

AGILE HAZOP/FMEA METHODOLOGY FOR SAFER HYDROGEN SYSTEMS



Agile and modular Hazard and Operability Study (HAZOP)/Failure Mode and Effects Analysis (FMEA) methodology for hydrogen systems, integrating advanced monitoring and active countermeasures to support early failure detection and safer operation

Description

- Agile HAZOP/FMEA-based risk analysis approach for hydrogen electrolysis systems
- Integration of advanced data acquisition and dedicated sensors for early detection of potential failures
- Active countermeasures and automatic responses to reduce or mitigate identified risks
- Modular approach supporting the adaptation and documentation of safety measures for different hydrogen equipment and applications

Maturity of the Result

TRL 8 – System complete and qualified

Result Availability

Available now

More information

- Paolo Lupotto: lupotto@mmates.it
- PEACE PROJECT: <https://www.h2peace.eu/>

Owner

Materials Mates Italia & Brandenburg University of Technology Cottbus Senftenberg

Impact

- 01 >> Earlier identification and mitigation of safety risks
- 02 >> Improved safety and reliability of hydrogen electrolysis systems
- 03 >> Faster adaptation of risk-management measures to different equipment configurations
- 04 >> More efficient integration of monitoring and safety measures
- 05 >> Support for cost-effective development and deployment of hydrogen technologies

Target Users

- Electrolyser manufacturers: improved failure detection and safer system design
- Hydrogen technology companies: adaptable safety measures for different applications
- Industrial plant operators: better risk identification and mitigation
- System integrators and engineering companies: structured safety solutions for hydrogen systems
- Safety and certification specialists: agile tools for risk assessment and safety documentation

Collaboration opportunities

- HAZOP/FMEA consultancy for hydrogen and electrolysis applications.
- Application of the methodology to new hydrogen equipment and systems.
- Industrial safety and risk-management studies for hydrogen facilities.
- Joint development of tailored safety and monitoring solutions.
- Training and knowledge exchange in hydrogen safety and risk management.

	MAIN PART	PROCESS	CONTROL	DATA ACQUISITION
LYE CIRCULATION	circulation pump	lye circulation	setpoint	
			flow meter PID	flow rate
	electrical heater	heating	setpoint	
			temperature PID	temperature heater
				temp send cell
				temp return cell
				temp circulation
	heat exchanger	cooling	temperature PID	temperature ext fluid in
				temperature ext fluid out
				temp circulation
GAS MANAGEMENT	separator	water/gas separator		level high
		water level control		level low
	bypass circuit		bypass on	status
	flow meter	water circulation	flow meter PID	flow rate
	water injection valve	water level control	valve on/off	status
	water drain valve	water level control	valve on/off	status
		emergency control		
	flush injection valve	in/out procedures	valve on/off	status
		emergency control		
	overpressure valve	emergency control	none	none
	mass flow controller	pressure control pid	setpoint	flow
			pressure PID	pressure
	pressure sensor	pressure control pid	pressure PID	pressure
	cold dehumidifier	gas drying	none (ext device)	Cooling temp
	crossleak sensor	safety control	none	cross-leak %

Examples of system parts and processes definition within PEACE HAZOP



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