

# MoC in The Process industries

My Personal Experience

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2<sup>nd</sup> June 2019 – IOSH Hazardous Industries Group

# Agenda

- Introduction and History
- How have MoC systems evolved?
- Themes and Learning
  - Identifying Scope and Impact
  - Considering Detail
- Summary

# Introduction and History

- Graduated Nottingham 1995 (Chemical Engineering)
  - Internship - International Paints
- Hickson and Welch (1995-2000)



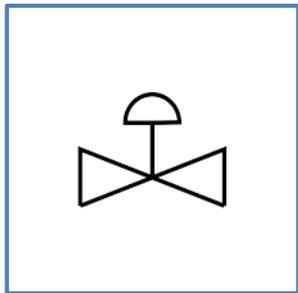
- BP Chemicals (2000-2008)
- Ineos (2008-Present)
  - Operations Engineer
  - Senior Process Engineer
  - Acetyls Process Technology Manager

# Now Have MoC Systems Evolved?

- Technical
  - Plant, Process, Materials
- Organisational
  - Re-organisations, Staff changes, T&C's, Locations, Ownership
- Procedural
  - SOP's, Technical Standards
- What about a implementation of a change to a corporate standard?

# Themes and Learning

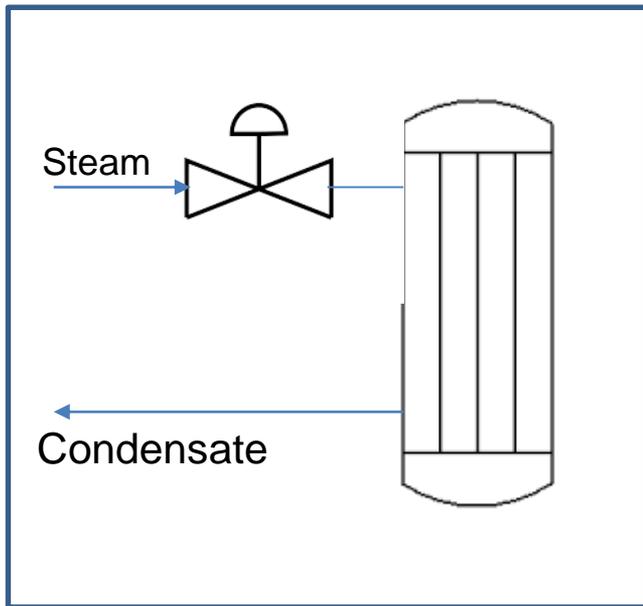
- Identifying Scope and Impact
- Theoretical Example:
  - Re-trim of a control valve
  - 10% increase in maximum flow



## Issues:

- Line size/Valve size
- Design Pressure and temperature
- Support arrangements
- Control Valve Tuning

# Scope and Impact

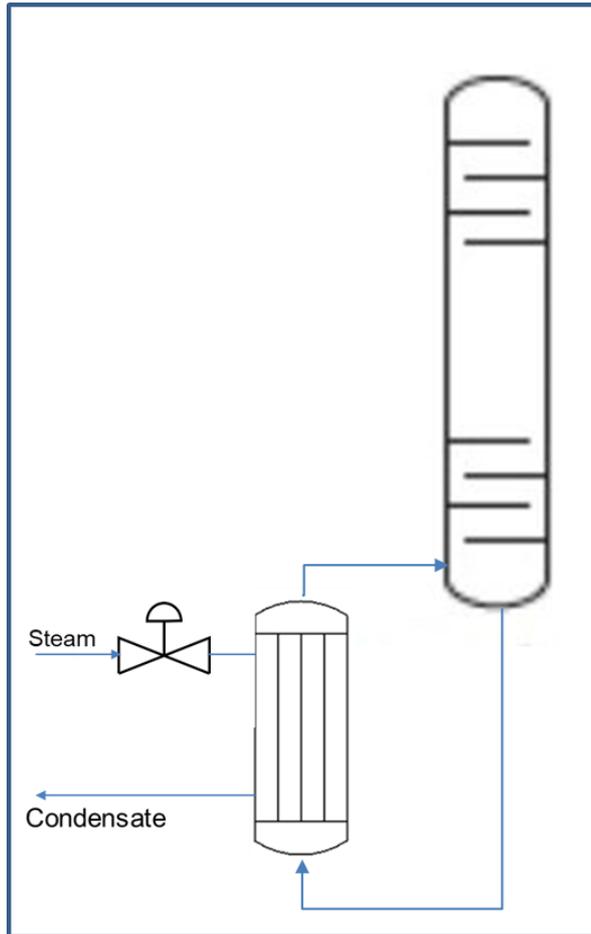


## Issues:

- Line size/Valve size
- Design Pressure and temperature
- Support arrangements
- Control Valve Tuning
- Heat exchanger design/capacity
- Exchanger design temperature and pressure
- Condensate system sizing



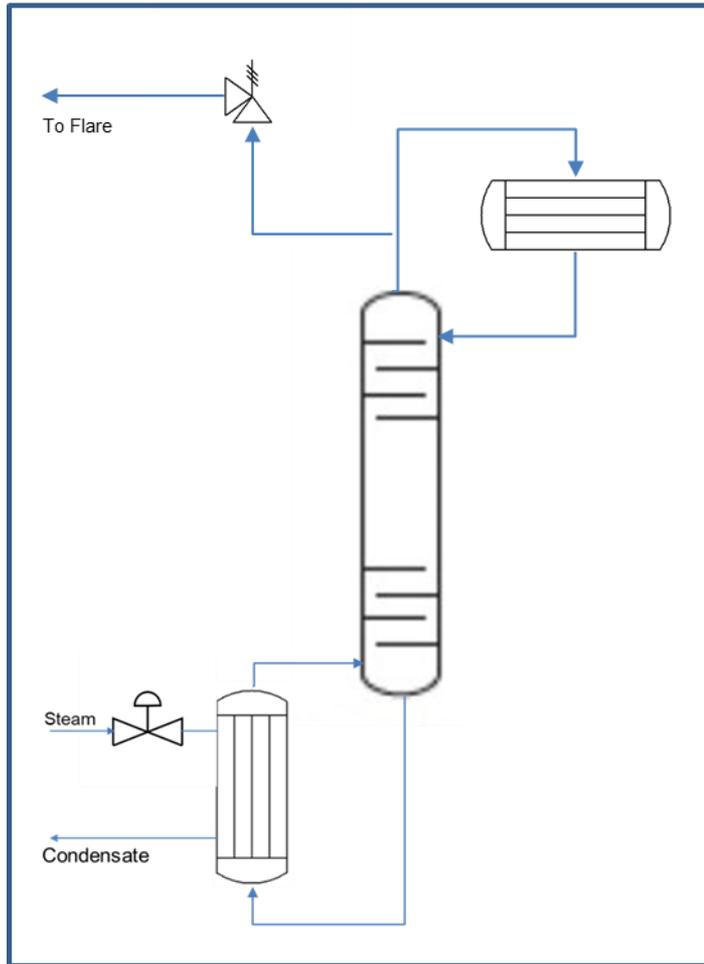
# Scope and Impact



## Issues:

- Line size/Valve size
- Design Pressure and temperature
- Support arrangements
- Control Valve Tuning
- Heat exchanger design/capacity
- Exchanger design temperature and pressure
- Condensate system sizing
- **Column Sizing**
- **Column Operating Envelope**

# Scope and Impact

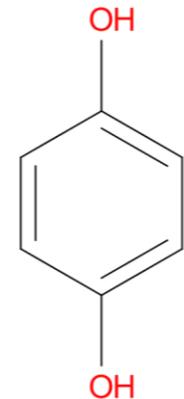


## Issues:

- Line size/Valve size
- Design Pressure and temperature
- Support arrangements
- Control Valve Tuning
- Heat exchanger design/capacity
- Exchanger design temperature and pressure
- Condensate system sizing
- Column Sizing
- Column Operating Envelope
- Condenser sizing
- Safety Valve Sizing
- Flare system capacity

# Scope and Impact

- Real Example:
  - Large scale continuous plant
  - Requirement for two polymerisation inhibitors
    - Process – high temperatures, short residence time
    - Bulk Storage – ambient, long residence time
  - Change to the process inhibitor used
    - Less toxic
    - Less manual handling
    - More Effective at process conditions
    - Cheaper (a lot!)



# Scope and Impact

- Management of Change Process
  - Laboratory studies (at process conditions)
  - MoC Form
  - Detailed Health and Safety Assessment (Team Exercise)
  - Documentation Updates
    - Operating Procedures
    - COSHH Assessments
    - Analysis requirements
  - Physical Changes to the unit

# Scope and Impact

- What Happened?
  - Rapid polymerisation event in offsite off specification storage tank
  - Emergency vent lifted
  - Emission to atmosphere
  - Tank irreparably damaged



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# Scope and Impact

- Why?
  - Focus on core production unit only
  - Effect on Offsite off specification tank missed
  - Procedures/analysis for this unit not updated
  - Fall in inhibitor levels missed

# Themes and learning

- Considering Detail
- Background
  - Frequent blocking of pump suction strainer
  - Conventional single basket strainer
  - Replaced with multi basket strainer (Standard vendor supplied equipment)
    - Less frequent strainer cleans
    - Improved manual handling
    - Easier preparation (Draining/flushing etc.)



# Considering Detail

- Management of Change
  - Full MoC process with sign off
  - Detailed HSE review (Team exercise)
  - Many issues identified – spares, leaks, training etc.
  - Identified that process technicians had “mechflex” training and so were ok to open, clean out and box up filter
  - Procedures updated, training delivered

**MODIFICATION APPROVAL FORM**

Group Reference No. 1/246 | Task/JP No. |  
Plant VAM |  
Job Title PS102 Filter Lid Modifications

**Health, Safety and Environmental Checklist**  
The following topic headings should be used as a basis for the HSE review. Combine them where appropriate with the HAZOP procedure words (no, more, less, reverse, part of, as well as, other than) to help in identifying HSE hazards. Where the procedure identifies something that is relevant to the modification, attach an explanation of the consequence and explain the existing and/or proposed safeguard.

Part 1 - Job Description  
Background  
Incident 20

Is specific technician input needed? (If "Yes" include summary in commentary) NO

**Part 2 - Approval** (where no signature is required, write N/A to indicate Not Applicable)

Design Team Approval			Specialist Approval*		
Discipline	Name and Signature	Date	Discipline	Name and Signature	Date
Ops.					
Chem. Eng.					
Mech. Eng.					
I.E.	Na				

\* Specify as appropriate

Is the modification significant enough to justify a formal HAZOP? NO  
Have all HAZOP actions been incorporated? NA  
If no, add actions to punchlist  
Is the (HYPERLINK "\\Eubals1\applications\Change control\Change Control 2001 Rev 2\Criticality forms.doc") record attached? NA

Group Management Approval | Date |

**Part 3 - Authority to Commission** (attach punchlists)  
Whole modification  or Final Part of  Part-complete authorities

**Commissioning Team Completion** - This modification (including all 'A' documentation items) is complete.

Discipline	Name and Signature	Date	Discipline	Name and Signature	Date
Ops.			Project		
Chem. Eng.					
Mech. Eng.					
I.E.					

**Commissioning Comments**

Group Management Approval | Date |

# Considering Detail

- What Happened
  - Filter passed pressure test prior to start up
  - During start up one stud came loose
  - Significant loss of Acetic acid (100mm opening)
  - Contained within unit drainage system
  - No Injuries – incredibly fortunate
  - Isolated quickly

# Considering Detail

- Why?
  - Mech flex training covered bolting up of flanges but did not consider ‘captive’ studs
  - Studs needed to be fully screwed into the filter body
  - Filter lids were held in place with two studs each. Four filter lids per filter unit
  - One stud was not fully screwed in



# Considering Detail



# Summary

- Two key questions:
  - Does the MoC consider all of the upstream and downstream impacts? What about outside battery limits?
  - Does the MoC consider sufficient detail?
- Equally applicable to organisational or procedural change
- Questions?