Industrial Engineers Australia(IEA)
Incorporated as Institute of Industrial Engineers Australia(IIEA) in 1959
ACN 000 264 513 www.iie.com.au admin@iie.com.au

Industrial Engineering is concerned with the analysis, design, improvement, installation and management of integrated systems of human resources, data, finances, materials, equipment, and energy as safely as possible with minimum impact on the environment, delivered within a holistic methodology.
INDUSTRIAL ENGINEERS MAKE IT HAPPEN BETTER

The three key objectives of the IIEA are:-
1. TO UNDERTAKE AN ACTIVE AND VARIED PROGRAM FOR MEMBERS
2. TO PROMOTE AND ENHANCE THE TRAINING OF INDUSTRIAL ENGINEERS
3. TO PROMOTE AND CAMPAIGN FOR INDUSTRIAL ENGINEERING OPPORTUNITIES WITHIN INDUSTRY

NEWSLETTER 15-January/February 2023

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FROM THE EDITOR-David Karr(CP Eng, FIIEA)

Welcome to the second issue of the IEA newsletter for the 2022/23 year. We are back again for another interesting update of IE and the IEA.

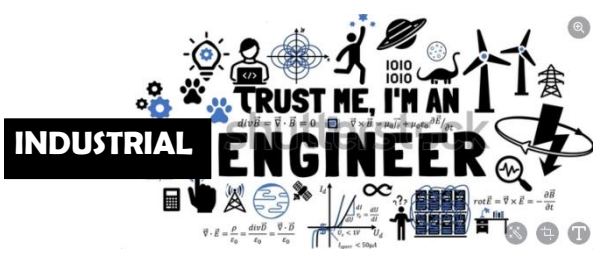
The IEA Newsletter thrives on interesting and updated articles regarding the world of Industrial Engineering(IE)

For this to occur, we need to have articles submitted by our members as well as from academia and industry.

To reiterate, at the recent AGM/IE Conference it was decided to **REQUEST AT LEAST ONE IE RELATED ARTICLE FROM EACH MEMBER EVERY TWO YEARS**.
This will allow our members to contribute to the organisation and to pass on their experiences. This is still a challenge.

As a trial, it is again requested that ALL members whose surnames starting with **A,B or C**. It would be appreciated if you could, provide an IE article detailed or just an A4, to the editor at editor@iea.org.au by **May 30th**.

Thanks to all those members who have already provided interesting IE articles.



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FROM THE PRESIDENT-David Karr(CP Eng, FIIEA)

Welcome to the January/February 2022/23 issue of our quarterly newsletter.

We welcome our new members:-

- Alexander Hyland
- Andrea Quintero Ojeda
- Alan Strang
- Garry Summers

I wish these new members well and hope they will contribute actively to IE and the IEA.

I met up with Andrea Quintero and welcomed her to the IEA. We discussed promoting IE in Australia as well as IE in Columbia.

I recently attended Engineers Australia WA Division's new office opening in Perth CBD.
The facilities are available to all members of EA and hopefully IEA members.

The 2023 AGM is planned for Saturday 14th October(TBA). It format will be either F2F/Online or Online only.

The IEA encouraging members to actively participate in the organisation by

- Regularly attending events(F2F or Online)
- Providing articles for the newsletter
- Participating actively in the organisation(committees/events)
- Promoting IE

As I mentioned at the AGM the objectives of the IEA for year 2022/23 include:-

- To undertake an active and varied program for members
- To promote and enhance the training of industrial engineers
- To promote and campaign for industrial engineering opportunities within industry

In this vane, there will be an exciting announcement by a large consulting company regarding IE positions in Australia.

The president recently met up with Assoc Professor Pawel Podsiadlo of IE Dept at Curtin University and Robert Eichfeld of Connors Group(www.connorsllc.com). regarding the training of IE students and workplace and employment of IEs in Australia. Watch this space.

Also there is a need for an active Board. The next board meeting is planned for Tuesday 21st February.

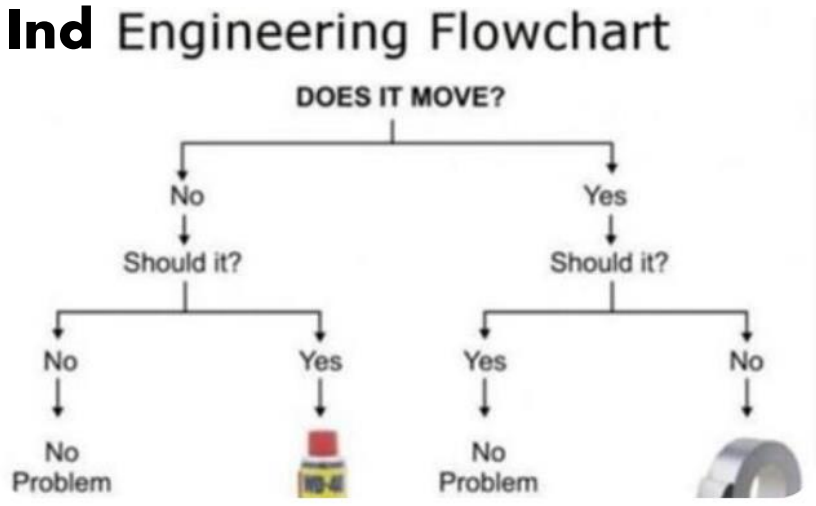
The website has been updated. All events are listed also is Past Events allowing access to previous events webinars. www.iea.org.au/events

The WA Division will be visiting the Rio Tinto Operations Centre at Perth Airport in March. The visit has been very long in the planning and will be very well received.

And finally there will be an Online MEET THE PRESIDENT MEETUP in Mid March. Details to follow.
If you have any queries, questions, please bring them along.

All the best for 2022/23 and keep active

David Karr(CP Eng, FIIEA)
Federal President



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FROM THE DIVISIONS

WA Division-David Karr(CP Eng, FIIEA)-acting

The WA Division will be visiting the Rio Tinto Operations Centre*RTOC) at Perth Airport 7TH March. The visit has been very long in the planning and will be very well received. RTOC is one of the most advanced remote operating centres in the world controlling and observing various remote and autonomous equipment.
Attendees will see live RT remote operations of the

- Haulage Trucks
- Drilling rigs
- Water Haulage Trucks
- Trains
- and ship loading

The visit will continue on from the presentation by Dr Chris Ware entitled Rio Tinto's Automation Journey in September 2022, which was attended by over 160 attendees.

NSW Division

An Autonomous Robots webinar is planned for April, to be presented by Konica Minolta

Queensland Division

Prof Charlene A. Yauch of the University of Wisconsin-Madison will be presenting a webinar on the Relevancy of IE in July.

Please refer to https://iea.org.au/events/

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TOTAL QUALITY MANAGEMENT (TQM): HISTORICAL LESSONS.

Alan Strang (MIIEA). January 2023.

Human Resources

For many years the Japanese have come close to perfecting their automotive manufacturing industries while being the envy of many countries. There are a few examples and one in particular, when the Japanese manufacturing management philosophy was transplanted into a re-opened GM Toyota joint venture, NUMMI, in Fremont California. The same USA GM automotive factory that was shut down earlier in 1982 due to amongst many reasons extreme alienation between labour and management.

When the factory re-opened in 1984, the new arrangement remarkably exceeded expectations. Surprisingly most of the workers except for a few Japanese advisors consisted almost entirely of the previous workforce. One of the many key contributing factors was the multiskilling of workers through training; this was knocked back at first by the union, but was eventually accepted due to the advantages, including making their jobs more interesting and the workers more employable. The more than 120 job classifications the union had set for the defunct factory were now reduced to only 4. The frontline workforce was divided into team members, team leaders and group leaders and consisted of multiple team rooms for team meetings, briefings, de-briefings and work breaks.

The Japanese Management system works with a decentralised, quality –orientated approach, carried through a team-based structure collectively known as “associates”. The four S’s, now 5S’s and sometimes 5 S’s +1(safety) were fundamental to ingraining the reformed workers with Toyota’s quality mindset.(Creech, 1994).

Quality

General society’s early adoption of the triangular relationship between speed, quality and cost has led to the idea that you can only attain two of these three areas, and inevitably accept willingness to cut corners. When you believe that offering fast and cheap is an option, it means you’re comfortable with providing a lower quality offering.

Finding a defect at the final product stage is aptly called “inspecting quality in”. TQM is all about building quality into the product from all areas, not inspecting it in.(Creech, 1994, p 46,51)

The Japanese believe that “quality is not a cost issue”. According to their philosophy the real costs come from poor quality which drives up cost by providing scrap, rework and warranty repairs. The term “quality is not a cost issue” in relation to Jidoka (quality principles) suggests that costs to create the quality mindset is minuscule when compared to beneficial returns and savings generated.

One past example of the above was in 1985 when a Honda Accord factory in Anna, Ohio introduced newly developed chassis sealant in order to have the best in the industry in terms of longevity and quality. The former chassis sealant prevented corrosion for approximately nine years in any climate, while the new sealant was good for at least fifteen years. The extra cost to provide the new sealant was not passed on to the customer because their overall approach to quality helped keep costs 2/3 down in other components. Even though the new sealant would not be appreciated until the second or third owner of the vehicle, the notion that people will notice older Hondas on the road and draw customers’ perception not only to the quality of the vehicles but also to their durability was enough to warrant the decision. (Creech, 1994).

Other Success Factors

In the above Honda factory, the gap between managers and workers were eliminated, by having the same uniforms, eating in the same cafeteria and having the same parking spaces. Japanese executives believe the gap is a natural consequence of allowing fault lines to develop between the two groups.

Another factor was the reward incentives which were in contrast to the standard USA industry practices where only managers received bonuses. For example, the basic wage for Honda frontline employees was the lowest in the USA auto industry, but the total compensation was the highest.

There were two bonus programs, firstly Honda paid an attendance bonus directly related to 30 days without being absent or tardy. Then the bonus was drawn day by day thereafter, should a worker default then the bonus is lost until the 30 day lead has been completed again. Secondly every associate from the president to the newest recruit received a scaled annual profit-sharing bonus which was substantial especially for the frontline team members. More than half of the associates had boasted a perfect attendance record. The absenteeism in Honda factories was as low as 2%. Japanese management make sure that the team has goals

that give meaning and substance to Kaizen (continuous improvement). Honda's just in time production arrangements extend well beyond component supply to virtually all aspects of the operations. (Creech, 1994).

Summary

Over the last 40 years, many things have changed and while it hasn't been all smooth sailing for the Japanese expansion into global manufacturing, Honda and Toyota have always been standouts in relation to automotive manufacturing. This is confirmed by their unwavering history relating to
ongoing sales, customer satisfaction and market share. The Japanese practise of Quality Principles continues to make the difference.

Besides the total quality management (TQM) (1980s) approach to improvement, there have been other overlapping singular and hybrid versions of approaches such as business process reengineering (BPR) (1990s), Lean (1980s) and Six Sigma (Initially a Motorola "total customer satisfaction"
objective) (1980s). All four of the approaches have their pros and cons, the latter has been criticised for not offering anything that was not available before, while BPR is often compared to early scientific management, very technical, but brutal to human resources. (Slack et al, 2022).

To be fair the Japanese didn't invent quality management, though they are extremely good at it. Nor did the Japanese adopt a complete blueprint of quality techniques and processes exported by American quality pioneers in the 1950s. The Japanese have been able to holistically apply all the 3/3
important aspects of quality management such as quality mindset and orientation in all activities; humanistic employee treatment; and decentralisation of management to provide empowerment to the frontline workers, and all of these and more are applied throughout their operations. (Creech, 1994).

The Figure below illustrates the overlapping approaches of various quality philosophies in two dimensions of improvement.

Four approaches on the two dimensions of improvement (Slack, et al. 2022)

References:

Creech, B. (1994). The Five Pillars of TQM: How to make total quality management work for you. Penguin. Slack, N., Brandon-Jones, A., & Burgess, N.(2022). Operations Management (10th ed).Pearson

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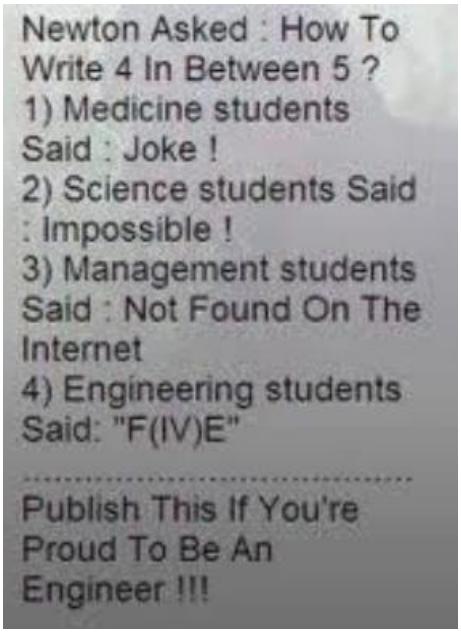

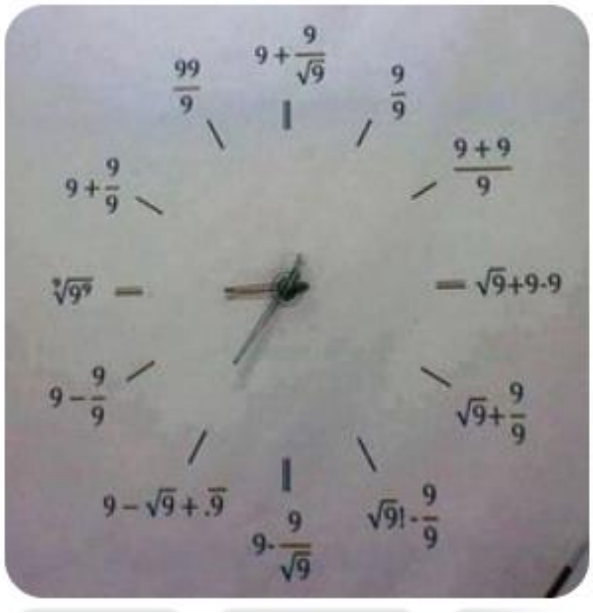

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LAYOUT PLANNING: BASED ON INDUSTRIAL ENGINEERING TECHNIQUES

S. Radha Krishnan FMS UK, MIIE Aust, EuroIEng, Grad DP UK. Deceased

Introduction

In brief

The prime objectives for Layout planning as summarised as:

- Reducing costs
- Improving Service/Operations
- Increasing Output
- Improving work place safety
- Improving working conditions
- Improving Maintenance
- Streamline process work flow

Where this improvement method is applicable

- Manufacturing shop floor
- Warehouses
- Inspection and Quality Control areas
- Laboratories
- Offices
- Service industries

Fundamental considerations for an effective layout planning Project

- Integration
- Utilization
- Expansion
- Flexibility
- Closeness
- Orderliness
- Convenience
- Safety

Types of layout

- Layout by Fixed Position / Material Location
- Layout by Process / Function
- Layout by Product

Methods of approaching a layout

- Instinct and Intuition
- Find one ready-made
- Full participation of Everyone
- Flow of Material

Main stages of layout planning

- Selection of Location. Various aspects such as financial

implications concerning logistics capital deployment and

various overhead costs to be worked out.

- General Overall layout. Traditional Industrial

Engineering techniques such as Operations flow charts,

Flow process charts, Flow diagrams and String diagrams

can be performed by a trained practitioner.

- Detailed layout. This has to be formalised after

consultation with personnel and associated cost benefits

of the proposed Layout project

- Installation. Once the above is approved by the

corporate management then the process of Installation

will take place under the guidance of an Industrial

Engineer.

Basis for layout planning

The following key aspects have to be considered prior

to a Layout planning study:

- P Product or Material
- Q Quantity or Volume
- R Routing or Process
- S Services or support
- T Time or Timing

Process

1. Improving the Process as a Precondition for Layout

Planning

2. Where applicable work simplification program has to

be carried out.

3. Apply Methods Engineering techniques i.e.: Motion & Time

Studies / MTM, Work sampling / Value Engineering

Material flow

To streamline the material flow the following Industrial

Engineering strategies are to be adhered to for optimum

efficiency

Effective Material flow

- Progressively
- Without detours
- Without back tracking

Material Flow Analysis

- Operations Process/Multi Product Charting/Process

Mapping

- Grouping
- Flow diagrams

Relationships

Activity relationship being determined by the following

process scenario.

Range A Heavy products or materials in large quantities

– High Importance

Range B Job shop Layouts (Tool Making)

Range C Service Shops (Maintenance, Laboratories)

Range D General Office and Administration Areas

Space

The following five major methods to determine space

requirements are:

- Numerical analysis and calculation
- Converting
- Space standards
- Roughed – out Layout
- Ratio Trend and Projection

The Practitioner has to balance or compromise what

is determined as space required with what can logically be

made available.

Material handling

When planning for an effective layout, Material handling

aspects have to be considered

A simple definition for Material Handling…

- Is handling of material
- Is not confined to the movement of items.

The practitioner has to target material handling by

defining handling systems and methods

So the Material handling Equation would be:

Material + Move = Method

Considerations while

planning for a layout design

The following aspects have to be taken into consideration

when at the problem definition stage of the proposed

project.

☐ Maintenance/Tool room

☐ Personal Requirements (locker rooms, canteen etc)

☐ Production Planning and Control

☐ Rework and Scrap Handling

☐ Site Conditions//Environment/Building features (

Windows ,Floor load, Ceiling height)

☐ Information Processing and Technology (Computer

Centre)

☐ Occupational Health and Safety

☐ Legislation and codes of practice

Approval and selection criteria

a. Selection Criteria

- Balancing advantages against disadvantages
- Simulation/Weighted factor Analysis
- Decision Analysis
- Cost Benefit Analysis

b. Approval process

- Corporate Management
- Installation / Maintenance personnel
- Occupational Health & Safety personnel

Installation procedure

- Who should make the move
- What to Move/Sequence of Move(s)
- New Equipment
- Phase in/Phase out of production

Problems associated

with layout planning projects

- Product might change/Quantity might change –

Unpredictable

- Scope of layout not clearly defined at Problem definition

stage

- In most cases there was no participation by the top

management

- Too many assumptions and no actual data
- Danger of getting too specific
- Schedule wrong

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