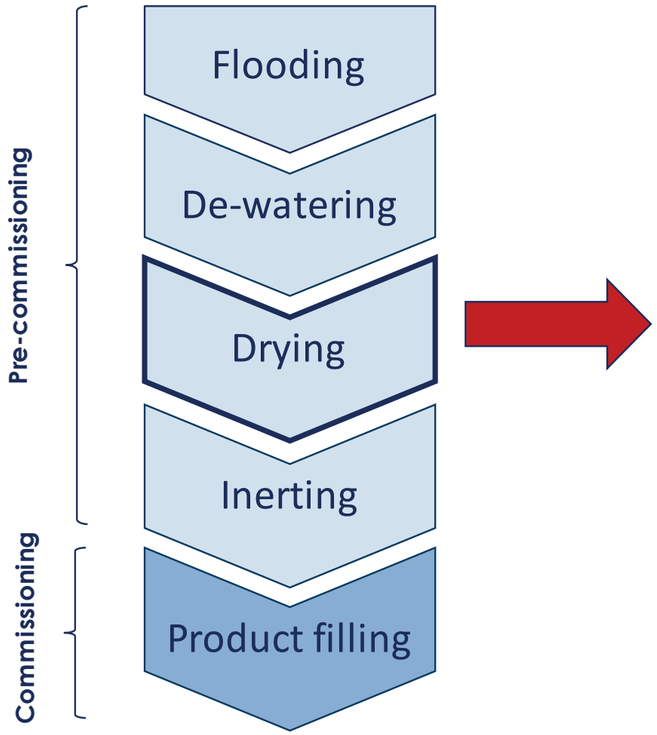
Pipeline Drying

Process simulation

Background

The knowledge of air drying pipeline phenomenon is fundamental for a correct execution of pre-commissioning activities in the petrochemical industry



The main consequences of the residual water in the pipeline are:

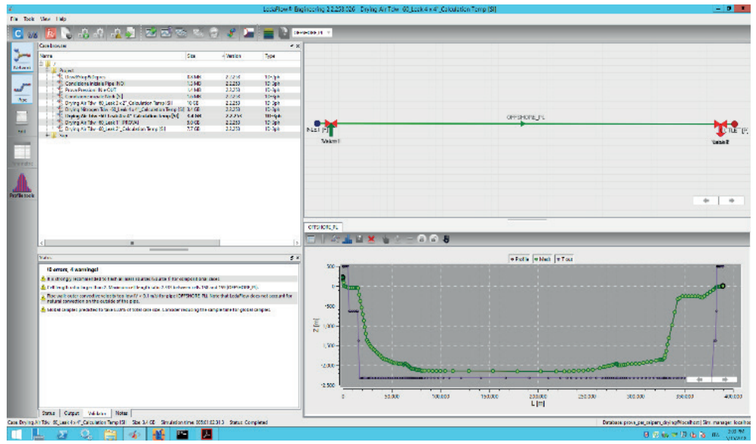
- Formation of hydrocarbon gas hydrates
- Pipes corrosion
- Reduction of natural gas quality
- Formation of ice when pipeline operates at low temperature

In order to achieve a complete removal of the water, the preliminary dewatering operation has to be followed by a drying operation

Software

The first step of the activities concern the characterisation of the phenomenon with the following software:

- LedaFlow® - Kongsberg: LedaFlow® is used in flow assurance calculations for wells and flowlines for:



- Liquid management
- Multiphases flow assurance simulations
- Line sizing and route selection
- Thermal analysis and design
- Slug catcher sizing
- Contingency planning
- Hydrate, wax and corrosion monitoring

- Multiflash™ - KBC: Multiflash is a powerful and integrated PVT and physical properties package, which allows modelling the phase behaviour of complex mixtures for applications in offshore transport and processing, flow assurance and throughout the entire oil and gas value chain.

Modelling

Streamline Eng. provides the support about the process simulations needed for the drying activities.

The support go through the following initial actions:

- Pipeline profile construction in LedaFlow® (geometry, material, thickness, profile length, roughness etc.);
- Identification of initial conditions (amount of total water, temperature, pressure etc.);
- Identification of the boundary conditions (external temperature needed to the heat exchange);
- Characterization of the process fluid in Multiflash™.

Process Optimization

Through the simulation, the Company is able to optimise the drying process in terms of:

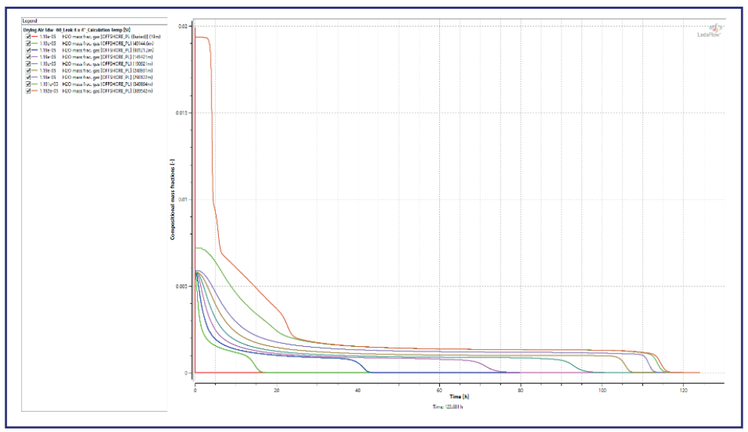
- Type of fluid (Air, Nitrogen);
- Dew Point of the fluid;
- Maximum flowrate at the inlet terminal;
- Fluid pressure at inlet terminal.

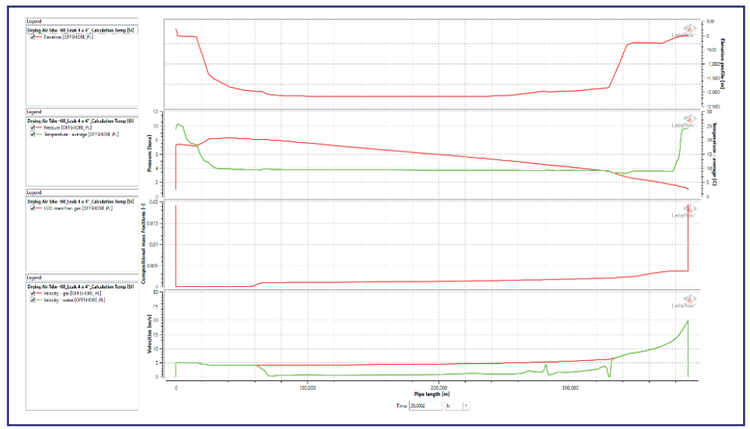
The purpose is to reduce the operation time and guarantee the success of the activities

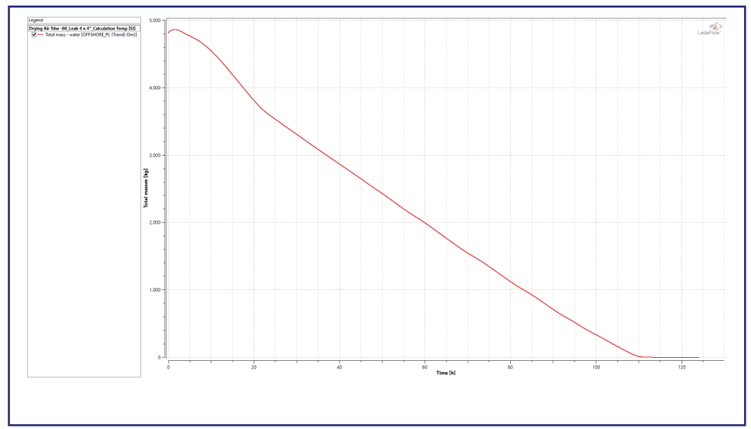
Results

To the customer is provided as follows:

- Pressure and Temperature trend;
- Mass Fraction (gas and water);
- Volume Fraction (gas and water);
- Gas and water velocity;
- Water content in pipe;
- Density trend.







The results are supported by a technical report having the most important basic data used and the process considerations about the activities.