



open**SAP**

SAP LEONARDO IOT FOR THE INTELLIGENT ENTERPRISE

OPTIONAL IDEATION CHALLENGE

IOT IN A PETROCHEMICAL PLANT TO PRODUCE TO QUALITY

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This is a template that can be used for the optional Ideation Challenge included as part of the openSAP course "SAP Leonardo IoT for the Intelligent Enterprise."



IOT in a Petrochemical Plant

Industry : Energy and Resources (Hydrocarbons / Petrochemicals) and Manufacturing. Use Cases to Improve Business Outcome (Product Quality) and reducing Losses.

Story : Petrochemical Plants as part of refinery plants or separate make Polymer Plastic Granule Grades (for Blow Molding of Plastic Parts - Bags, Plates, Buckets, Containers , Toys, Plastic Furniture, Automotive ... etc.) as well as Polyester threads (in Polyester Clothing for Self, Home or Office use).

Polymer Granules of Poly-Ethylene (PE) and Poly-Propylene (PP) Polymer can have a degraded quality product depending on the Parameters like Temperature, Pressure, Viscosity at different points in the Chemical Reactor equipment (see pictures below) for Continuous Polymerization. Using IOT we can create a Predictive Model that if the Input Carbon Compounds, Gases to the Reactor are at a certain parameter (temperature, Pressure, Viscosity ... etc.), then the End Product Plastic Granules Product Grade will be of acceptable quality (Golden Batch), else it will be down-graded quality (Ladder Grades which are always sold at much lesser price to MSME customers as opposed to large customers. See Multiple Reactor Equipment's in Plant below.



This Project Ideates to put Sensors to Measure Reactor temperature, pressure, viscosity at entry and intermediate points inside the Reactor to be able to PREDICT if the Output Product Grade Quality will be good or have to be down-graded or even scrapped, and giving the Plant Supervisor a chance to adjust the Parameters during Actual Production to be able to Improve the Product Quality before it gets scrapped. This will be beneficial to reducing losses for the Petrochemical Product.

“Sensors” in the Reactor at Entry Point Pipes as well as within the Reactor pipes will measure the parameters of Temperature, Pressure, Fluid Viscosity. A Predictive Model will be built with DATA of all the Reactor Entry and Intermediate Parameters for the Multiple Reactor Equipments in the Flow of Fluids and a “Correlation analysis” with “Multi-Linear Regression analysis” with “Machine Learning” (Data Science analysis) will have to be done to be able to Judge the Quality of Output Product (Plastic Granules or Polyester thread) DURING the Manufacturing execution is WIP. Such a IOT Application with this Predictive Model can be used to Pre-guide the Manufacturing People in the Control Plant to be able to ESTIMATE the Quality of the Product being made as compared to the Golden Batch parameters with Best Quality while the manufacturing is going on – so that Parameter variations can be adjusted to make a better quality Product.

Machine Learning and Edge Services in SAP LEONARDO can be used on the Historical BIGDATA of Sensor readings of Past Manufacturing processes and Output Grade quality to be Modelled on the SAP Cloud Platform. If the Target Temperature or Pressure range varies outside Threshold, then their Adjustment can be done at the EDGE gateways.