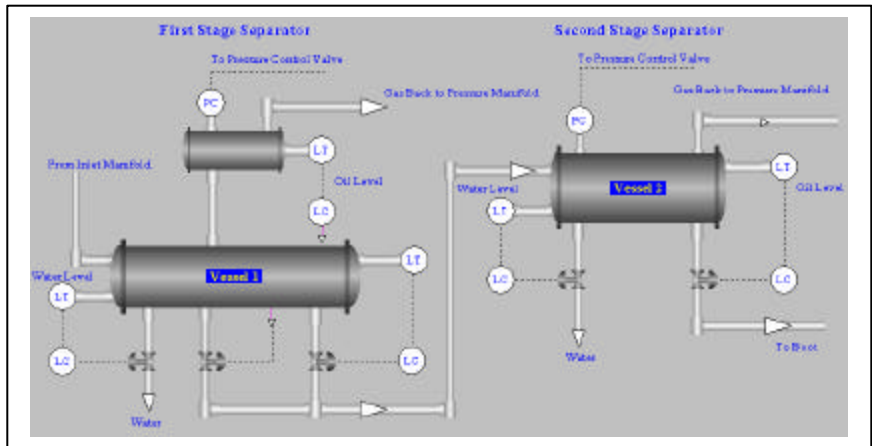


# MFA Control and Optimization of Crude Oil Separators

| <i>Use of MFA Control</i>   | <i>Benefits</i>   |
|---|---|
| Multivariable MFA control of oil levels to balance the material flow in multiple vessels. | To ensure that all capacity in a 3-phase crude oil separator is being used so that the process throughput is maximized without any trips occurring.                         |
| Robust control of water levels to maximize vessel capacity and prevent leakage.           | Automatically control critical oil level, water level, and pressure loops in all operating conditions and eliminate the need to manually re-tune the controller parameters. |
| Nonlinear MFA control of gas pressure to handle slugs and reduce gas waste.               | Quick return-on-investment (ROI).   |



## *The CyboCon Crude Oil Separator MFA Control and Optimization Solution*

**Process:** A typical onshore or offshore 3-phase oil separator train consists of 2 separator vessels with or without a slug catcher. Crude oil consisting of water, oil, and gas is separated through the system.

**Control Problems:** Each vessel is typically controlled as a standalone unit. There are instances where a high level trip in one of the vessels has occurred while there is spare capacity in the other vessel. Also, the gas pressure loop is nonlinear in nature and a random slug can cause the pressure loop to swing resulting in frequent ignition of excessive gas.

**Solution:** This is a combined control and optimization problem.

CyboSoft offers an effective solution for controlling critical level and pressure loops and maximizing the separation capacity.

**Water Level Control:** Robust MFA controllers are used to control the Water Levels. This allows a lower setpoint setting leaving more storage room for the Oil Level. A lower bound on the Water Level PV prevents the level from dropping too low which might cause oil leakage.

**Pressure Control:** Nonlinear MFA controllers are used for the pressure loops. They can effectively deal with gas loop nonlinearity and slug problems with easy configuration since nonlinear characterization is not required.

**Oil Level Control:** A MIMO MFA controller is used to control the oil levels in a multivariable control fashion. It can coordinate the related oil levels by simultaneously manipulating the related oil valves to prevent too high an oil level in one vessel while there is still storage room in others. This special MFA can balance the oil levels for both vessels to maximize the vessel capacity usage.

**Conclusion:** This solution can be delivered in either the CyboCon software (Professional Edition) or a CyboCon Dragon Micro distributed control system depending on the interface and integration needs. Since no process models are needed, commissioning and maintenance of the system is simple with guaranteed performance.