

Safety in the Process Industries

Caution: Rough Road Ahead

Karl Kolmetz
KLM Technology Group
www.klmtechgroup.com

Ai Li Ling
KLM Technology Group

September 2008

Introduction

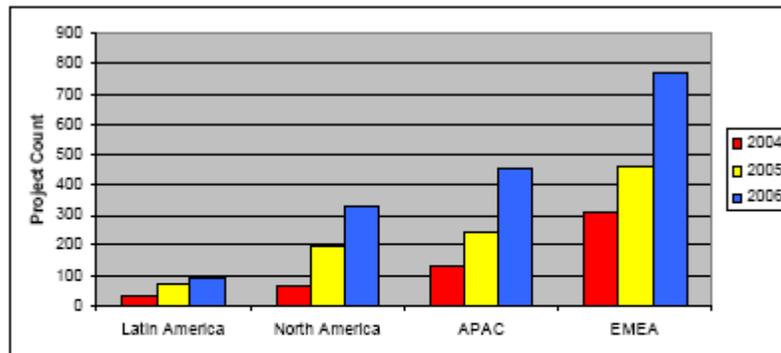
For safety in the process industries 1988 was a catastrophic year. That year there were many fatalities in the process industry in the United States alone. As a result of this catastrophic year the Occupational Health and Safety Administration (OHSA) implemented the Process Safety Management (PSM) guidelines. Consequently the process fatalities have declined since the implementation of PSM.

Unfortunately four independent events are coming together to bring concern to the future of safety in the process industries. These items need to be addressed or significant safety issues will be generated. These items include;

1. The largest amount of new hydrocarbon construction projects ever, followed by the largest commissioning efforts of these projects.
2. The shortage of 10-year to 15- year experienced engineers.
3. The retiring of senior operations personnel and engineers.
4. Increased capacity and run length of existing units

Growth in the Hydrocarbon Construction Industry

Today we are experiencing a boom in construction projects. As an engineer this is a great thing, the demand for engineers is at an all time high. As a project manager for the design of the project this is a major issue. Less experienced engineers are now making major design decisions. The chance of engineering design mistakes has increased. The operating company needs to have increased review of the critical engineering designs.



Highest Industry Project Growth rate in 25 years.....

Source: Hydrocarbon Processing Market Data Book

This boom has also stretched the capability of the equipment suppliers. Construction companies have reported that even previously dependable equipment suppliers are now having increased equipment quality issues. Again the operating company needs to review the quality of the critical delivered equipment.

The number one cause of accidents, 38%, is equipment malfunctions and this was before the current construction boom.

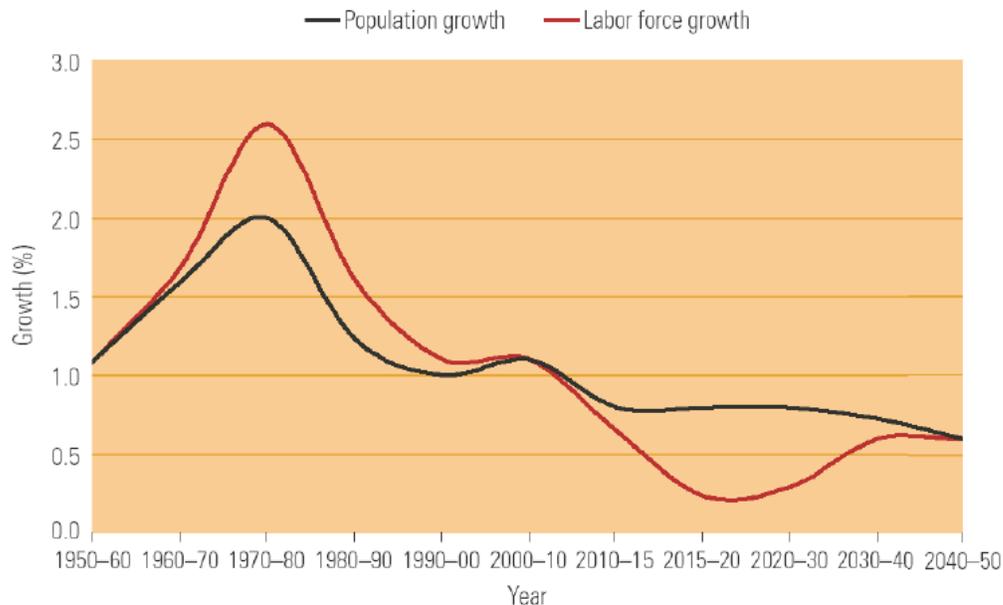
Shortage of 10-15 year Engineers

In 1984 there was a major downturn in the chemical processing industry. Most of the engineers that graduated during this period could not find engineering jobs. Due to this lack of employment, engineering became less desirable than other fields like IT and Management particularly in the Dot Com area.

We particularly need this group of experienced engineers to handle this current boom. The US has not invested properly in engineering talent.

The retiring of senior operations personnel and engineers

Each of the new plants will need to be commissioned and staffed. This would be a challenge even without the retiring senior personnel. One estimate is that 30% of the existing work force will retire in the next 5 years, and take a large slice of the operating and commissioning experience into retirement.

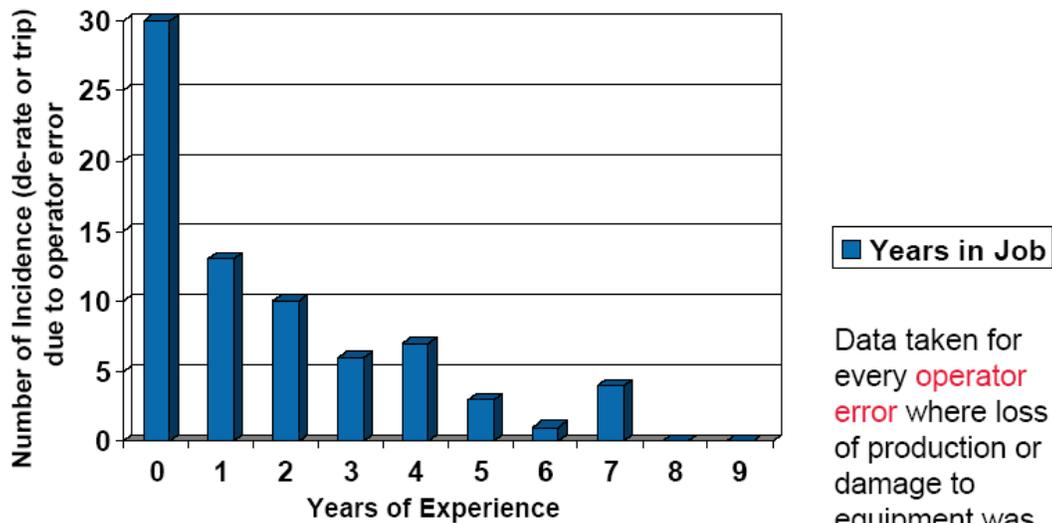


40% of all U.S. workers will be 55 or older by 2010, and that the size of U.S. workforce will grow less than 0.5% annually for the next several decades

Operations error is the second leading cause of accidents at 26%, and this is with the experienced team. This retirement of experienced personnel will require training to be greatly intensified.

It takes approximately eight to nine years of on the job training to make an operator potentially “error free” and experience can be a painful and costly way to learn. A second phenomenon is the young operators (age 25) have the energy to play with equipment, where an older operator (35+) does not have the extra energy, and “does not fix what is not broke”.

It takes approximately 8-9 years of OJT to make an operator “error free”



■ Years in Job
Data taken for every operator error where loss of production or damage to equipment was identified

Edison Electric Institute, 1984

Each company and project should have an actual training budget, not an overall overtime budget that can be utilized in other areas. One of the philosophies of learning is that people remember only 10% of what they hear; and only 30% of what they see; but 70% of what they do. Classroom training followed by hands on training is required.

The selection of the trainer and results of the training should be evaluated. A lesson from the health care industry is that there are statistical methods that measure and monitor the results of training. These evaluation techniques came from the AIDS treatment and care, where if the health provider made a mistake, the mistake could be fatal. These parameters may need to be utilized in the process training industry.

One of the OSHA findings from Texas City BP incident was that the operating supervisor with experience had a family emergency and left the unit. No experienced replacement could be found, but they proceeded with the unit commissioning. If the managers at BP had a second chance they would delay the unit commissioning and have more than one qualified person.

Commissioning team experience will need to be reviewed. Most accidents happen during start up and shut down. I have been on a commissioning where the lead engineer for a major engineering corporation was less than 30 years old. The operating company should not accept this level of experience.

Increased capacity and run length of existing units

Today the existing operating units are being run at maximum capacity with extended run lengths and many of these units are over 40 years old. The instrumentation of the units needs to be improved to ISA 97 Standards. The on-line monitoring and inspection of these units need to be increased due to the longer run lengths.

Caution: Rough Road Ahead

These four related but independent trends can lead to significant safety issues, or managed correctly they can be minimized.

Master Sun-Tzu “The Art of War”, 6th Century B.C.

- “So the rule of military operations is not to count on opponents not coming, but to rely on having ways of dealing with them; not to count on opponents not attacking, but to rely on having what cannot be attacked”
- “If you can always remember danger when you are secure, and remember chaos in time of order, watch out for danger and chaos while they are still formless, and prevent them before they happen. This is best of all”

Is a Risk a Problem? No, a risk is not a problem. A problem is a risk whose time has come. Problems are existing conditions and circumstances. Risks are future events and conditions. We need to keep these four independent issues a risk and not a problem as much as possible.

Risk Management Guidelines

Hydrocarbon Project

Each operating company needs to review the team of engineers that the engineering company is proposing to utilize for the engineering design and commissioning team. If acceptable personnel are not available, the schedule of the project should be reviewed. It is better to postpone a commissioning than wish you had.

Some of the major construction companies are now declining new projects. For the long term it is better to do things safely, than wish you had.

The shortage of 10 to 15 year experienced engineers.

We cannot create a 10 to 15 year engineer in 2 years, but we can assist the 10 to 15 year engineers by utilizing their time efficiently. Many companies have engineers doing HR, Accounting, and secretarial functions that take more than 10% of the available working time doing items that do not lead to improved safety. HR and Accounting are important

functions, but administrative assistants can provide support in these functions to free up engineering hours for design and safety reviews.

The retiring of senior operations personnel and engineers

Training of existing and future staff will need to be intensified. Dedicated training budgets will need to be implemented in every plant and project. It takes approximately eight to nine years of “on the job training” to make an operator potentially “error free”.

Conclusions

Rough roads lie ahead. The four independent risk factors are reinforcing each other. We need to keep these four issues a risk and not a problem. With proper training, training analysis and risk management we can navigate these perilous times.

References

- 1. T Chanlland, SimSci North America 2007 Users Meeting**
- 2. A Fraser, SimSci North America 2007 Users Meeting**