CASE STUDY - CHLORINE GAS

CHLORINATION IN FLOW WITHOUT CRYOGENICS

"A chemical producer replaced an unsafe, energy-intensive chlorination step into a cryogenics-free, intrinisically safe and cost-efficient continuous process and reduced operational risk, CAPEX, and energy consumption, while fitting seamlessly into their plant infrastructure."

THE CHALLENGE

Our client's batch chlorination relied on cryogenic cooling, creating a process that was commercially unsustainable and operationally risky. Scaling or optimizing whithin these constraints was no longer feasible. Key issues included:

- **Strict safety and regulatory compliance** due to large volumes of hazardous chlorine gas and complex permitting.
- **Expensive cryogenic cooling requirements**, making the batch approach energy-intensive and slow.
- **High operational risk** from large reactor volumes, temperature excursions, and difficult thermal control.
- **Barriers to modernization,** including long cycle times and limited scalability.

THE SOLUTION

The chlorination step is replaced by Flowid's SpinPro gas-liquid dynamic flow reactor solution. The reactor volume was reduced by a factor of 10,000, while delivering precise mass transfer and rapid, cryogenics-free heat removal. Benefits deliverd:

Instrinsic safety through small reactor volume.	Cryo-free operation, dramatically cutting energy use and simplifying utilities.	Seamless integration within existing facilities, enabling hybrid flow-batch operation.

KEY RESULTS

- Thermal operation: Ambient temperature instead of cryogenic cooling
- Energy consumption: Cost prohibitive in batch, ambient temperature in flow
- CAPEX: Reduced safety related and no cryogenic related CAPEX
- Reactor volume: 10,000x smaller
- Investments / costs: Lower CAPEX and OPEX

STRUCTURED SCALE-UP APPROACH

Flowid applies a phased methodology to introduce flow technology:

1. Chemical & Technical Feasibility: Evaluation of chemistry and equipment fit
2. Proof of Concept: Validation at lab scale with the SpinPro
3. Pilot Skid: Continuous unit
4. Production Skid: SpinPro R3 or R4
5. Commissioning, maintenance and service level agreements

Flowid - Expect more from your chemistry!
If you are considering converting your process to flow or evaluating a retrofit for this step, feel free to reach out to us.

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