

Value of Product Certification to Professionals

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1. Quality Construction

- We design, we build and we construct to deliver value.
- We deliver value by upholding standard to ensure quality construction.
- Needless to say, quality construction is to provide utility and infrastructure for improving our quality of life.
- Quality construction is also to develop while maintaining sustainability.
- Quality construction demands foresight in planning, careful design for performance and minimization of adverse environmental impact, and good management and site supervision during construction.
- However, at the end, the quality of construction is heavily dependent on the quality of materials and components used.

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2. Quality of Materials and Components

- Quality is not the same as performance.
- Performance: how good is the average (sometimes mistaken as how good is the best)?
- Quality: how good is the worst?
- We, who have to deliver, are more concerned with quality (or both quality and performance).
- For instance, in the design of structures, we use the characteristic strength rather than the mean strength to ensure safety.
- Another example: a concrete producer has to ensure that every truck load of concrete produced (even the worst truck load) complies with the specification.

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3a. Materials Engineering and Quality Engineering

Knowledge of materials:

- All construction professionals have to have some basic knowledge of materials, because they hold the ultimate responsibility of the quality of construction.
- However, very few have good knowledge of materials. In fact, materials engineering is a highly specialized area and materials engineers are more like specialists.
- Another problem is that materials engineering advances so rapidly that often certain materials technology can become outdated within a few years.
- As a result, most books on materials are outdated. Even materials engineers who are not persistent enough in life-long learning could become outdated.
- So, how can you expect construction professionals to consistently keep themselves updated about materials?

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3b. Materials Engineering and Quality Engineering

Knowledge of quality:

- Quality engineering is a discipline by itself. It belongs to industrial engineering but most industrial engineers are not familiar with construction materials.
- All construction professionals have to have some basic knowledge of quality, because they hold the ultimate responsibility of the quality of construction.
- It then comes to a difficult situation. Whilst construction professions have to be good in planning, design and management of construction, they have to know materials and quality as well.
- Another problem is that quality engineering also advances very rapidly. Even materials engineers have to learn very hard to keep themselves updated in quality.
- So, why don't you leave the issue to professionals who specialize in materials and quality engineering?

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4a. Product Certification

Traditional quality assurance:

- It takes regular samples of the as-delivered materials and components for quality control testing so as to evaluate actual quality and verify compliance with specification. There are, however, four major problems.
- First, construction professionals have to rely on themselves, regardless of whether they are familiar with materials and quality engineering.
- Second, the engineer in charge of quality in a certain project has only limited test results for statistical analysis to detect outliers and/or system change.
- Third, the quality may vary a lot and despite regular sampling and passing of all tests, there is still a risk that some of the materials and components used are of inadequate quality (the consumers' risk).
- Fourth, materials/components supplied to many projects have to be checked again and again in every project.

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4b. Product Certification

Product certification - performance attributes:

- Manufacturer with legal identity to specify product with clear identification (brand name) and details of performance in various aspects.
- The performance attributes include those affecting its as-installed performance and compliance with specification requirements, such as dimension, strength, serviceability and durability. These are usually clearly specified by the designer in the contract documents.
- The performance attributes should also include those affecting its quality due to installation limitations, such as heat treatment needed during welding, environmental control needed during curing, pot life, open time, workability retention time and workmanship requirements. These are often not stipulated in the contract documents but can cause trouble.

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4c. Product Certification

Product certification - quality system:

- Manufacturer to establish a quality system for the specific product to be certified.
- Manufacturer + product + associated quality system to be subjected to quality audit by a Certifying Body.
- Certifying Body to be accredited by the HKAS of the ITC of Hong Kong SAR Government in conjunction with materials and quality experts in the field.
- The quality system is not just a general management system like ISO 9000. It has to give every details of the raw materials used, manufacturing process, equipment, personnel including qualification and training provided, testing procedures, process monitoring, calibration, maintenance, warehousing, delivery and complaints handling etc. Through regular auditing, it has to be updated from time to time as a kind of continuous improvement.

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4d. Product Certification

Product certification - upstream quality assurance:

- We check the raw materials, the production process and the quality of the product before delivery. That is why it is an upstream quality assurance scheme.
- Manufacturer has to have all the set up for process monitoring and quality control etc before applying for product certification.
- It requires a certain overhead cost but is vital to quality.
- It takes 6 to 12 months to seek product certification and is thus not for short-term tailor made materials and components supplied only to small number of projects.
- It is more for regularly produced materials and components consumed in large quantities.
- It is best for materials and components supplied to many construction projects because product certification needs to be done only once.

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5a. Value of Product Certification

Benefits to manufacturers:

- Product certification is sometimes mistaken as an additional overhead to the manufacturer.
- However, the manufacturer bears legal liability to any damage caused by inadequate quality of the materials and components supplied to the market.
- At the least, the manufacturer has to pay for the replacement of any defective material or component.
- The cost of replacement is often much higher than the material cost. For instance, the concrete producer has to pay for the cost of concrete, steel rebars, formwork and reconstruction if the concrete cast is defective.
- The risk to the manufacturer is very high and therefore good quality control is needed in any case.
- Product certification can help to continuously improve the manufacturer's quality system.
- Upholding of quality promotes fair competition.

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5b. Value of Product Certification

Benefits to construction professionals:

- Inadequate quality causes damage, nuisance, hidden defects, potential safety and durability problems. But most important of all, it leads to legal liabilities.
- Construction professionals are responsible for the quality of the materials and components they employed in the construction regardless of whether or not they have good knowledge of materials engineering.
- The best is to employ a materials engineer to handle all the materials and components to be used in the works.
- The second best is to rely on product certification. Use only products certified by an accredited certifying body.
- The worst is to pretend that you know materials. Bear in mind that the risk to the construction professionals is also very high.

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5c. Value of Product Certification

Benefits to clients/developers/owners:

- Materials and components are often inadequately specified or even wrongly specified by construction professionals who have little knowledge of materials and quality.
- Product certification would at least ensure compliance with established standards.
- Product certification would help to reduce the risk of incorporating defective materials/components in the permanent works (the consumers' risk).
- The certifying bodies and their experts are more knowledgeable in the fields of materials and quality. They can help to relieve part of the work load and responsibilities in quality assurance of construction professionals.

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5d. Value of Product Certification

Benefits to construction industry:

- Overall, product certification would raise the quality standard of the materials and components that we use in construction works.
- With quality standard upheld, bonafide manufacturers can compete in a level playing ground. This would promote fair competition instead of cut-cost competition that would jeopardize quality.
- With upstream quality assurance in place, the sampling rate of as-delivered materials and components can be reduced. Particularly good for products supplied to many construction projects at the same time.
- With product certification in place, the approval process by authority should be easier.

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5e. Value of Product Certification

Benefits to society at large:

- With no quality materials and components, there will be no quality construction.
- With no quality construction, there will be no quality infrastructure.
- With no quality infrastructure, there will be no quality of life and no sustainable development.
- Testing and certification (i.e. quality engineering) is an industry by itself. It is one of the six economic pillars of Hong Kong. It may not be a very profitable business, but the manufacturing and construction industries that it supports rely very much on it, which gives us the brand name of "tested and certified by Hong Kong".
- If we are good in testing and certification, we can even extend our business circle to China and South East Asia. This can help us to create jobs, which is in great demand, especially during economic downturns.

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6. Epilogue

- The two major ingredients for industrial development are: **quality** and **innovation**. We all talk about innovation for added value. But very few people understand how important quality is. I would say that quality is at least as important as innovation.
- Testing and certification is not just for the construction industry but the construction industry would benefit from the better quality and reduced risk that would come along with product certification.
- However, one major hurdle is lack of quality culture. Quality engineering is usually taken as a branch of industrial engineering and for this reason, many construction professionals have little knowledge of testing and certification.
- This seminar is very timely, but just one is not enough.
- Let's work together to promote "certified by Hong Kong" as a brand name.

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That's the end.
Thank you for your attention.

