

## Assessment of Impact of Reduction in Mixing Vessel Capacity

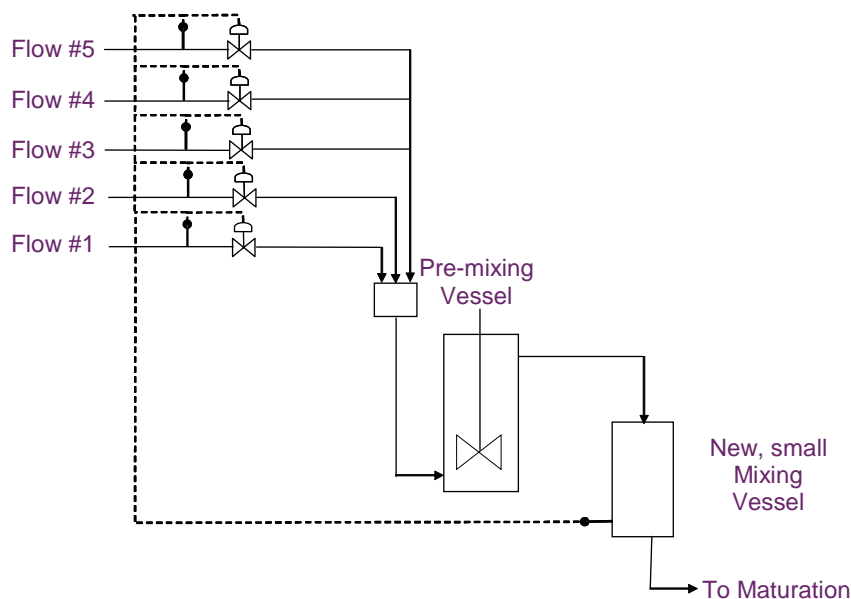
A chemical company wanted to reduce the size of a mixing vessel to minimise waste when changing recipes and allow the plant to be more responsive to production schedules. ISC Ltd. was contracted to investigate the viability of level control on the new vessel and the impact on composition and wider process operations.

The existing large mixing tank had 9-10 hours of inventory and consequently acted as a buffer between the upstream make-up and downstream maturation units, allowing them to be started and stopped without any impact on the other. As the tank was so large the operators made occasional adjustments to balance the inflows and outflows to maintain the level, i.e. no automatic control.

A new mixing vessel was in-place, but uncertainty had arisen due to its small capacity (< 1% of the existing vessel, equating to 5 minutes of inventory) and consequential need for new automatic level control. A dynamic model was therefore required to investigate the change in simulation ahead of commissioning.

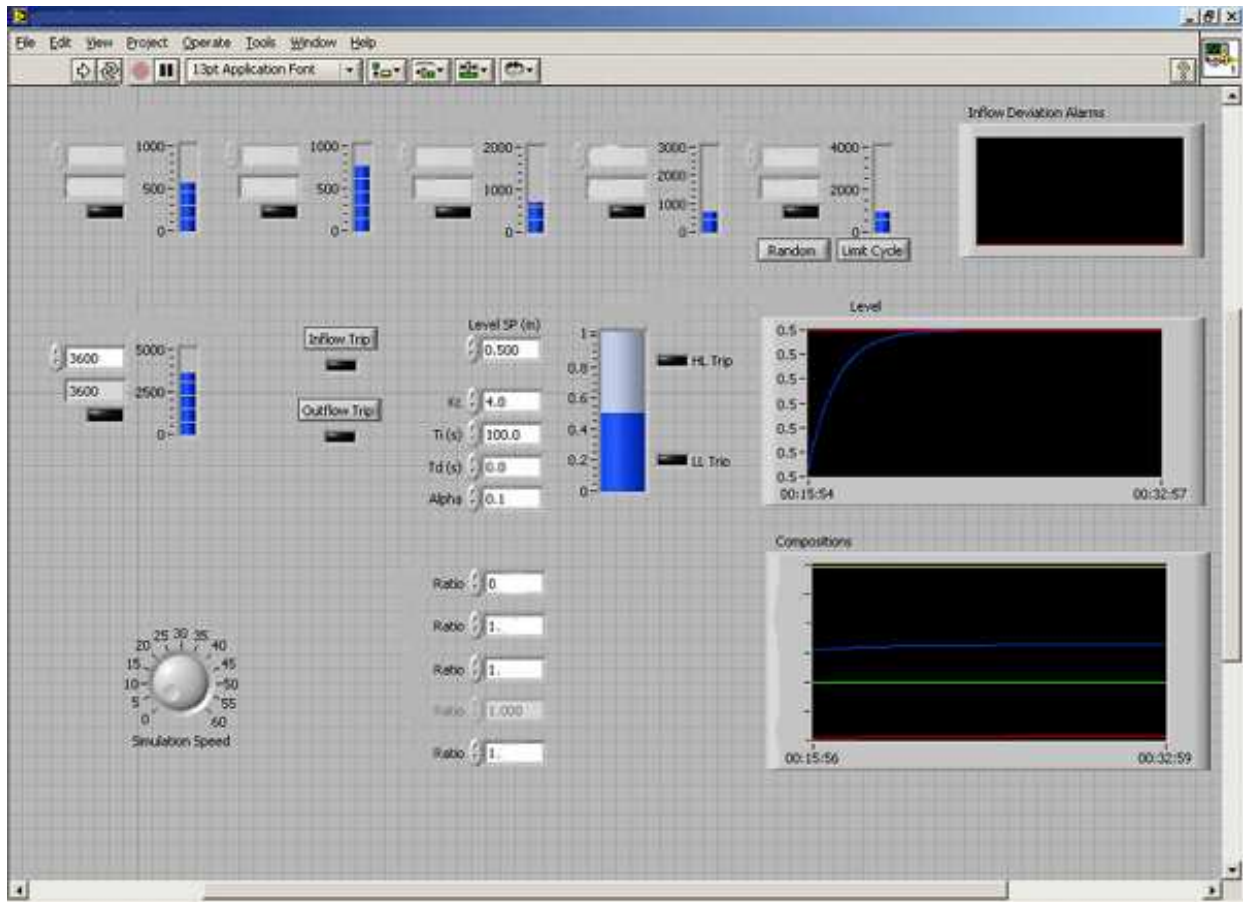
Questions to be answered were:

- Is automatic level control viable given expected disturbances?
- How will mixture composition be affected? The large volume of the existing tank smoothes the effect of any transitory deviations in the make-up flows (e.g. due to saturation limits and different flow dynamics).
- What is the impact on make-up and maturation units and vessel start-up?



**Figure 1 Schematic of the Mixing Process**

- modelling and simulation
- control design
- system troubleshooting
- technology transfer and training
- energy efficiency investigation
- software tools



**Figure 2 LabView Model**

A validated dynamic model of inflows, outflows and mixing vessel was built, which included the mixing process. This proved that level control was viable and that the mixture composition would still be within the operational limits. Plant operations would need to be re-assessed, as currently routine interruptions (e.g. for transfer operations) in the upstream make-up would impact the maturation process.

***ISC Limited supplies process control consultancy services to the process industries. The services supplied include control design for new plant and plant extensions, process troubleshooting, training and technology transfer. Industries served include Oil, Petrochemical, Chemical, Pharmaceutical, Paper and Food.***

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