

CASE STUDY: GAS-LIQUID REACTOR OPTIMISATION

THE CHALLENGE

Our client was **undertaking commissioning** of a new gas-liquid reactor. Key features included:

- Gas sparged by dip tube above the impeller
- Recirculation loop with heat exchanger for additional cooling
During commissioning, our client found that there were **pressure fluctuations** upstream of the pump in the recirculation loop **causing the pipe to shake**:
- Shaking was worse at lower fill levels
- **A solid by-product formed if the gas dispersion was poor**
- The by-product of this was blocking heat exchanger

OUR APPROACH & FINDINGS

Working closely with our client we reviewed their detailed drawings and operational data, also guiding additional testing, in order to **identify a range of solutions to resolve the issue**, giving our client the choice of which was the best way to proceed. During this process we found that:

- Large scale fluctuations from asymmetric sparging were causing pressure fluctuations at the vessel base
- This was accentuated by **poor piping design** between the base and the pump
- We identified that the heat exchanger **blocking was not caused by simple settling**

THE OUTCOMES

Having analysed the entire process incorporating the pipes, pumps and reactor, we presented our recommendations to our client, **working together to agree the best solutions** given their requirements. Our client took our advice, deciding against moving to a ring sparger and/or adding a new impeller and changed the impeller clearance along with the piping and pump design. These **changes resolved the pressure fluctuation issues, stopping the reactor shaking** and the associated by-product production.

This **de-risked a range of future operations** and enabled a smooth transition to the gas-liquid reactor's operations.

