022.

As one of the largest emitters of greenhouse gases in France, TRIMET France signed its ecological transition contract with the French government in 2023, which plans to achieve carbon neutrality by 2050 through the implementation of breakthrough technologies such as inert anodes or Carbon Capture, Utilisation and Storage (CCUS).

In the short term, we are focusing on developing, in collaboration with our customers or the French grid manager, product-to-product recycling of end-of-life cables and cable makers' process scrap. A new range of electrical wire rod with recycled content was created in 2022, and volumes are increasing year on year.

7. Issues and Opportunities Associated to the Energy Crisis (2022-2024)

In 2022, the French nuclear power plants began to experience high levels of unavailability due to detected cracks that led to unscheduled outages for repairs. This lack of production generated a high risk of grid imbalance for the winter of 2022/23 and beyond. Against this backdrop, we were approached by our energy supplier to look into the possibility of significantly reducing consumption for a long period of time by reducing production.

Negotiations culminated in the decision to shut down F-line once again, which was executed in October 2022, with a minimum 15-month commitment. We took advantage of the line shutdown to carry out major work that would have been much more difficult to perform in operation:

- Installation of a short-circuit to avoid keeping the line live during the shutdown
- Electrical and mechanical modernisation of the two PTMs
- Replacement of the main gas collector
- New roof covering
- Modernisation of the gas treatment centre (electrical cabinet, filtering technology, etc.)
- Modernisation of alumina distribution to cells

There was no impact on employment, and the staff surplus has been used for additional training, executing the projects or preparing the restart. Restart has been completed within 3 months, with a 98 % success rate (Figure 21). 20 % of the cells were completely relined, with the remaining 80 % restarted on metal pad after burners preheating.

The rapidity of the decision and execution of the shutdown was a key factor in the success of our negotiations with EDF for an extension of our electricity supply contract beyond 2023, which was signed in June 2023 (Figure 22).

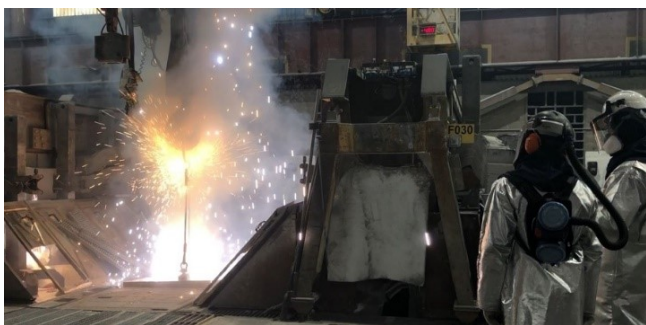


Figure 21. F-line restart in 2024.



Figure 22. Power contract signature June 2023.

8. Conclusion

TRIMET's takeover of the Saint-Jean-de-Maurienne smelter and Castelsarrasin casthouse has been a renaissance for both plants, involving significant investments in assets and employees.

The success of this takeover is further proof that aluminium production in Europe can be sustainable, provided it is associated with a business model that hedges risks and aims to secure margins rather than being totally exposed to the markets.

Thanks to the investments in assets and people realized in the last 10 years, both plants are well prepared to face their future challenges of decarbonisation, digitalization, competitiveness and people attractiveness.

9. References

[1] Maenner Loïc, Contribution of an Aluminium Smelter to Power Grid Stability, *12th Australasian Aluminium Smelting Technology Conference*, Queenstown, December 2018.