16th STS-AIChE Southwest Process Technology Conference

Respect of Gated Process via Fit-for-Purpose Process Design

Lee Henderson

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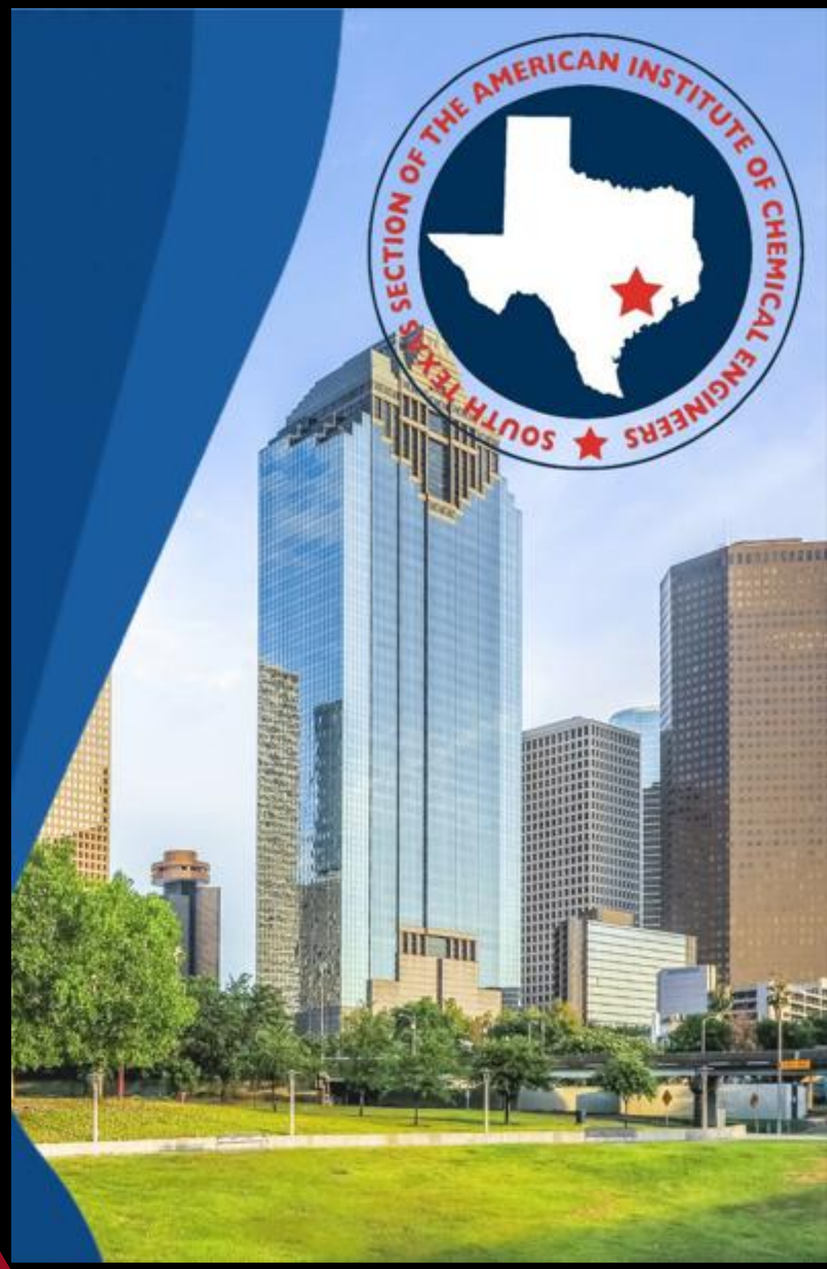

Sept 22-23, 2025, University of Houston

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Mr. Henderson has over 40 years of experience in the heavy process industry working primarily in the oil and petrochemical sectors. He has an extensive technical engineering management participation perspective with project management and proposal development. He is a registered chemical engineer in the great state of Texas with on the ground professional experience executing project work in America, Africa, Middle East, and Europe.

He has worked within large, medium and small EPC firms, and with a manufacturing firm executing design build operate projects. He has had the privilege of functioning as owner's representative in various project management and engineering management roles which enhanced his understanding of the overall complexity to executing large technical project in various operating environments.

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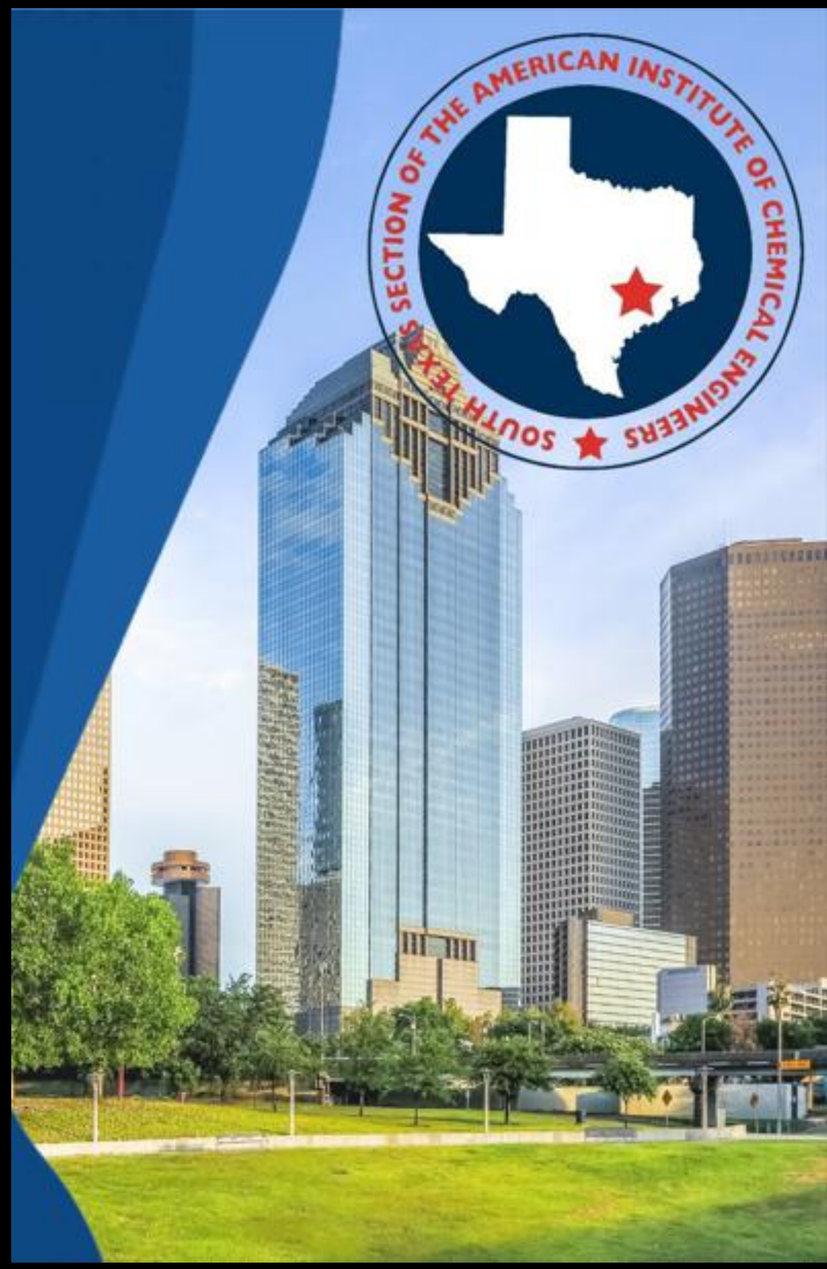

Respect of Gated Process via Fit-for-Purpose Process Design

- Design Intent of Gated Project Execution Process
  - Provide Stakeholders actionable estimated project cost with a specified confidence level for a facility with specified inputs and outputs

- Fit-for-Purpose Process Design
  - Provide just enough process definition to achieve the stated confidence level

Respect of Gated Process via Fit-for-Purpose Process Design

- Today's presentation will focus on FEL-3 project execution, but the concepts are valid for all phases
- A given phase should define the scope of work only sufficiently enough to meet the cost confidence interval target
  - This reduces stakeholder cost and calendar time to complete the phase
  - Process Engineers need to focus upon both an inward and an outward perspective of a process.

Respect of Gated Process via Fit-for-Purpose Process Design

- Inward focus is unit configuration, technology selection, optimization of equipment sizing based upon normal operating conditions, and some consideration of start up and shutdown scenarios
- Inward focus usually spends little time on alternate operating conditions of other units which may impact unit being developed

- Outward focus spends more time and energy evaluating the impact of alternate operating conditions upon surrounding units and the possible need for additional equipment to ameliorate the condition

Respect of Gated Process via Fit-for-Purpose Process Design

- An outward focus will better define the total scope of work which may be required for the proposed new unit.
- After an outward focus to fully define total scope of work, an opportunity for a more fit-for-purpose estimate may appear
  - An allowance for items not initially considered with the inward focus will do much more for the quality and confidence level of an estimate than another optimization pass through the equipment which was evaluated with the inward focus

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- The outward focus inherently aids in producing a fit-for-purpose estimate since it will bring into question the confidence level of estimates provided by outside entities such as vendors and subcontractors
- Once and honest evaluation has been made of the thoroughness of engineering data and cost estimates provided by others has been made, then the extent of engineering to be performed based upon that data should be evaluated in light of fit-for-purpose goals;
- i.e., would factored total costs based upon the quotes be more appropriate

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- If the project execution plan is to have a significant break in engineering execution between stage gates, then a fit-for-purpose execution would not typically include any advance engineering of any of the subsequent phase.
- Any gains in confidence level from advancing engineering will likely be overwhelmed by uncertainties in material cost escalation, interest rates, tariffs, etc.

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- A balanced outward and inward focus is also known as keeping the big picture in mind or having your arms around the entire project

- This role has traditionally been performed primarily by great Project Managers and Process Engineers who welcome everyone's input

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- For FEL-3, it is imperative that Process looks wholistically at the entire project including alternate operating conditions
  - –Field support of commissioning, startup, shutdowns and turnarounds are invaluable experiences for lead process engineers supporting project development

Respect of Gated Process via Fit-for-Purpose Process Design

- Plan the work
- The extent of work and what areas will be evaluated to what degree (big picture thinking; inward vs outward) should be decided early in the project execution phases
- Work the plan
- Failure to work the plan will likely result in schedule delays and engineering cost increases

- There is no excuse for failure

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