Hazard Identification Techniques

HAZOP

A **hazard and operability study** (HAZOP) is a structured and systematic examination of a planned or existing process or operation in order to identify and evaluate problems that may represent risks to personnel or equipment, or prevent efficient operation – it is:

- A qualitative technique
- Based on guide words
- A multi-disciplinary team attending set meetings

For identifying cause and the consequences of perceived mal operations of equipment and associated operator interfaces in the context of the complete system

It accommodates the status of recognised design standards and codes of practice but rightly questions the relevance of these in specific circumstances where hazards may remain undetected

HAZOP Team

Study Leader	Experienced in HAZOP but not directly involved in design (Provides impartiality)
Recorder	Clearly document the process ensuring recommendations passed on
Designer	Has in depth knowledge of the design and can explain key functions
User/s	Provide 'In Use' questions and challenge operation and provide deviation methods
Specialist	If required to provide core knowledge not available to the team
Maintainer	Highlight maintenance issues and highlight potential issues

HAZOP Common Guide Words

None	No forward flow when there should be
More	More of any parameter than there should be, *e.g.* more flow, more pressure, more temperature, etc...
Less	As above, but "less of" in each instance
Part of	System composition difference from what it should be
Other Than	What needs to happen other than normal operation, *e.g.* start up, shutdown, maintenance
Reverse	Caused by pump failure: NRV failure or wrongly inserted; wrong routing; delivery over pressured; back- siphoning; pump reversed

HAZOP Check Table

Use of a check table to assist navigation through the range of parameters and relevant guidewords in a consistent way.

		Guideword					
Parameter	App.	More	Less	None	Reverse	Part of	Other than
Flow	Yes/No						
Pressure	Yes/No						
Temperature	Yes/No						
Level	Yes/No						
Time	Yes/No						
Agitation	Yes/No						
Reaction	Yes/No						
Start-up / Shut-down	Yes/No						
Draining / Venting	Yes/No						
Inertising	Yes/No						

Recording

It is vital that the process is accurately recorded to ensure any actions identified have been closed out, and also that this is signed off by the HAZOP team.

Hazop Title				Date	
Study Node					
Design Intent					
References					
Team Members					
Node	**Deviation**	**Cause**	**Effect or Hazard**	**Safeguard**	**Action Required**