Lessons learned and the Pros & Cons of Virtual Hazop

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This paper describes the lessons learned and the Safety challenges surrounding carrying out virtual Hazop.The paper highlights the Human Factors (HF), the management of the Safety Studies, as the world is facing an enormous number of challenges due to COVID-19, not least because of the need for social distancing and remote working. The challenge is even greater for those in the hazardous process industries where the requirement to comply with modern risk-based process safety legislation calls for added scrutiny. Studies such as HAZID, HAZOP, and LOPA.

Online HAZOP is certainly an interesting option. Especially for short HAZOP's, an online meeting can also save costs compared to a physical meeting because there is no need to travel. It is also possible to think of a hybrid solution, where part of the team is together, and an expert can be present virtually.

The author will share his practical experience chairing virtual Hazop under COVID-19 and provide insight to what to do or not under these circumstances. Furthermore, the lessons learned will be shared.

It also requires expert facilitation skills to ensure that ideas and concerns do not go unnoticed when there is such a high reliance on verbal communication. So, what are the pros and cons of working remotely and could this way of working be an indication of the future of Hazard Identification and Risk Assessment Studies?!!!

Keywords: Virtual, COVID-19, Human Factors (HF),Hazard Identification (HAZID), Hazard and Operability Studies), (HAZOP), Layer Of Protection Analysis (LOPA)

INTRODUCTION

In this paper, I propose to consider the need for a focus on what contribuate as a good Hazop; furthermore the paper describes the lessons learned and the Safety challenges surrounding carrying out virtual Hazop.

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HAZOP METHODOLOGY

What is Hazop

Hazop is a structured team based study of a firm design to ensure that the consequences of deviation from the design intent are fully understood. The Hazop Examine operability, start-up, shutdown, maintenance, furthermore Hazop is defined by International Standard IEC 61882: 2016.

The most fundamental issue in Hazop is the problems occur when there are unforeseen effects of deviation from the intended design. In Hazop the design intended representd in the P&IDs , backed up by equipment datasheets, instrumentations, cause and effect diagrams, and layouts.

Interms of the human of factores, the key is to get the design intention right. In the Hazop meeting: the team needs to undrstand what the operators actualy have to do during running the plant. These might be represented by operating procedures, start-up and shut-down procdures, emergency shut-down procedures, and maintenance.

So, in a Hazop we are looking for problems caused by deviations from the intended design of a process. As in all Hazops, we need to be thorough and systematic including Human Factors (HF), which require imagination and creative thinking. Furthermore the Hazop team needs to carry out a creative search for causes based on Human Factors knowledge and performance influencing factors.

As always in a Hazop, we look at the consequences to the individual, the plant, the environment or reputation of the company and decide whether or not they matter; and ask the question is it significant failure, then review the safegurds and decide whether the safeguards are adequate or we need to make further design improvements.

It is important that (HF) to be considered in the conceptual and preliminary stage of the design, to ensure that (HF) are taken into account throughtout the Hazop studies. As with all Hazops studies the review process will be driven by the checklist or prompt list of the issues and concerans which need to be considered. The list can be used to help decide which issues neede to be considered, and decide the strategies for dealing with them, or basic principles to be included in the design.

Key Points to be considered when the Hazop is carried out:-

- Identify ALL causes for each deviation

- Causes are inside the node

- Describe causes in detail e.g. tag numbers

- Id no cause, record "no credible causes identified"

- Identify potential, practical ULTIMATE consequences – assume no safeguard are in place

- Consequences can be inside or outside the node

- Double jeopardy = multiple independently-caused events happening at the same time

- Risk ranking
  - Consequence considered without safeguards
  - Likelihood considered with safeguards

- If causes has no effect, record "no significant consequences"

- If causes does not result in a hazard, record "no hazardous conseq

Recommendations

The recommendations is very important part of the Hazop and they should stand alone; i.e even if you are not taken part of the hazop meeting, the recommendations should convey the message, to what it is require to be done to close this recommendation (action) and should answer the 3 Ws:-

- What, where, why

- Avoid 2consider" and "evaluate" unless really optional

- Categorisation

  1. Information need

  2. Procedure review/update

3. Design check

4. Hardware changes including instrumentation

5. SIL determination

6. Maintenance procedures, inspection & testin

7. Risk assessment or specialist review

8. P&ID check/update

9. Training

Observations

To reduce the number of recommendations during the Hazop the following are some of the observations which will need to be closed out but will not be issued as recommendations:-

- Minor procedure updates

- Locked valve register

- SRD change

- Dead leg register

- HP/LP interface register

- C&E issues

- Alarm rationalisation

- Drawing checks and changes

- Design checks and changes

- PSV list

- Other

Parking Issues

To manage the time efficiently during the Hazop, and reduce the time spent on finding the answers for the following issues, these issues will be captured under the term Parking Issues and that will keep the flow of the Haziop meeting.
These Parking issues should be resoloved by the end of the Hazop; otherwise they will be converated to recommendations:-

- Minor procedure updates

- Locked valve register

- SRD change

- Dead leg register

- HP/LP interface register

- C&E issues

- Alarm rationalisation

- Drawing checks and changes

- Design checks and changes

- PSV list

- Design/operating pressure.

- Maximum/minimum flow rate.

- Other info required and can be obtained next day

- Other

HAZOP facilitator Role

The Hazop leader (chairman also referred to as HAZOP facilitator) should be an independent party with no direct involvement with the project execution.It is his responsibility to ensure that the HAZOP is performed to the applicable standards and good engineering review practices.

- HAZOP leader role is to

  - Keep the team together / manage conflict

  - Motivate and encourage the team

  - Limit discussion where appropriate

  - Keep the team focused

  - Summarise discussion / seek consensus

  - Make interventions when require

- HAZOP leader role

  - Technical expert

VIRTUAL HAZOP

The global pandemic of COVID-19 has changed the world in so many ways. Industries and companies have had to adapt to all health advice and regulation requirements. Face-to-face meetings were replaced with virtual meetings due to travel restrictions, mandatory quarantine in some locations, the need to maintaining physical distancing and capacity limits. In normal Hazop it is usual practice to have hard copies of drawings and technical documents at hand or either displayed on the walls or on the screen for ease of access for the participant to reference. All of this is much harder in a virtual environment. The nature of the virtual environment makes the Hazop leader and quality of the HAZOP doucments package all the more important.

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It also requires expert facilitation skills to ensure that ideas and concerns do not go unnoticed when there is such a high reliance on verbal communication. So, what are the pros and cons of working remotely and could this way of working be an indication of the future of Hazard Identification and Risk Assessment Studies.

In any activity which performed in unsual circumstances, the outcome is going to be postive or negtive ; in our case is going to be pros and cons of working remotely; furthermore it might even be worst as it can be seen below:-

1. The Good; advantages of online HAZOP

- Save in cost

- No travel time / no visas

- Accommodation costs

- Cost of venue from 3rd party

- Saving on office space

- Flexibility: scheduling (offshore)

- Flexibility: multiple locations possible (offshore)

- Share experience with multiple locations

- Possible "observers" can easily watch the meeting

- Less Stres

- Environmental benefit: Reduce greenhouse gas effect or Carbon footprint

2.   The Bad; disadvantages of online HAZOP

- Communication is more difficult because of the absence of non-verbal communication and because it is not possible to point to the study documents with some tools:

  ‣Visual
  ‣Sound
  ‣Quality

- Lower productivity compared to a normal HAZOP

- Additional preparation: distribution of documents should be done well in advance

- Internet connections are not always reliable

- Possible fatigue

- Interruptions by the family of the household (see funny moments !!!!!!!!!!!!

3.   The Ugly; worst scenario of online HAZOP

- Loss of power during the Hazop and inability to carry on with the Hazop (home, platform)?!!!!

- On a few occasions the scriber was out of phase with the Hazop Chairman!

- Sensitive data accidentally being shared.

- Corporate firewall or incompatible browser blocking the use of Hazop software.

- Screen sharing is slow and lags with bad resolution.

4.   Funny moments of Virtual Hazop:-

- A Child holding a placard behind their Mums & Dads require something from them (e.g. IPhone, IPad, money or he is drinking).

- Cats and dogs entering the room.

- Little child on his walker entering the room.

- House maid chasing a child entering the room.

- Wife's/husbands entering the room wearing bath robe after having a shower?!!!!!!!

- Hazop members in their payjama or bottomless?!!!

- Hazop members forget to mute their computers during the meeting with interesting conversation between the family?!!

- Hazop members forget to switch off the camara during the meeting with interesting viewing?!!

CONCLUSIONS

In virtual Hazop the skills and expertise of the facilitator are needed to ensure that ideas and concerns do not go unnoticed when there is such a high reliance on verbal communications. The facilitator may need to slow the process down, taking into account; internet buffering or connectivity issues and allow the team enough time to catch up.

Due to the infrequent use and limited application of virtual Hazop, There is not yet enough evidence to determine whether virtual Hazops are more or less effective, so the jury is still out on this issue.

As a Hazop Chairman for the last 20 years; and by chairing a few virtual Hazops; I can say in my humble opinion that, face to face Hazop is more effective that virtual Hazop; but as they say horses for courses!

REFRENCES

1.   International Standared IEC 61882: 2016, Hazard and Operability Studies – application guide.