



# AMERICAS LNG SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA

## Technical Conference

# TURBOMACHINERY CONTROL FOR LNG FACILITIES: FIVE KEYS FOR SUCCESS

**Alex Biggs**

Sales Engineer, Honeywell-CCC

**Christopher Elko**

Rotating Equipment Lead, Honeywell-LNG

info@AmericasLNGSummit.com | AmericasLNGSummit.com | #AmericasLNGSummit



Technical Conference Sponsors

Organized by

**dmg** events

# AGENDA



AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA

- 1. Introduction**  
**Turbomachinery Control for LNG**  
*Challenges and Opportunities*
- 2. Five Keys for Success**  
**Lifecycle-Focused Execution**  
*Early Engagement and Broad Reach*
- 3. A Holistic Approach**  
**End-to-End Solutions for LNG Facilities**  
*Partners for the Life of Your Plant*



TECHNICAL  
CONFERENCE



AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA



# INTRODUCTION TURBOMACHINERY CONTROL FOR LNG

*Challenges and Opportunities*



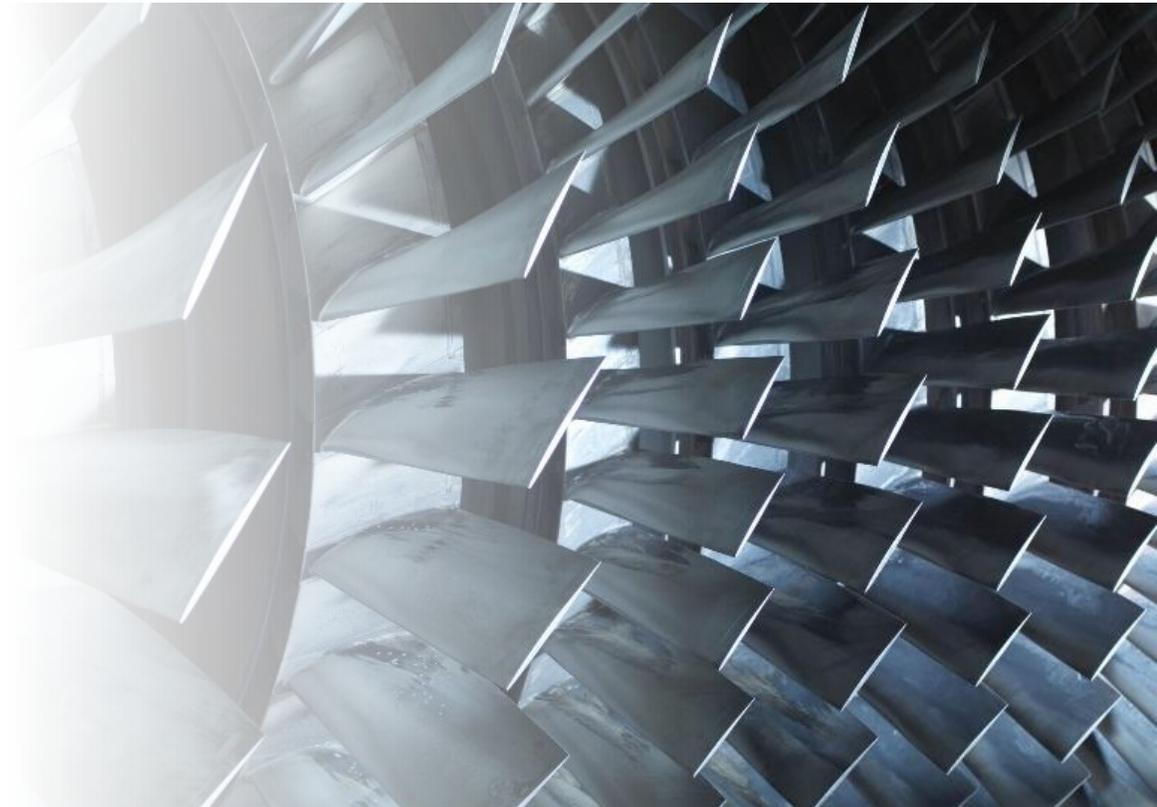
# CHALLENGES & OPPORTUNITIES



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

- Turbomachinery: **the motive force behind industrial refrigeration**
  - **Refrigerant compressors** - *mixed and pure-component, pre-cooling, subcooling*
  - **Gas expanders** - *reverse-Brayton refrigeration or NGL extraction*
  - **Balance-of-plant duties** - *feed gas, end flash gas, BOG, fuel boosting*
  - **Drivers** - *don't forget the turbines and motors responsible for powering them!*

**Optimized control of these machines is just as critical as their function**



TECHNICAL  
CONFERENCE

# CHALLENGES & OPPORTUNITIES



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

- Turbomachinery Controls: **just as critical!**
  - **Multiple compressor duties** operating in series, parallel, or on a common driver present steady-state load balancing and machinery protection requirements
  - **Complex dynamics** between compressors, their drivers, and the process require robust control algorithms to maximize facility uptime
  - **Positive revenue impact** from performance optimization and availability gains justifies the investment in additional instrumentation and fast system response time



TECHNICAL  
CONFERENCE

# CHALLENGES & OPPORTUNITIES



AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA

- To err in execution is **all too common**
  - Machinery controls tend to be **treated as an afterthought**
    - *Controls hardware and software often selected **after** machinery package orders are awarded*
  - Controls may be merely **adequately** specified by the machinery vendor
    - *This results in oversimplification of the control schemes required to manage complex process interactions*



**Control solutions require a systems perspective,  
along with early engagement of process licensors**



TECHNICAL  
CONFERENCE



AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA

**SEPARATING THE  
TURBOMACHINERY AND  
CONTROLS PACKAGES  
SO THAT EACH IS DESIGNED,  
OPTIMIZED, AND PURPOSE-  
BUILT BY THE MOST QUALIFIED  
DISCIPLINES CAN ULTIMATELY  
BENEFIT THE PROJECT  
AND OPERATING FACILITY**





AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA



# **FIVE KEYS FOR SUCCESS** **LIFECYCLE-FOCUSED EXECUTION**

*Early Engagement • Broad Reach • Systems Perspective*



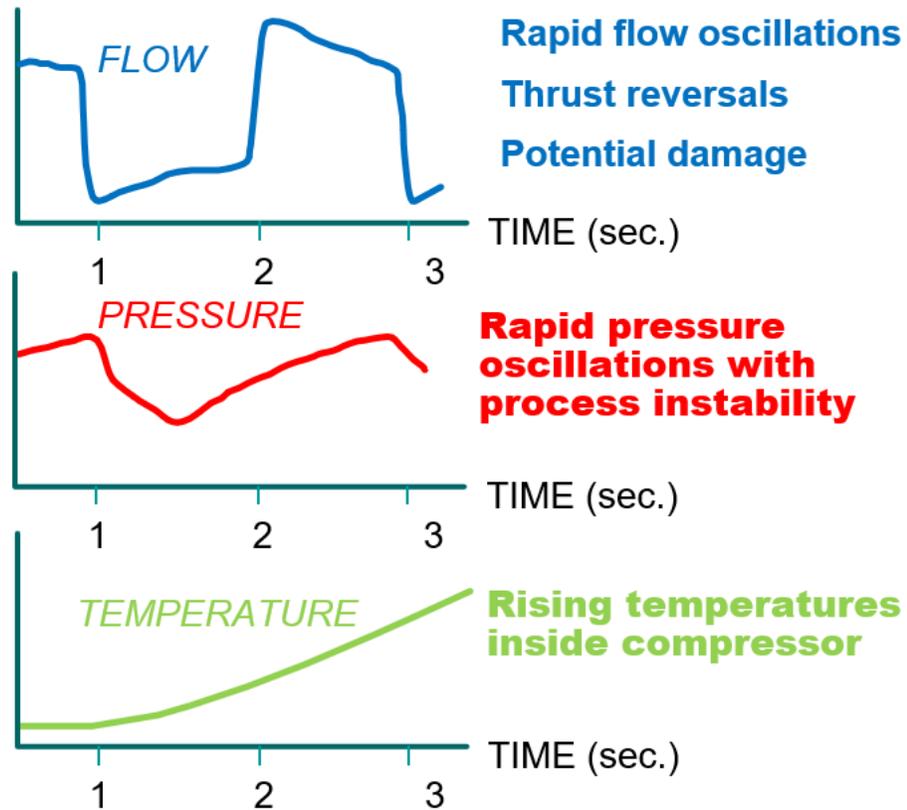
TECHNICAL  
CONFERENCE

# KEY #1: FAST RESPONSE & INTERVENTION



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

A surge or cascading trip can happen within fractions of a second



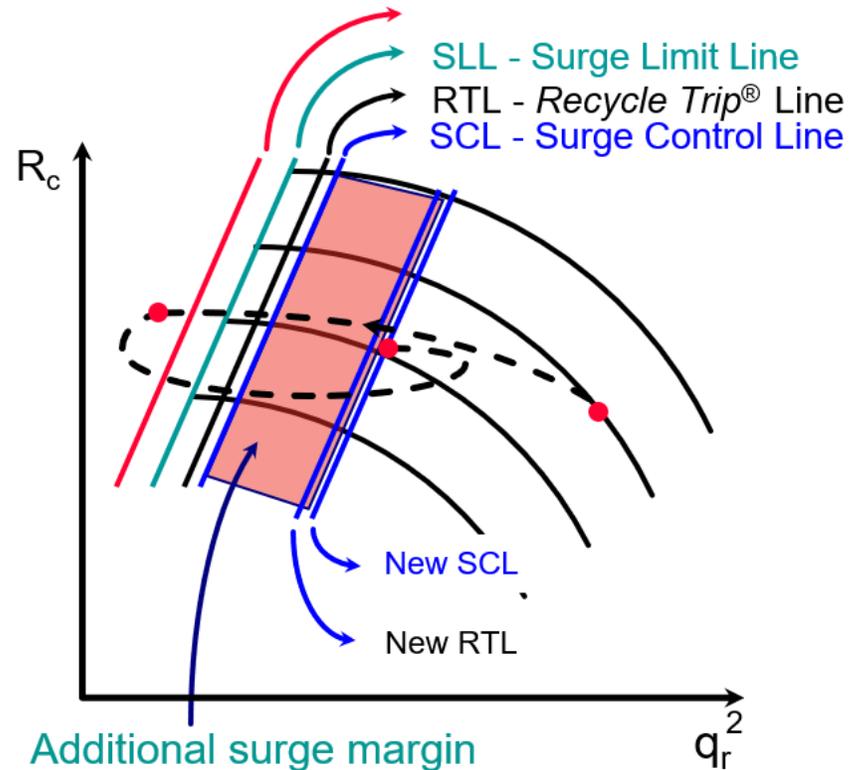
- Unstable flow and pressure
- Damage in sequence with increasing severity to seals, bearings, impellers, shaft
- Extended shutdown periods
- Increased seal clearances and leakage
- Lower energy efficiency
- Reduced compressor life

# KEY #1: FAST RESPONSE & INTERVENTION



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

## Robust control features can keep upsets from becoming a process trip



# KEY #1: FAST RESPONSE & INTERVENTION

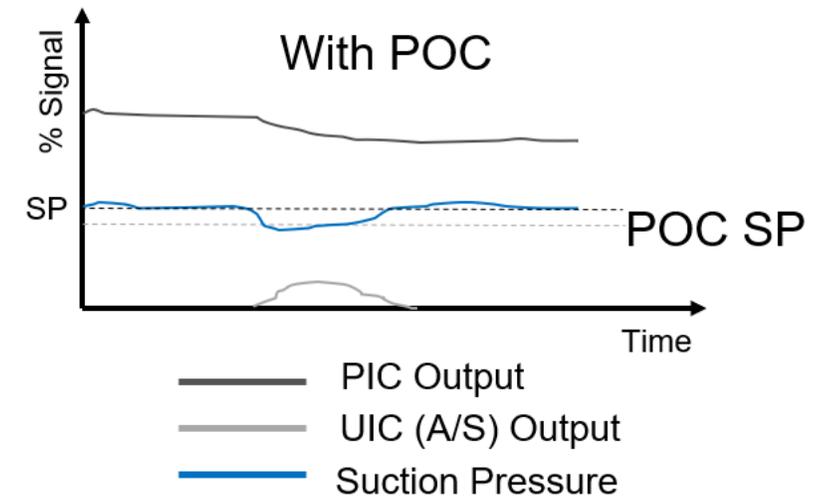
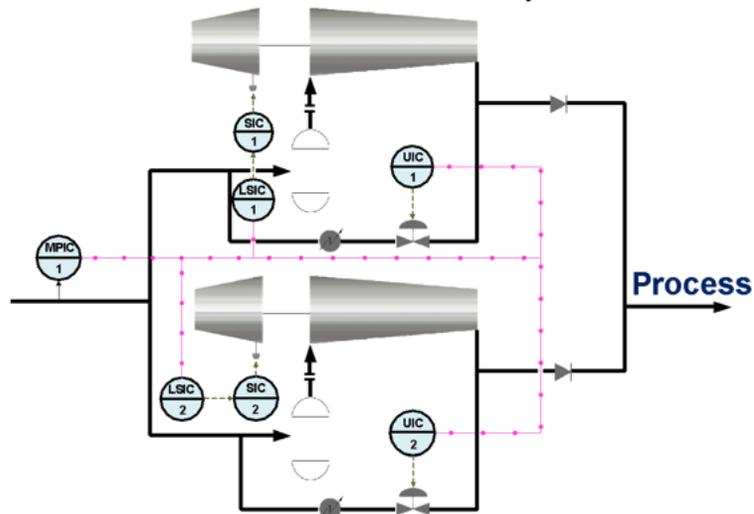


AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

## Robust control features can keep upsets from becoming a process trip

### PIC/MPIC uses recycle to help maintain suction pressure

- POC set point fixed or relative to PIC set point



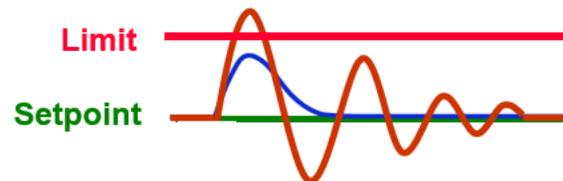
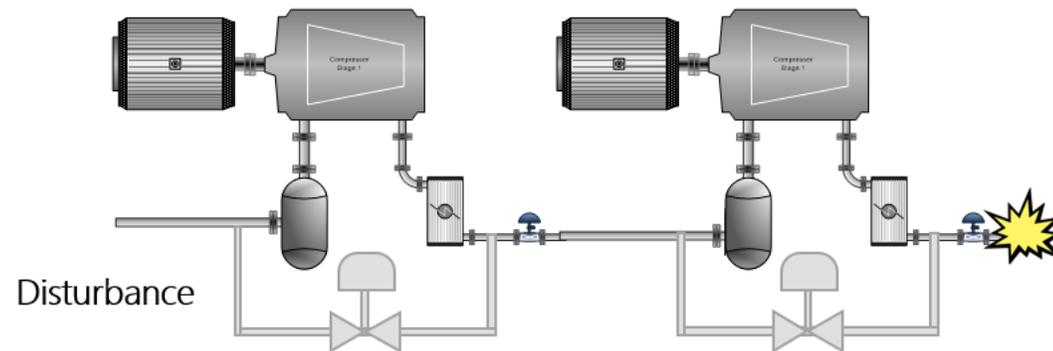
# KEY #1: FAST RESPONSE & INTERVENTION



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

## Fast, well-tuned and integrated response allows operation near trip limits

- Prevent unnecessary trips and downtime by stabilizing your process quickly – maximize availability



OP of General Purpose or OEM Control  
OP of Purpose-built Control

# KEY #1: FAST RESPONSE & INTERVENTION

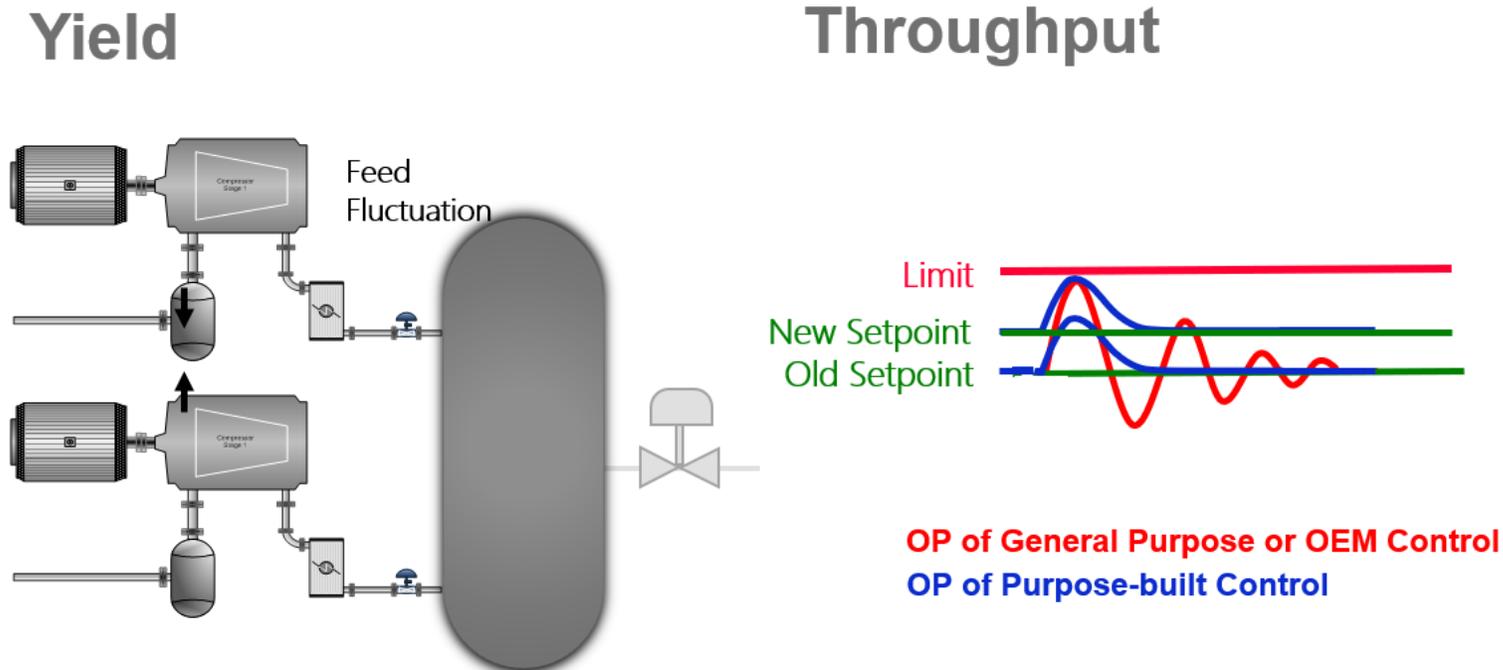


AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

Operator intervention is not quick enough to stop split-second events

## Fast, well-tuned and integrated response allows operation near trip limits

- Stabilizing the process and maximizing the operating envelope increases yield and throughput

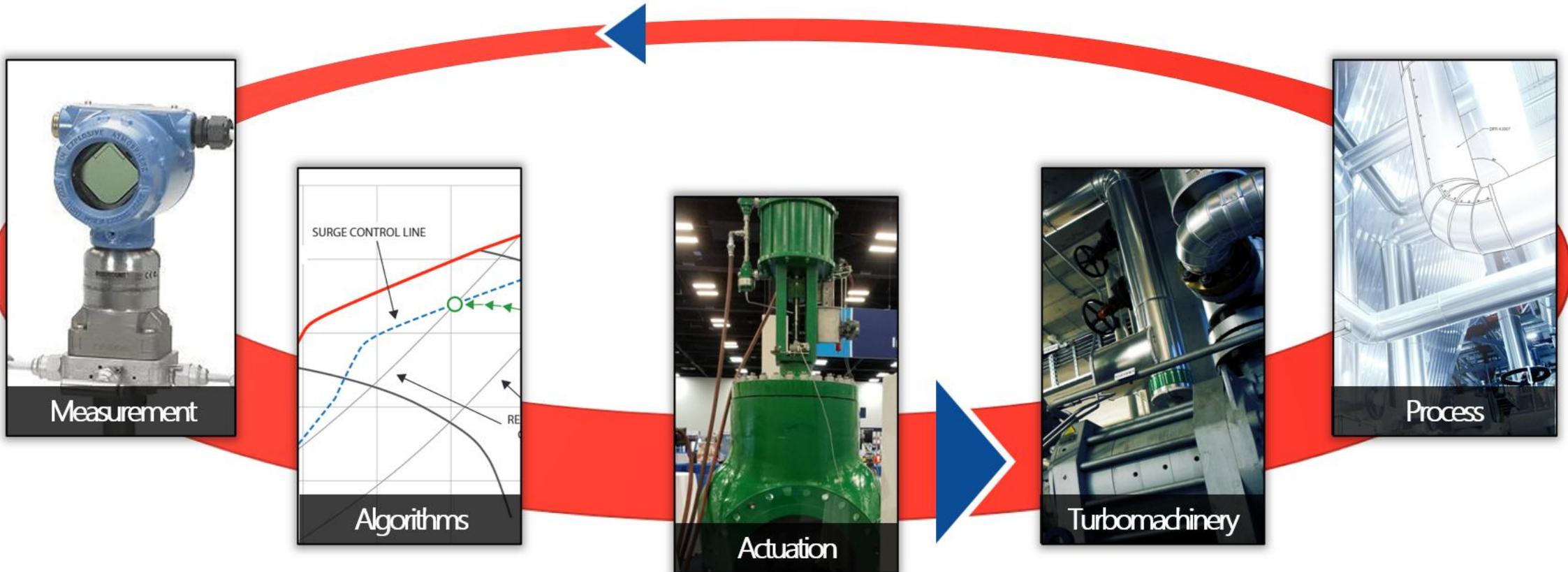


# KEY #2: PROPER INTEGRATION & CONFIGURATION



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

## Complex machine, equipment & process dynamics to control

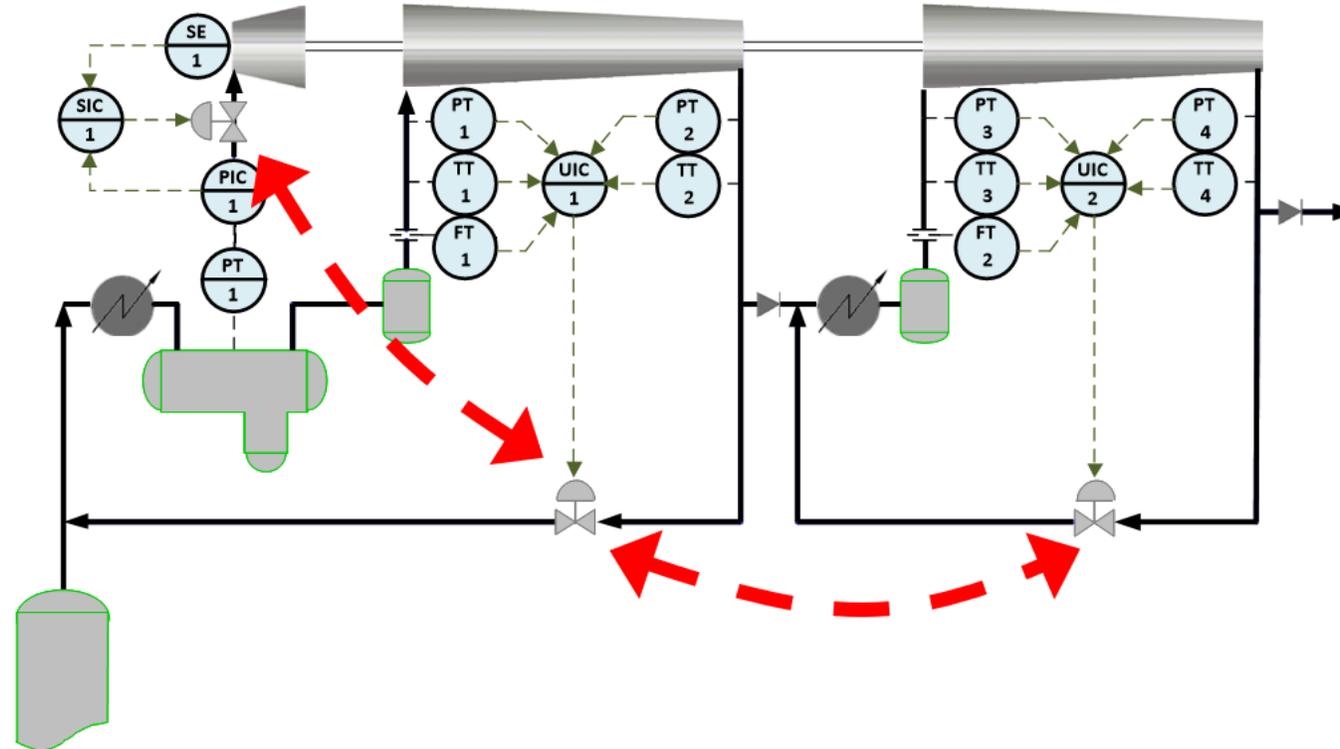


# KEY #2: PROPER INTEGRATION & CONFIGURATION



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

## Feed-forward control responses to mitigate upsets and avoid trips

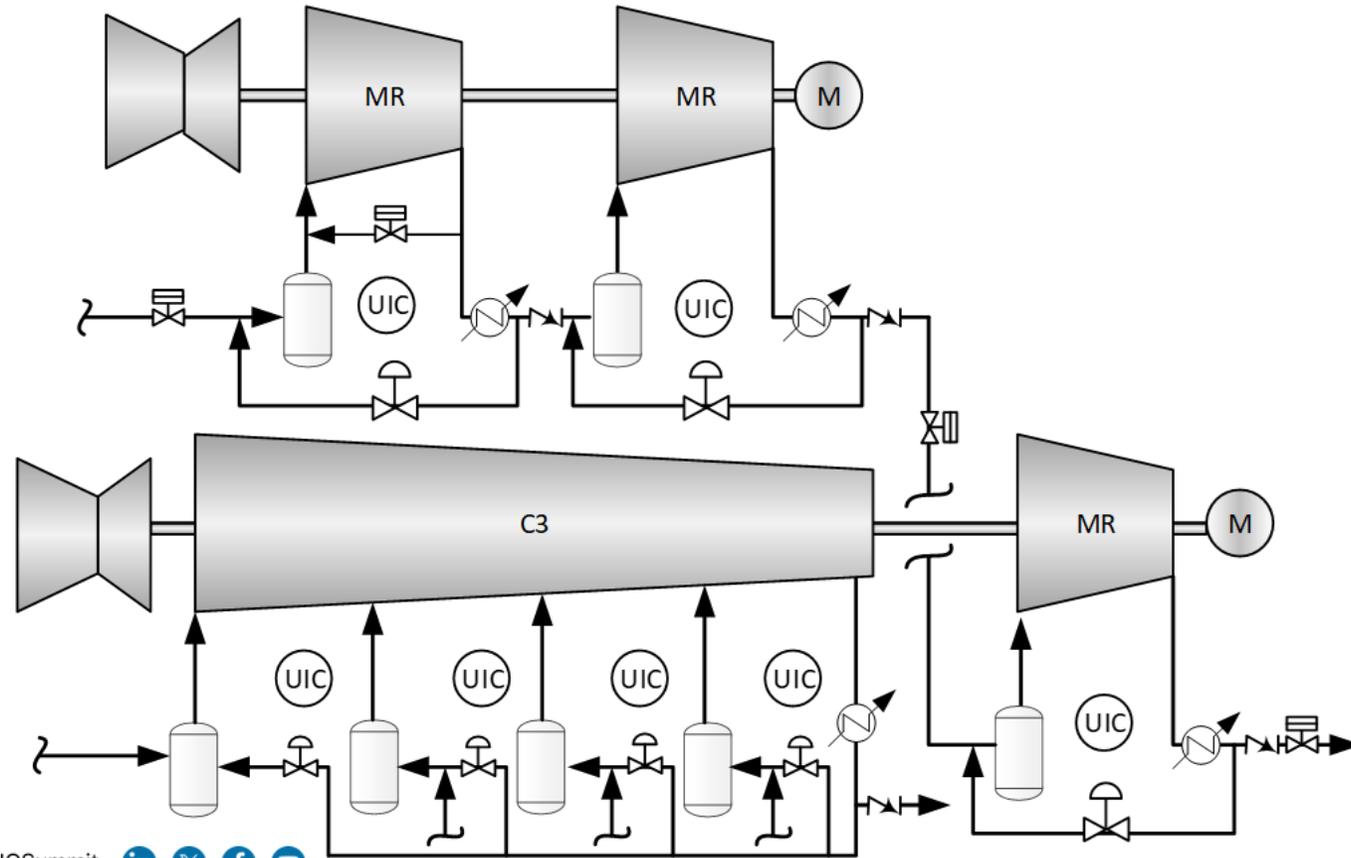


# KEY #2: PROPER INTEGRATION & CONFIGURATION



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

## Control for multiple machines operating in parallel or series



TECHNICAL  
CONFERENCE

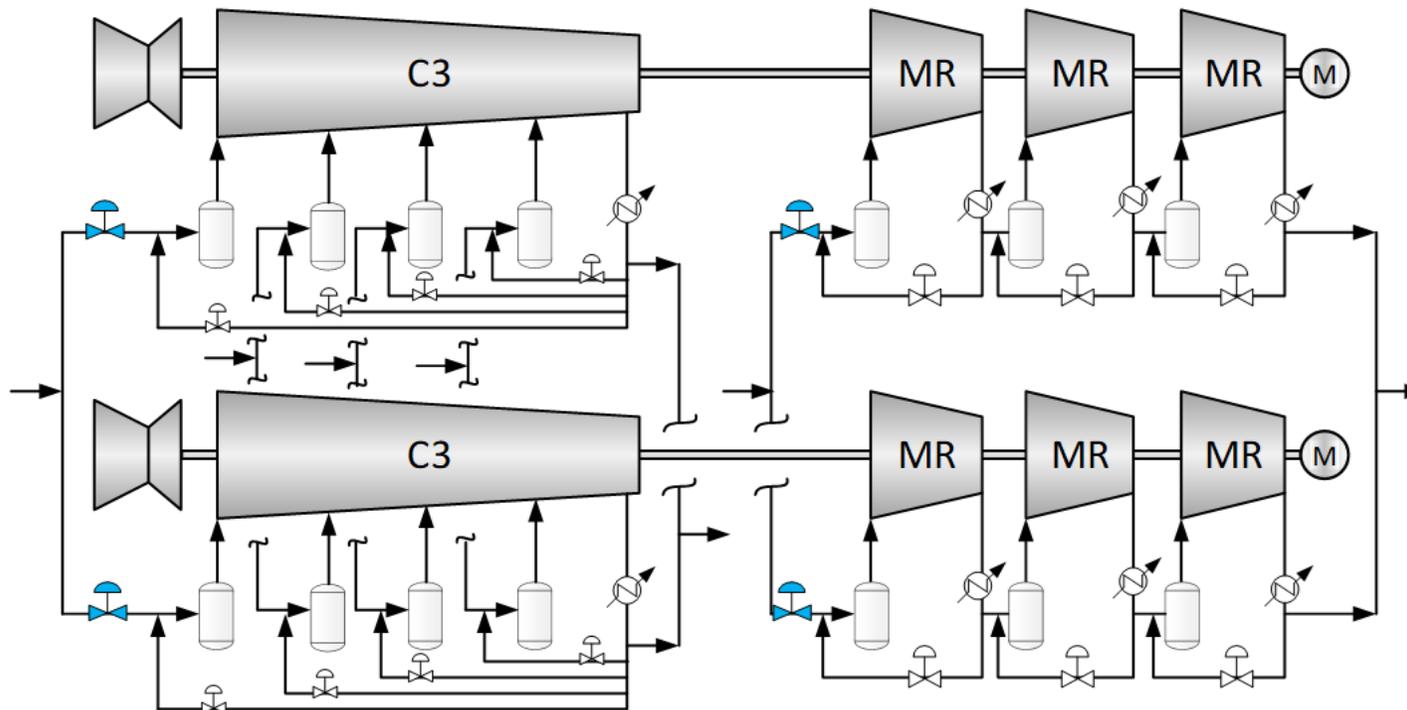
# KEY #2: PROPER INTEGRATION & CONFIGURATION



AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA

## Control for multiple machines operating in parallel or series



TECHNICAL  
CONFERENCE

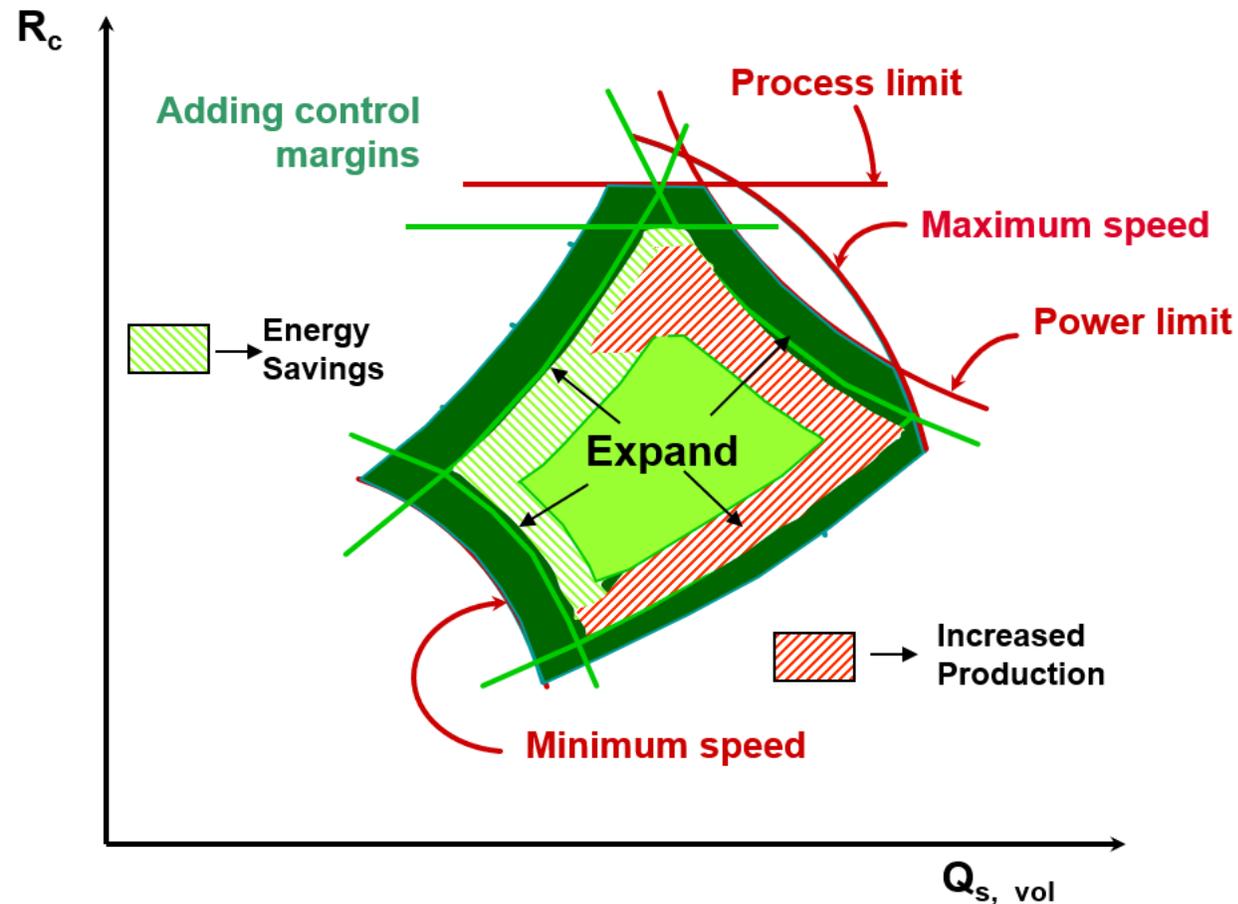
# KEY #2: PROPER INTEGRATION & CONFIGURATION



AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA

Properly integrated control systems will increase availability and production – and also save energy



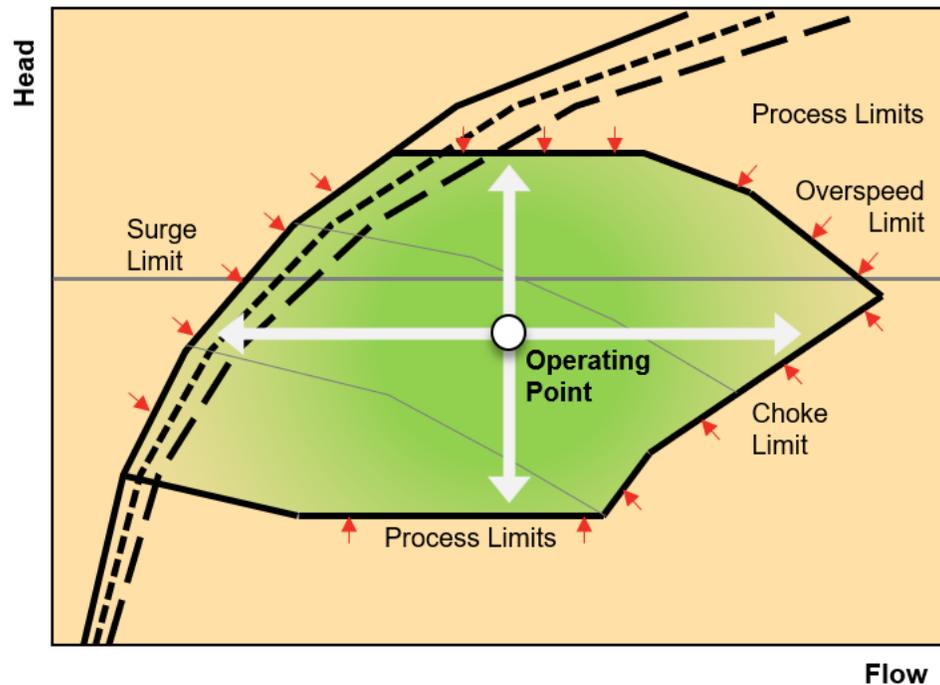
TECHNICAL  
CONFERENCE

# KEY #3: HIGH RESOLUTION



AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA



- **Critical to keep compressor operating point within operating envelope to avoid catastrophic issues.**
- **Solutions should include fast control systems (20-50 ms) and HMIs (100-200ms).**
- **Specialized knowledge often required to support turbomachinery control systems in operation.**
- **Expertise is difficult to develop and retain locally, and often sourced through services and centralized SMEs.**



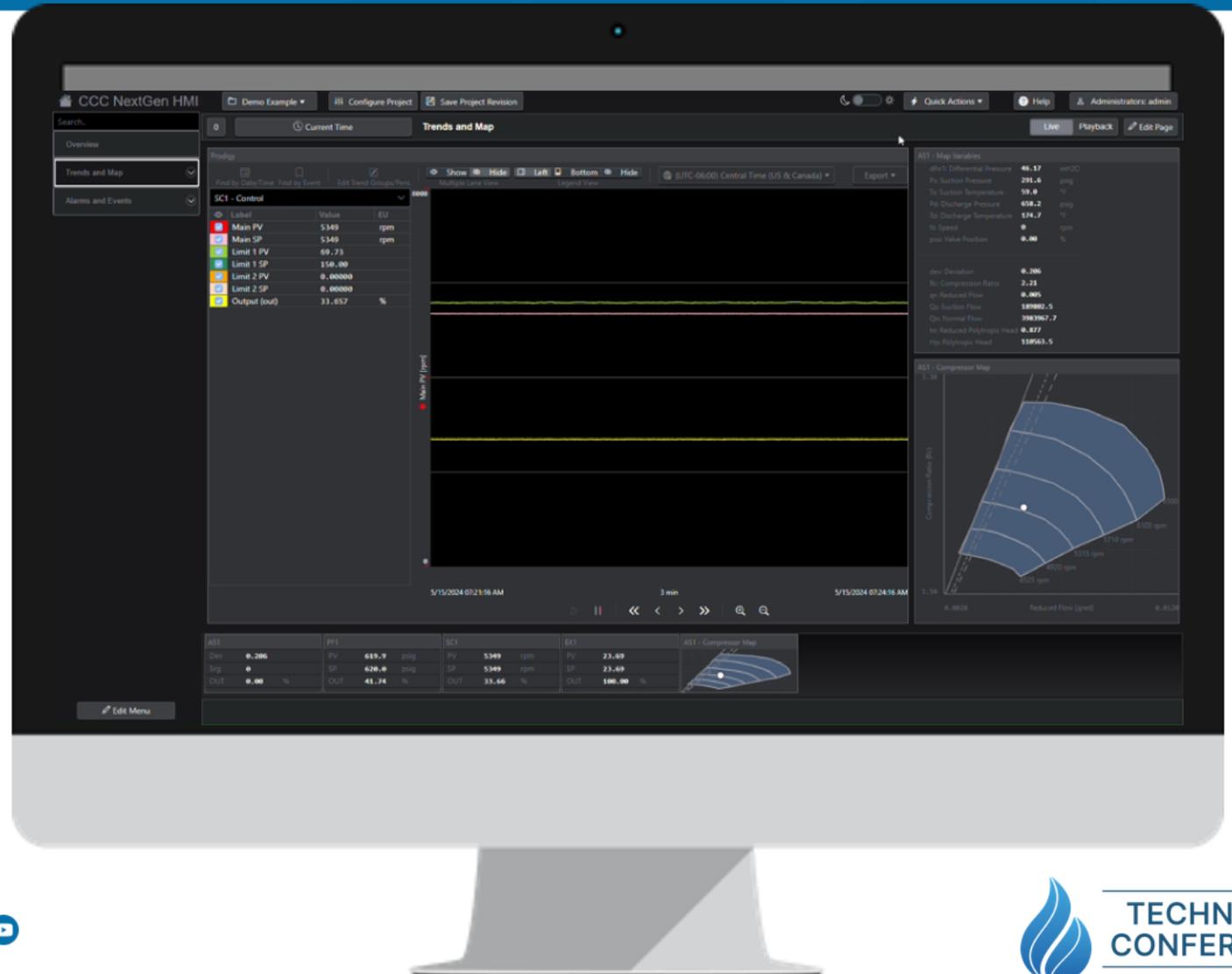
# KEY #3: HIGH RESOLUTION



AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA

Data can't only be held remotely – it should first be generated and available onsite

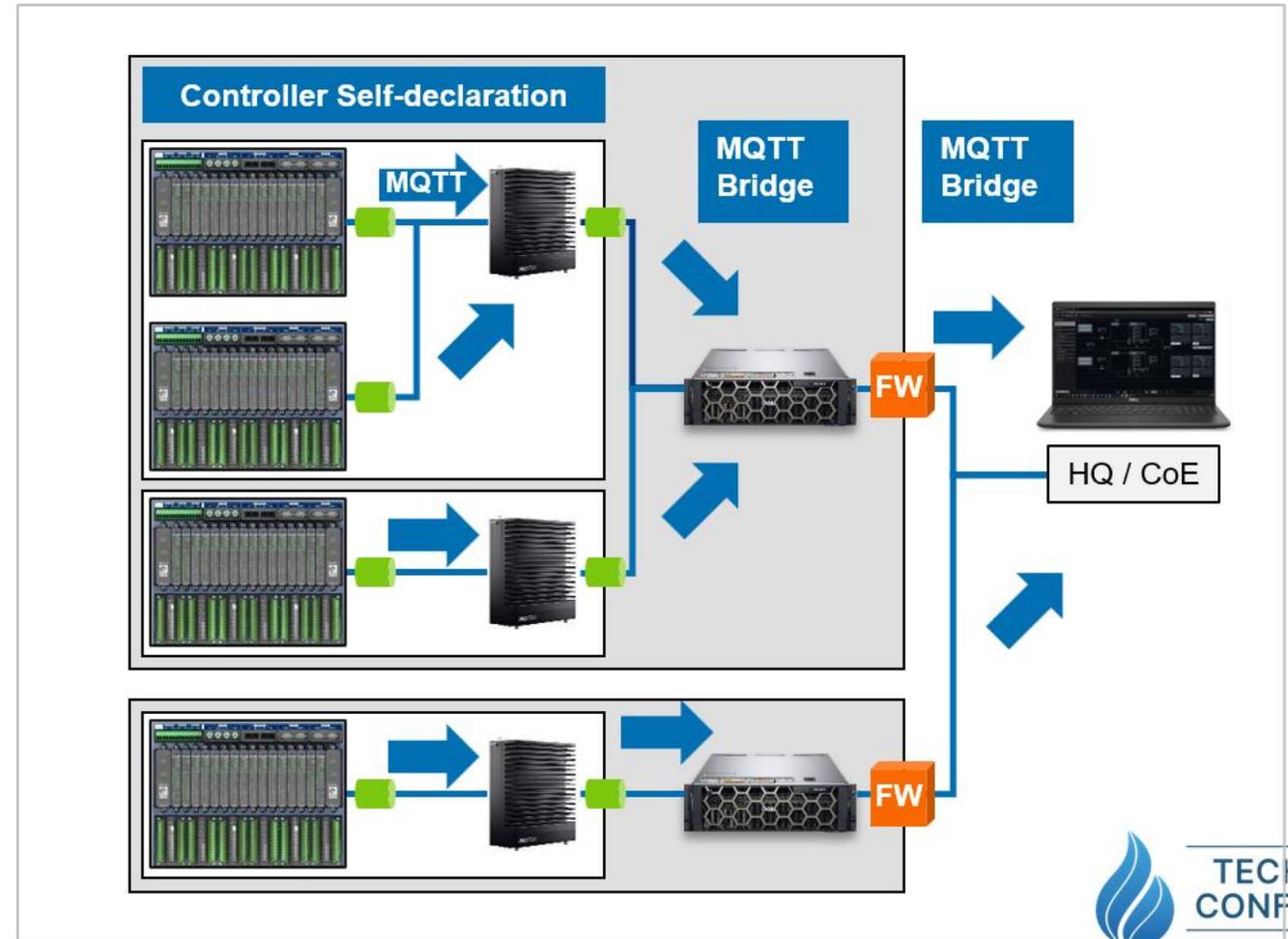


# KEY #3: HIGH RESOLUTION



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

Ideally, the data is then published to enterprise level for various users and SMEs

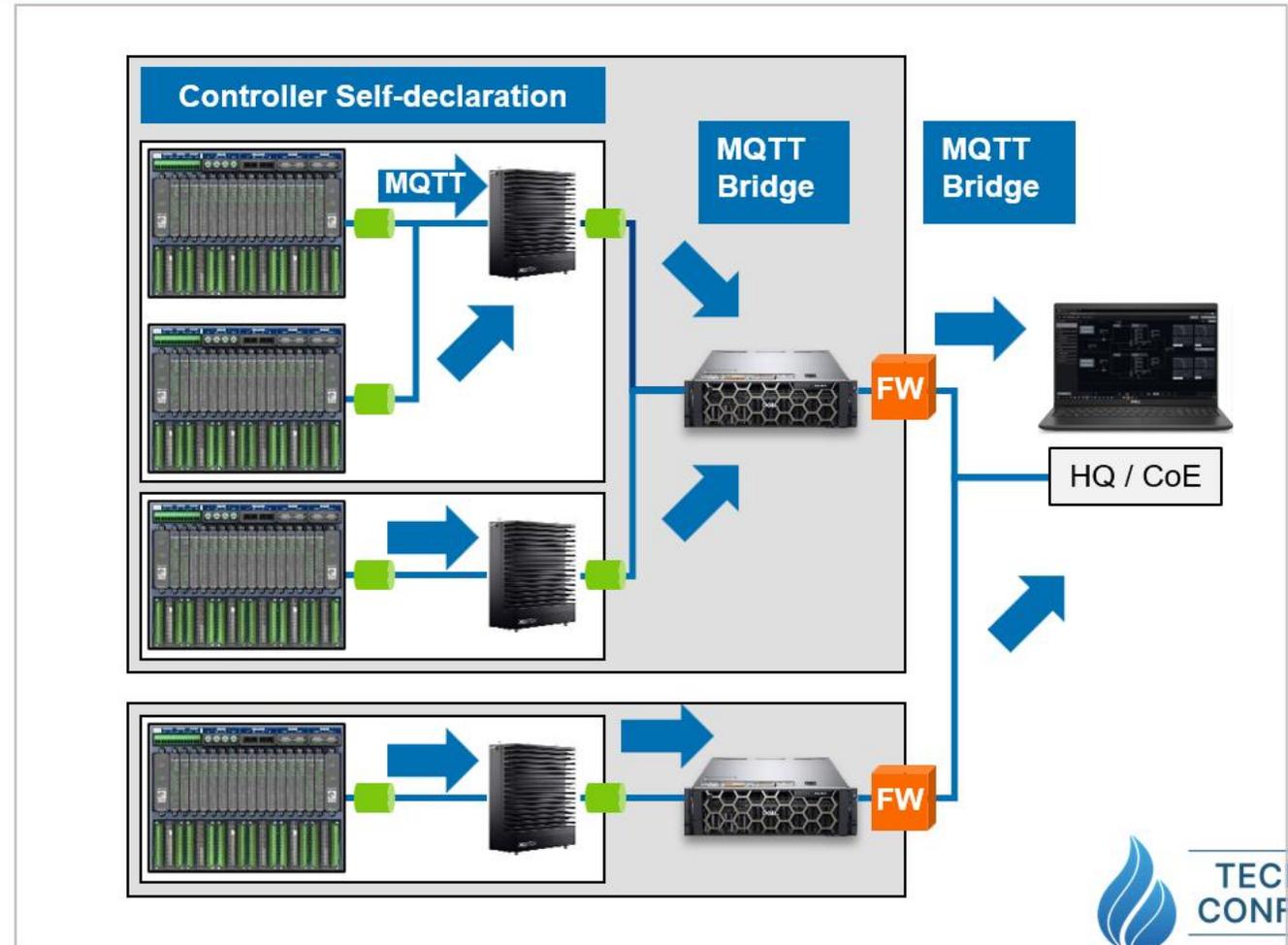


# KEY #3: HIGH RESOLUTION



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

Diagnostic data must be readily available and high-resolution for proper troubleshooting



TECHNICAL  
CONFERENCE

# KEY #4: SYSTEMS PERSPECTIVE



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

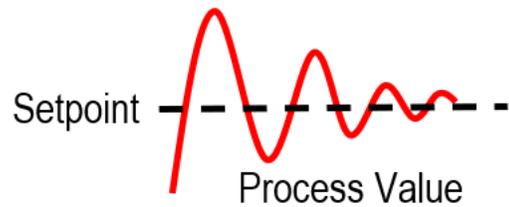
- Earlier involvement of control solutions provider:
  - Bring experience of turbomachinery control (TMC) design and lessons learned from similar/past LNG projects with that process licensor while the project is in FEED
  - Design consistency across multiple processes and machinery OEMs
  - Reduce risk and change management costs on projects
  - Advance engineering and evaluation of long lead items (e.g. Antisurge valves)
  - Increase project design control and compliance to end user global specifications
  - Provide confidence that EndUser interests are represented and protected
  - Improve safety, reliability, process yield, throughput, energy consumption in the system design



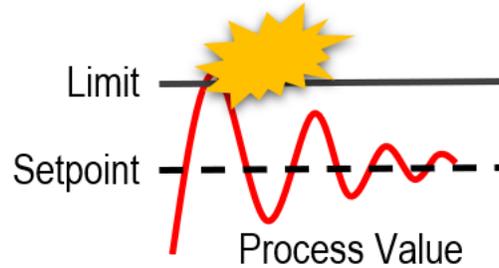
# KEY #4: SYSTEMS PERSPECTIVE



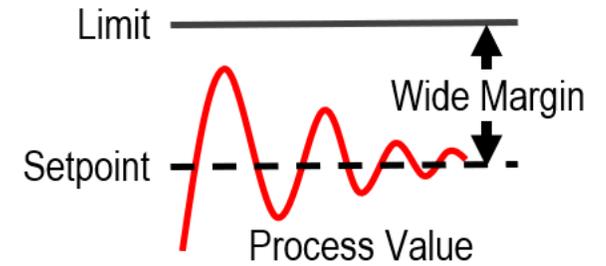
AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA



Unstable Process & Low Yield



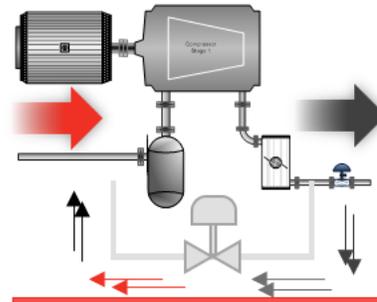
Frequent Process Trips



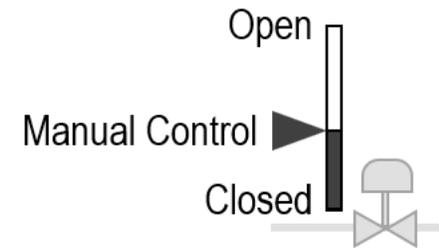
Wide Control Margin & Bottleneck



Frequent Machine Damages



Constant Recycle



Manual Operation

These symptoms are often results of: Slow loop execution, lack of sophisticated algorithms, and inadequately-specified instrumentation

# KEY #4: SYSTEMS PERSPECTIVE



AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA

Control solution providers must have expert knowledge of Controls, Machinery and the Process

 <b>Controls</b>	<ul style="list-style-type: none"><li>• Anti-Surge</li><li>• Gas Turbine Fuel</li><li>• Loadsharing</li><li>• Performance</li></ul>	<ul style="list-style-type: none"><li>• Quench</li><li>• Variable Speed Coupling</li></ul>
 <b>Machinery</b>	<ul style="list-style-type: none"><li>• Axial Compressors</li><li>• Centrifugal Compressors</li><li>• Cryogenic Expanders</li></ul>	<ul style="list-style-type: none"><li>• Hot Gas Expanders</li><li>• Gas Turbines</li></ul>
 <b>Process</b>	<ul style="list-style-type: none"><li>• Gas Transmission</li><li>• Pretreatment</li><li>• NRU</li><li>• Utilities</li></ul>	<ul style="list-style-type: none"><li>• HHC Removal</li><li>• LNG</li><li>• BOGs</li></ul>



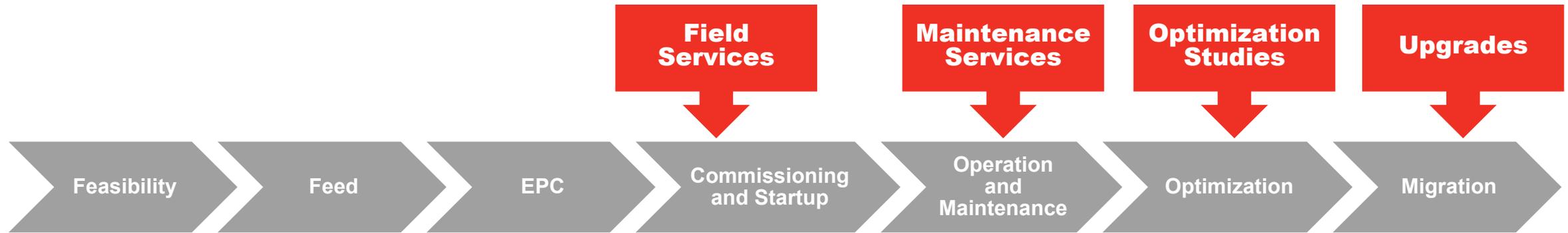
# KEY #5: FULL LIFECYCLE SUPPORT



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

Control system vendors should not only have large references, but widespread and dedicated support

## Service from FEED to lifecycle support and migration



### ▪ Dedicated knowledge, widespread capabilities:

- Large staff of engineering for testing, execution, commissioning and support
- Purpose-built control platforms that are standardized to be configured, not programmable
- Control algorithms with a well-established reference list on main refrigeration machines in LNG
- Software developed with standard features for LNG specific processes
- Proven load-sharing and load-balancing control schemes for parallel machines

- Responsive field service presence, with abilities to minimize commissioning time for turbomachinery controls
- Allows for trains to be brought online and up to nameplate capacity more quickly



TECHNICAL  
CONFERENCE





AMERICAS LNG  
SUMMIT & EXHIBITION

October 19-21, 2025 | Lake Charles, USA



# A HOLISTIC APPROACH END-TO-END SOLUTIONS FOR LNG FACILITIES

*Partners for the life of your plant*

Pretreatment  
Liquefaction  
Automation & Controls  
Digitalization

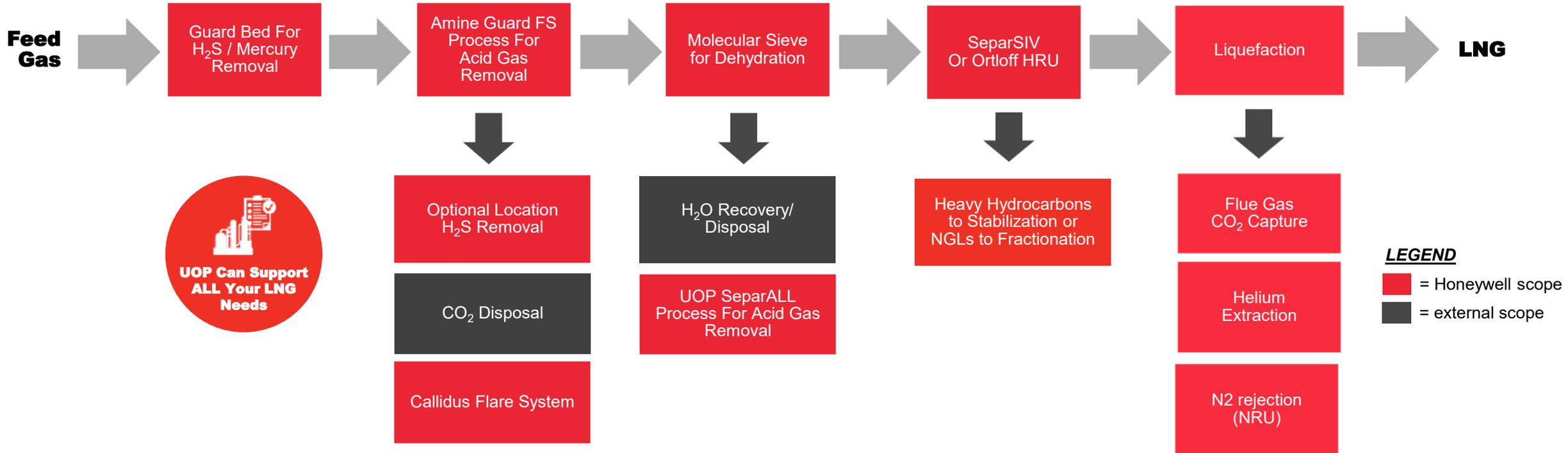


TECHNICAL  
CONFERENCE



AMERICAS LNG  
SUMMIT & EXHIBITION  
October 19-21, 2025 | Lake Charles, USA

# END-TO-END SOLUTIONS FOR TECHNOLOGY AND KEY EQUIPMENT



Honeywell Controls & Automation

Experion® Process Knowledge System (PKS), DCS, ICSS, TMC (CCC)

Digital Solutions on Forge Platform

OTS, APC, Digital Twins, Emissions Management

Digital Offerings

AP-OptiPlus™ Optimization Program



---

**AMERICAS LNG  
SUMMIT & EXHIBITION**

October 19-21, 2025 | Lake Charles, USA

---

**THANK YOU**



---

**TECHNICAL  
CONFERENCE**

---