





*Kitimat Modernisation Project*

**More than an IT solution**

Our fully integrated Manufacturing Execution System for ALuminium or Alumina (MESAL™) solution incorporates the knowledge and experience acquired during more than a century of designing, building, running and supporting smelters and refineries worldwide. It enables you to manage your plant operations and production, including monitor technical performance, with unprecedented accuracy, certainty and efficiency.

**Evolving rapidly**

First implemented in 2006, MESAL™ is now a mature solution. In 2012 MESAL™ 2.0 further integrated smelter management best practices along with the functionality required to achieve operational excellence. In 2013 our IT team designed MESAL™ 3.0, capable of exchanging data with any historian solution available on the market.

In 2014 MESAL 4.0 and its new functionalities were deployed at the Kitimat smelter. In addition to its smelter offer, MESAL™ now also meets your refinery alumina manufacturing excellence needs.

Today our team is delivering the new MESAL™ 4.0 solution, including enhanced functionality to ensure operational excellence across all plant workshops.

**Strong business content**

MESAL™ incorporates strong business content with more than 300 screens and dashboard views covering all smelter areas thanks to the AP Technology™ experts who contributed 5,000 man days to its development.

The continuous involvement of operations, technology and R&D experts as well as IT specialists is part of our MESAL™ development governance model.

MESAL™ is not only an IT solution. It integrates business processes and best practices defined and optimised by one of the world's leading aluminium and alumina plant operators.

**Our leading edge IT solutions are part of our AP Technology™ offer, the industry's most comprehensive smelter technology and services package.**

**MESAL™: the leading pre-packaged plant business solution**

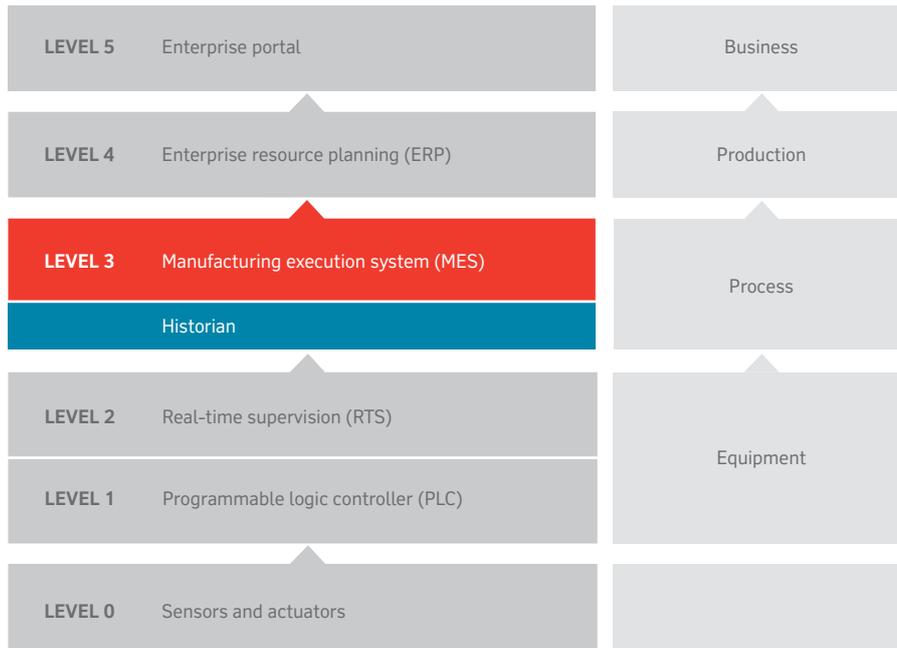
**Our MESAL™ solution:**

- Can be cost effectively customised and deployed to accommodate the diverse equipment, storage and materials used in all primary aluminium and alumina facilities.
- Incorporates reusable templates and standardised processes to allow cost effective customisation and to meet specific business requirements.
- Simplifies your plant start-up and operations by enabling all functions to employ the same standards of parameterisation, operation and use.
- Interfaces with enterprise resource planning (ERP), ALPSYS and all systems managing data acquisition such as historian systems, databases, master project innovation conception (PIC) and data concentrator (control command and real-time data acquisition).
- Integrates MES libraries for aluminium and alumina covering all sectors of a smelter or a refinery. Each sector is covered by an MES system composed of applications dedicated to the plant workshops. An application integrates independent and configurable:
  - Common functions deployed in all shops = Industrial framework
  - Specific functions dedicated to one shop = Business framework

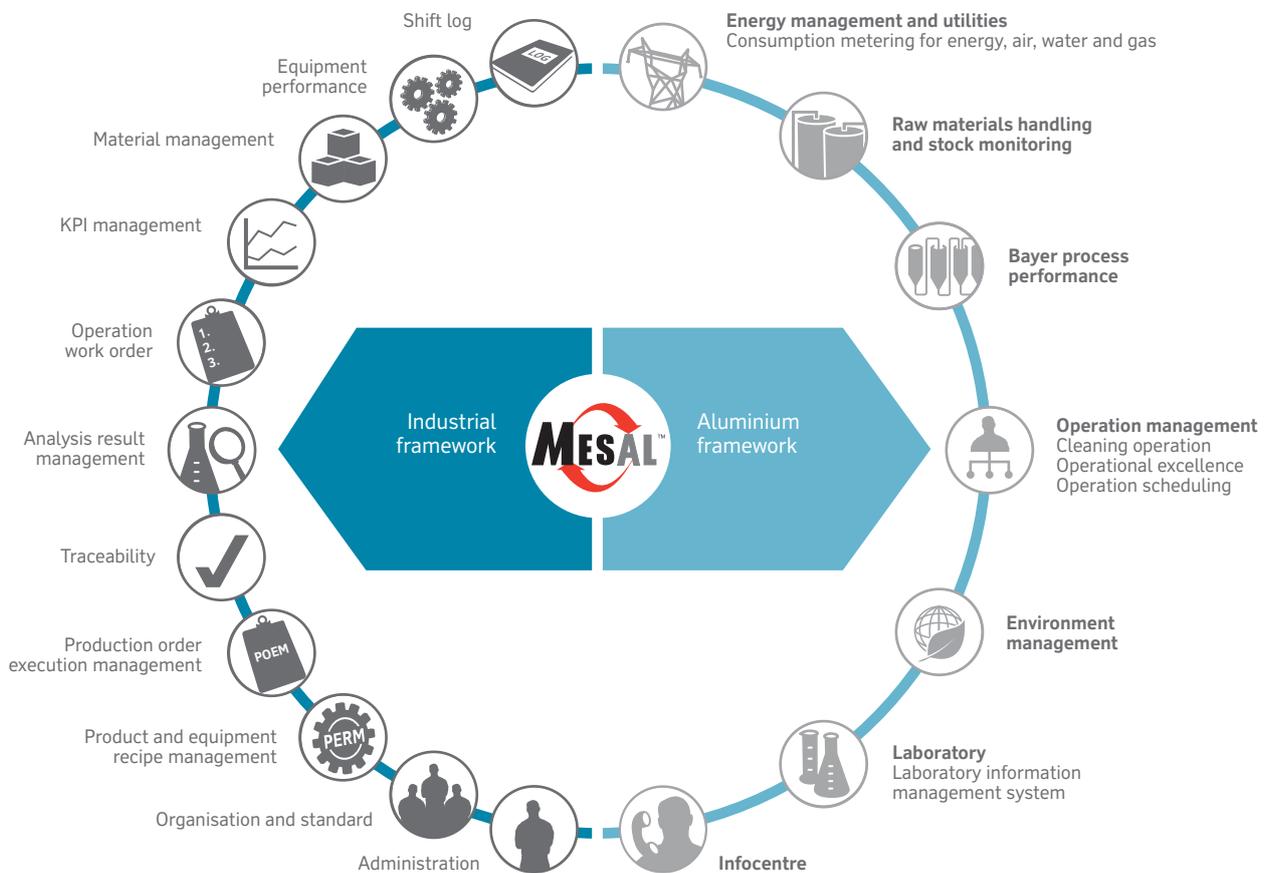
## Plant information system

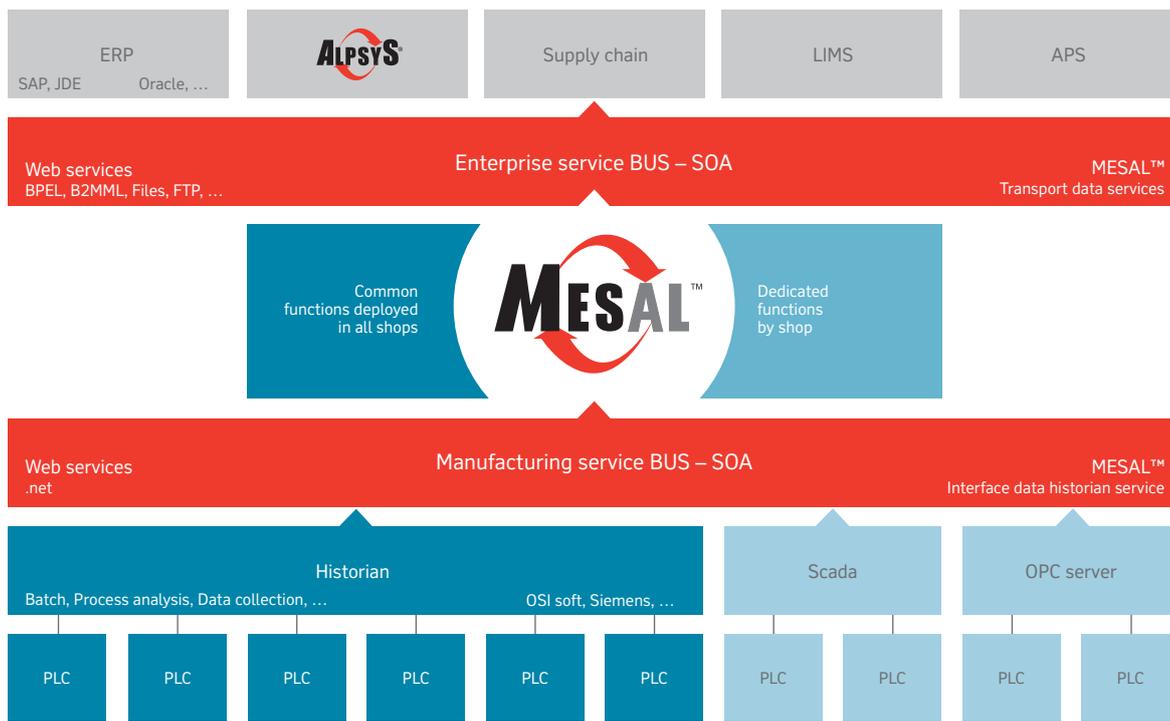


*MESAL™ lies at the centre of your plant, providing real-time visibility into your entire operation. This means immediate and customisable access to the information you need to maximise performance and proactively address issues.*



## MESAL™ frameworks





*MESAL™ 4.0 architecture integrates service oriented architecture (SOA) communication and collaboration applications into standard manufacturing practices and processes.*

### MESAL™ success story

Today MESAL™ is delivering significant benefits at five sites worldwide.

- In 2006 the complete MESAL™ solution was implemented at the Sohar Aluminium smelter in Oman. In November 2012 we deployed MESAL™ 2.0 at Sohar, one of the world's largest potlines. We also provide maintenance support for the full scope.
- In 2009 all MESAL™ common functions were implemented at Aluchemie, a Rio Tinto Alcan joint venture anode plant in the Netherlands. In 2010 and 2011 MESAL™ Carbon specific functions were deployed to cover anode manufacturing processes from raw material to final delivery.
- From 2011 to 2012 MESAL™ Casthouse specific functions were deployed at the Aluminium Dunkerque smelter in France to replace the legacy casthouse system managing all operations and processes to deliver value added products.
- In 2013 these specific functions were deployed at the Alma and Laterrière smelters in Quebec.
- In 2014 MESAL™ 4.0, the latest major release, was deployed at the Kitimat Aluminium smelter in British Columbia, Canada, embedding Operational Excellence enhancements and covering all aluminium smelter workshops.
- At the same time, the MESAL™ Framework for Alumina Refineries has been completed and is now on the market.

- With its unflinching focus on innovation, the MESAL™ team is already designing the solution's next generation to be released in the coming year. New technologies and concepts are being explored in the fields of business intelligence, mobility and the Internet of things (glasses, etc.).

### MESAL™ enables a high level of reuse from project to project

Based on a modular design and consistently embedding standardised processes and practices, MESAL™ is compliant with the concept of maximising the reuse of all existing functions. Functionality developed to address specific business needs is readily deployed at another site using parameterisation adaptation.

### MESAL™ 4.0: a flexible service oriented architecture (SOA)

With its modular SOA, MESAL™ 4.0 simplifies:

- Solution integration into the information system
- Application maintenance
- Application deployment (MESAL™ can be installed on one or several virtual machines)
- External system interface (historian, ERP, LIMS, ...)
- Solution upgradability

The benefit of this flexibility is most apparent in revamping projects when you need to interface with old and existing heterogeneous systems.

MESAL™ is compliant with the ISA-95 market standard.

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