The inevitable advance of technology in engineering

By Paul Fitzsimons

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To compete on the world stage, South Africa will have to adopt global engineering and construction standards and technologies. While some industries such as FMCG, automotive and financial have been innovating for years, other industries such as engineering need to accelerate their efforts to keep abreast of global trends.

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In the past, change in the engineering industry was more evolutionary than disruptive and the sector has been slow to adopt new technologies. It is only in recent times that disruptive technologies and processes have caused inflexion points in how the industry operates.

Adopting advanced digitised practices

Now engineering firms are rapidly adopting more advanced digitised practices and recognising the need to become more agile. Only by adopting new technologies quickly, training their people, getting new processes up and running and adjusting their pricing to market will engineering firms be able to remain competitive in an increasingly volatile space.

For many years the engineering industry followed specific, largely paper-driven processes to deliver solutions. For example, the building of a transport, powerline or pipeline route requires an initial feasibility study of the proposed route by the engineer. Traditionally, this initial data gathering stage required “boots on the ground” and could take months to complete.

In the past few years, however, the engineering field has witnessed significant changes in terms of technological innovation. Today, the presentation of alternative routes can be delivered to a high degree of accuracy using satellite or drone technology and this can now happen in a matter of days.

Building information modelling

A current innovation that is transforming the engineering industry is building information modelling (BIM), originally a collaborative digital process used to design buildings using a coherent system of computer models rather than separate sets of drawings. This results in better coordinated and more consistent information, which creates efficiencies throughout a project's lifecycle.

Today, BIM is fast becoming the international standard for the design, construction and operation of buildings, roads and rail, utilities, process plants, oil platforms, ships, factories and mines, amongst others.

It begins with the creation of an intelligent 3D design model. The model is then used to facilitate coordination, simulation and visualisation, as well as help owners and service providers improve how a facility is planned, designed, built, operated, maintained and finally decommissioned. Ultimately, BIM is the marriage of technology with a set of work processes, where everyone involved must work together as a true multi-disciplinary team.

Sharing critical information

BIM allows critical information to be shared with workers on a construction site as well as from one site to the next. That 3D model will tell builders if they are standing in the right place, where to knock the peg in and, after the building is completed, produce as-built drawings. After the building is completed, BIM allows for owners or service providers to walk through a building with a tablet, scan a piece of equipment and get the part number, characteristics, last-serviced date, and all other data needed to keep the equipment running.

Taking the digital process a step further, a 3D model can be imported into a 3D printer to produce building components.

Increasingly, digital data capture will be used in the engineering process. Drones will be used to inspect sites and capture data and robots will be used to build off a 3D BIM-style design. The role of engineers will be to design and oversee the process, and to consider whether something makes engineering sense and what standards the computer needs to design to.

Compelled to adapt

BIM will bring the engineering industry forward and organisations will be compelled to adapt. Internationally, such approaches are increasingly being integrated into public sector development standards. By way of example, a law passed in the United Kingdom in 2010 required that every government project commencing after 2016 be BIM level two compliant, with energy reduction as the main driving force.

Ultimately, South Africa needs to develop a sustainable approach to such issues regarding adopting global engineering and construction standards. Large multinational companies wanting to invest in facilities on South African shores may well expect companies competing for the engineering and building business to meet such global standards. Failure to do so could well decrease local productivity and competitiveness.

ABOUT THE AUTHOR

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