Mechanical Engineering Outlook 2008

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Some say mechanical engineering is a profession that exists in almost every industry; medical science, building construction, manufacturing, metallurgy, power generation, etc. Because it is so broad, the public may find it difficult to understand what exactly a mechanical engineer does.

Based on my personal experience, a friend once mocked my profession by asking 'Hey mechanical chairman, can you please repair my car?' Maybe some of us should give a thought to this matter or at least debate this issue over a cup of tea. After all, the 'identity' of a profession can be important, especially in our Asian context – the territory that is closest to our hearts.

IDENTITY CRISIS

If we take a look at the numerous mechanical engineering applications in various industries, the profession is always in demand especially in a growing economy, i.e. new mechanical engineering graduates will always be able to get a job anytime. However, such an 'advantage' comes with a price tag – it confuses the employment and academic industry.

Universities find it difficult to tailor their curriculum to meet the industry's needs because the application of mechanical engineering is too wide. Employers also find it very difficult to identify the right candidates who would be able to fulfill their job requirements perfectly. 'You say that you are a mechanical engineer, so how come you can't weld?' – déjà vu?

Technically, in the context of the building construction or oil and gas industries, the definition of 'mechanical' roughly means the 'mobilisation of fluid (air / water) via physical processes' which covers a mechanical engineer's role in fire protection, water reticulation, ACMV and natural gas, etc.

On the other hand, in the context of power generation, plant and machineries, we can roughly define the profession as 'physical activities that generate works (energy, processes)'. To add to the confusion, linguistically, there isn't an adequate Chinese translation for the term 'mechanical engineering'; 机械 is 'machine / kinematics' and 水力 is 'hydro' – so who are we actually?

The challenge is more philosophical rather than economical. The profession survives and continues to flourish for so many years despite having such an 'identify crisis' issue. Perhaps this is not an issue at all. In fact, few people may give much thought to it until someday, we find it cumbersome to explain to others what we actually do or run out of space to describe what we do in our business cards.

FINANCIAL RELEVANCY

Under the context of building services, a mechanical engineer's roles are extensive but the economy significance is less trivial – or made less trivial, despite the fact that it typically contributes to 15-20% of a project's total costs. Unfortunately, this 'heavy weight' component is often treated as one of the best avenues to exercise 'cost rationalisation', compromising on equipment efficiency and system longevity.

A 'cost savings' design approach is more prominent whereas 'operational efficiency' and 'maintenance friendly' is often paid less attention. The industry needs to be awakened from this passive engineering approach as this promotes inferior equipment employment and demotes quality value engineering practices. Who needs a good engineer if good engineering products are no more in demand?

Although 30-40% of a building's operational costs are from mechanical and electrical systems, the 'operator's burden' is seldom the 'installer's concern'. Traditionally, a project department's KPI is 'cost savings' and the operations department's KPI is 'operational efficiency'. Unfortunately, these two are mutually exclusive, and someone has to do some balancing work somewhere.

Traditionally, mechanical engineers in the power generation industry face fewer challenges of this nature. Most business decisions are made based on detailed simulations of system configurations, efficiencies control and equipment selection. This is achievable, perhaps due to the significance of quality engineering to the economic value of the results; high efficiency = high electricity generation = more profit.

But in the building services sector, things are relatively less exciting. High efficiency system designs may cost more to install but the relative payback in terms of potential cost avoidance in electricity wastage may be less significant. Occasionally, there are poorly engineered buildings situated in very prime locations which can fetch very

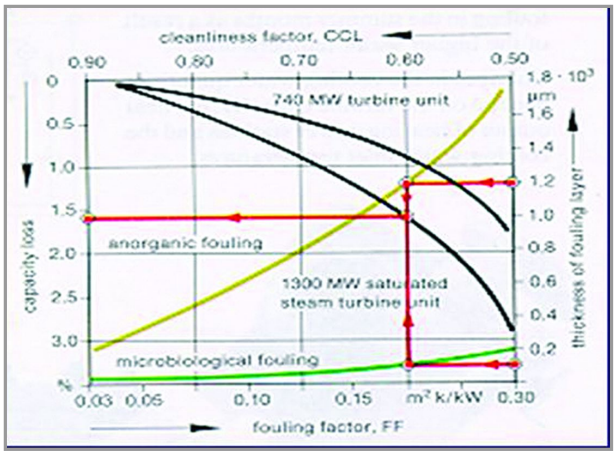

Chart 1: A local power plant's in-house optimisation initiative shows increasing cleaning frequencies from 0.2 – 5.65 per tube per day and running vacuum priming pump 15/shift can bring forth improvements of 10-12mb condenser vacuum. A typical day-to-day efficiency improvement initiative in the power plant industry. (Chart courtesy of Engr. Luk Chau Beng)

good real estate yield, hence it may outweigh the significance of energy inefficiency. Especially for 'build and sell' projects, maintenance/operational inefficiencies are seldom a builder's concern. Some speculate that people will only start to pay attention to the efficiency of a building when the electricity tariff rate doubles.

UNEXPLOITED PASTURE

A mechanical engineer's role in post construction is comparatively less significant compared to other technical specialties – technically and authoritatively. Typical building operations often require more electrical works than mechanical, mainly because maintenance for mechanical equipment are typically contracted out and require less day-to-day attention compared to electrical & electronic systems.

Besides, under the associated commissions' requirement, there should be a qualified 'chargeman' employed to oversee the electrical systems in accordance to any system complication (i.e. A0 for LV, B0 for MV). As for external specialist services, there is a requirement to have a building's electrical system 'supervised' by a competent electrical engineer on a regular basis.

The absence of such mandatory needs for mechanical services in building operations has indirectly resulted in the least economy value for mechanical engineers in the post construction sector. The earlier shout about on the renewal requirement of a building's annual 'fire certificate' also did not significantly improve the situation because this exercise still has not made anything 'mechanically mandatory' yet.

But lately, the dawn of 'energy management' services has opened up a new economy avenue for mechanical engineers. Basically, this is leveraging on a mechanical engineer's knowledge to improve the efficiencies of mechanical installations (which is the main source of energy losses). However, it is a very difficult task to produce 'savings' in a post construction environment.

Most of the time, 'significant savings' can only be achieved with substantial alterations to an existing system or the introduction of costly energy efficiency measures which makes the ROI less attractive to a building owner. And the worst part of this business is to get paid from a cut of the little 'savings' which is certainly not exciting at all.

Engineering decisions made on commercial buildings should be relevant to the estate value

Another more positive approach for mechanical engineers to venture into the building operation industry is via 'facility management' or 'value engineering'. Principally, M&E installations on a building have a direct impact on the 'tenantability'.

For example, modern coffee houses require 3phase supplies and power sockets for every table to cater for laptop users. The odd operation hours of such businesses also require a standalone air conditioning system instead of a shared system (e.g. sharing with the main shopping mall's system).

Hence, the absence of such facilities will indirectly reduce the economic value of these properties. Therefore, there is a new economic vacuum in the marketplace for mechanical engineers to provide value added M&E services to improve property yield in both the pre- and post-construction environment, especially in modern integrated development projects with complex M&E requirements.

The Terminal Two Shopping Complex in Era Square, Seremban – a typical modern integrated construction combining commercial, leisure and infrastructure activities in a single bloc development. Despite its size, it has incorporated split ACMV system for multi tenants, only require LV intake for the common area and each tenant has their own direct TNB meter.

CONCLUSION

Building operators and property investors have learnt two very hard lessons in the past. Firstly, overspending on construction delays the ROI and overlooked system efficiency which burdens the operation costs in the long run. Complicated architectural and M&E installations that do not benefit energy efficiency and the commercial property tenantability is as good as a white elephant.

Engineering decisions made on commercial buildings should be relevant to the estate value (besides compliances and associated architectural value), and such thought pattern warrens an innovative or even expensive engineering investment – because such costs can be easily recovered with good rental collection in the future. This is certainly a very unique capacity that mechanical engineers should be able to offer to the market place.

There is a need to further enhance the economic value of a mechanical engineer's 'value added' services. Perhaps this is more of a marketing effort rather than a technical one. Mechanical engineers know what is best for an application most of the time. However, the extra effort to elevate an ordinary 'compliance' based on an 'operational efficiency'. ■