Industrial Hazard Identification using Different Platforms: A Review

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Abstract— Hazard identification is a key part of any injury and illness prevention program within a business (especially small and medium sized companies). If hazards aren't identified, then they can't be mitigated properly. This tool is designed to help company leadership as well as workers practice more effectively identifying hazards. So here in this paper we provide some important knowledge related to that Hazard identification by using their definite matrix. We acknowledge here the work of some researchers which provides the knowledge of working for that particular safety. We focused here on some standard way of safety calculation like HAZOP, OSHA for our study and provide here the knowledge of researchers work.

Key words: Petroleum, Chemical, Risk, Hazards, Computational Parameters, Fuels, OSHA, HAZOP

I. INTRODUCTION

Risks, Hazard, Problems, Safety are the most important factors used for classification of Hazardous zone in any industry. Hazardous area classification is a process of identification of locations and spaces where explosives concentrations remain present at all times, or may develop during some phase of operations or may arise due some abnormalities in the system like leakages from joints or valves. The objective of such a classification is to prohibit all sources of ignition in such areas and install electrical fittings that will not allow the explosions that may take place within the equipment to release from the enclosure of the fittings in such a way that explosive mixture present outside the equipment or instrument may get ignited. Such electrical fittings and equipments are known as flame proof electrical fittings. Some instruments or equipments are so designed that the sparks generated during switching on and switching off of such equipments do not generate incentive sparks.

Hazardous areas are classified in zones based upon the frequency of the appearance and the duration of an explosive gas atmosphere as follows:

1) An area in which an explosive atmosphere is present continuously or for long periods or frequently.
2) An area in which an explosive atmosphere is likely to occur in normal operation occasionally.
3) An area in which an explosive atmosphere is not likely to occur in normal operation but, if it does occur, will persist for a short period only. There are still the possibilities of formation of explosive mixtures in case any abnormality likes leakage or damage of the systems.

II. LITERATURE REVIEW

Sunil Jayant Kulkarni et.al [1] shows safety and hazards in petroleum industries a research and study. The paper investigates various safety and hazards related to petroleum industry in the system. The author here study safety features with respect to construction industries and correlate all the data with other reference industries. The overall work of product and raw material are studied in the paper shows that the fatality rate in the industry is 2.25 times more than construction industry and 7 times more than the general industries.

Agro Lingua et.al [2] highlights unacceptable and unfortunate trends in the petroleum industry including health, safety, and environment. The submission done by Norwegian ministry of labor government and they focuses on the work for the improvement of industry level on behalf of petroleum and chemical industries. The work is result oriented which were placed for globalization for minimizing the cost.

Sectoral Policies Department et.al [3] work done in this paper is performed by independent consultant for safety and health in oil and gas industry at sub-Sahara. The main purpose of authors here is to improve the overall condition at the region. A proper survey and analysis was performed by the team to audit the system. They make an audit sheet related to accidents and incidents included. They highlight the rate and type of hazards in the company related to different regions.

Region	Fatalistic		Fatal Accident rate (FAR)		Fatal Incidents	
	2015	2014	2015	2014	2015	2014
Africa	10	5	1.84	0.86	7	5
Asia and pacific	7	11	0.76	1.02	5	10
Europe	4	4	1.17	1.04	5	4
FSU	4	2	1.60	0.81	3	2
Middle east	7	2	1.07	0.33	7	2
North America	20	16	2.31	1.56	13	14
South and Central America	2	5	1.41	1.13	2	5
Overall	54	45	1.45	1.03	40	42

Table 1: Fatalities, Fatal Incidents & Fatal Accident Rate by Region, 2014 & 2015 [3]

Delilah Lithner et.al [4] the paper here investigates one of the main harmful cause related to chemical i.e. Plastics. This research based on toxicity test and evaluation performed on plastic products. They show the hazard and risk on using of these products by using a data sheet. The main aim of studying this paper is to understand the software and practical level things and method of hazard identification in chemical productions. The paper discuss the overall sheet distribution on risk assessment and they conclude the main harms created by the use of plastic products and bi products with its percentage.

Brian Macnamee et.al [5] this paper provides us a great knowledge of a study method named ALOHA (The adaptive level of detail for human animations) which we

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applied in our research also. The method aims to a virtual human and virtual environment for the study point of view. The paper shows an intelligent role based technique placed between the human to note the function by study the paper and then correlate it with other. By analyze the whole methodology of the paper we adopt it for our research also.

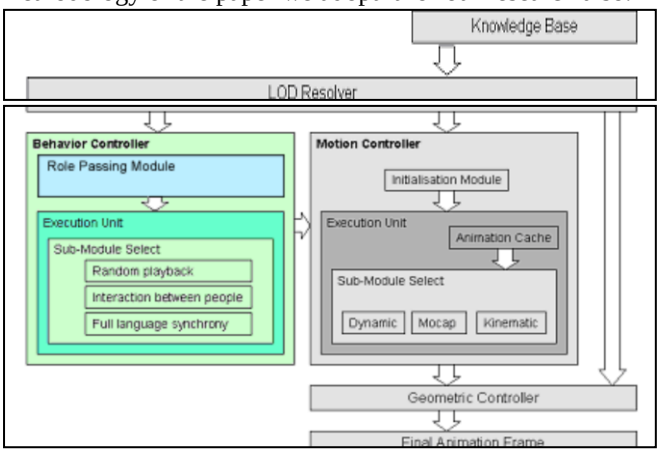

Fig. 1: Original ALOHA Framework Extended to Incorporate Role-Passing into the Behavior Controller [5]

Praveen Patel et.al [6] by studying present papers on ALOHA method we find the placement on an area of oil refinery with the tool. The scholar here investigates the hazardous atmosphere using ALOHA tool and assume some keys as toxicity, flammability, thermal radiation and explosion for the study. The output results for the system considered on worst conditions shows the requirement of useful facts and emergencies. The paper concluded that for hazard identification and graphical model study author adopt a result summary and then check their results by using software at different context. The paper shows the worst case scenario and finds the better solution for it.

S. M. Tauseef et.al [7] now the software used for investigation of forecasting the accidents in chemical industries are focused here. A critical analysis was done by the author on a software overall conditions. The survey done here also investigates the strength and weakness of tools. The paper also discusses Bhopal gas tragedy in their objective and analyzed the harm and risk over there. The research done here shows their work and results by using different Pi-chats and Flow diagrams by comprising their Values and benefits.

Srinivasan Chandrasekaran et.al [8] researcher in this paper shows a complete mathematical formulation and methodology for calculation of health, safety, and environment management in petroleum industry. Mathematical equations, models and overall strategies for performing the best actual analyses were here present in the paper. The researcher summaries their overall results by using graphs, tables, pi-charts, and flow diagrams etc.

World Bank group et.al [9] the research here shows the basic guidelines for petroleum refinery by taking environment, health, and safety as main parameters. The documentation done for good health of industry taking by World Bank group as an innovative project. They consider Air, wastewater, hazard material, and noise as its main parameter.

Pollutant	Units	Guideline Vanes
NO_x	mg/Nm^3	450
SO_x	mg/Nm^3	150 of sulfur recovery units, 500 for other units
Particulate matter	mg/Nm^3	50
Vanadium	mg/Nm^3	5
Nickel	mg/Nm^3	1
H_2S	mg/Nm^3	10

Table 2: Air Emissions Levels for Petroleum Refining Facilities [9]

Here studies of all relative chemicals were considered for the study. The results from various analyses were concluded by using various tabular formations for all types of hazard formations.

Karen Niven et.al [10] off shores industries related to petroleum are considered here by taking tar formations, drilling and other operational fundamentals as its main research. They focus here on the challenges facing by industries included the risk and hazard. The health sector in the industries got main focus in the research and the whole work was performed by taking the review from experts. They show the relative experiments to overcome from these phenomena and also concluded that by using their fundamentals the health safety and fundamentals were improved.

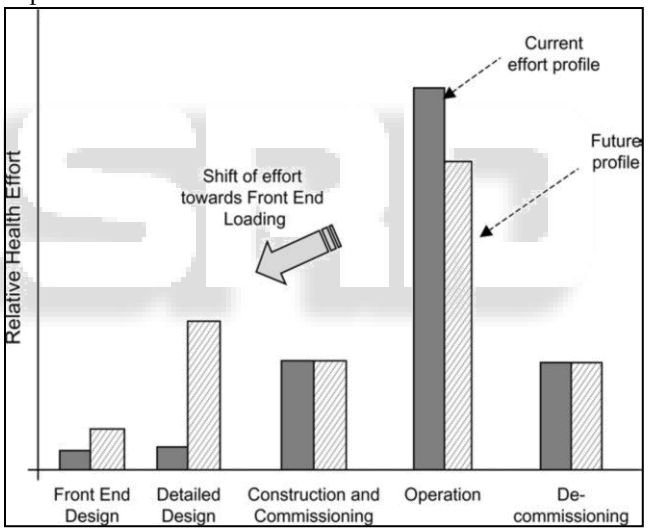

Fig. 2: Illustration of the Projected Change in Health Effort over the Lifecycle of a Typical Offshore Facility (Conceptual) [10]

Manufacturing Technology Committee et.al [11] HAZOP (Hazard and operability analysis) which we taken as main method in our work was come in our mind by taking a tour of this research paper. It was basically a mathematically arise method having unique feature of taking help and imaginations of team members. HAZOP works as a tool for analysis of risk and harm in a company. The paper explains the methodology by taking a flow chart for overall consideration. The paper also provides us knowledge by placing a training guide, operational methods and tabular measurements.

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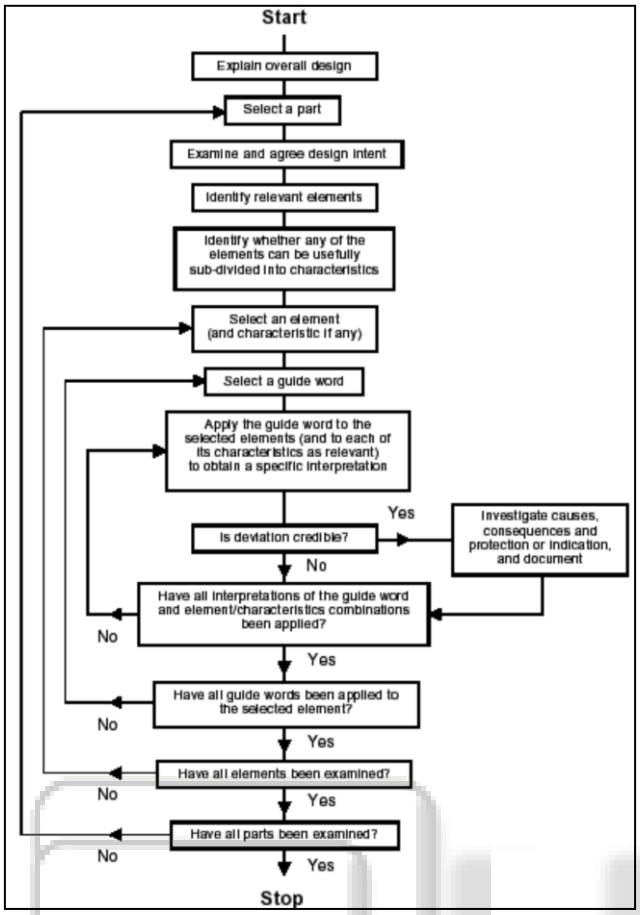

Fig. 3: HAZOP Examination Phase [11]

F.D. Larkin et.al [12] as world is moving toward digitalization so the research paper here moves us towards a computational based HAZOP analysis by considering various parameters like flow, pressure and temperature. The results and calculation here based on test, cause, bench marks, and user tutorials etc. They use a computational based program with fluid and material library for study. A tool name Auto-Hazid was taken here for the study of process. The results of software based analysis are quite similar to that of normal HAZOP tables and the overall results were validated with the actual one for betterment of analysis. By using software HAZID as a computational HAZOP we achieve better results with minimum cost and less time.

III. Conclusion

As known the whole method and procedure was developed for finding appropriate conditions for hazard analysis at different sections of industry. So here our paper presents the work of all such researchers in the required field. By studding our paper one can easily understand the use of OSHA and ALOHA type of computational methodology for Hazard analysis.

We are here also thankful to the various authors for showing their work from which we adopt our overall sources and methodology.

Our paper here presents the best suitable knowledge of the listed reference papers and this was also provides us a great help for work selection.

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