Carving Out a Digital Future for EPC Industry with Business 4.0™

Abstract

The EPC industry faces a unique set of challenges. Investments in the Oil & Gas and construction sectors have been slowing, leading to tougher contracting, growing market consolidation, and increasing competition from firms in rapidly growing economies such as China and India. How can firms in the industry successfully combat the challenges? Adopting a Business 4.0 framework, which is essentially, an integrated and holistic strategy that helps create an efficient ecosystem of technologies and stakeholders to enable digital transformation, will be key to driving growth.

The USD 10 trillion EPC industry continues to lag other industries in digitization despite the fact that its end customers are whole-heartedly embracing digital transformation (DX). It’s time EPC players take note of the massive digital opportunity and reimagine business models and processes to not just survive, but thrive in the new reality.

The paper explores the challenges faced by EPC players in going digital, and the role technologies such as Big Data, Artificial Intelligence (AI), Internet of Things (IoT), and Augmented and Virtual Realities (AR and VR), can play in future-proofing the industry.
EPC and digital transformation: What ails the industry?

While retailers, banks, airlines, and other industries are making the most of the data deluge, what keeps EPC companies from embracing the digital wave at the same pace? Here are four key challenges that stand in the way:

1. **Disconnected ecosystems:** Today’s EPC companies are producing humongous amounts of data, typically dispersed across disconnected legacy platforms. Collecting and aggregating this data between systems involves multiple touch points, resulting in increased errors, greater security risks, and fragmented decision-making. In many cases, data is not available and if available, data quantity and quality does not justify the application of transformational initiatives.

2. **Lack of standardization:** EPC companies deal with a variety of construction-specific challenges. These include projects spanning multiple sectors, geographies, and levels of sophistication. In addition, rapidly growing project scale and complexity require constant recalibration. Standardized digital platforms will be critical to ensuring process efficiency, safety, and quality, in turn, driving faster adoption.

3. **Incomplete visibility:** The lack of holistic visibility makes it difficult to effectively communicate the ROI of large-scale investments. This prevents decision makers from realizing the benefits of digitization across the value chain. According to PwC projects, by the year 2030, global construction output will grow to USD15.5 trillion. This means that even a 1% reduction in costs would result in savings of over USD 150 billion.¹

4. **Lack of digital engineering talent:** The EPC industry’s talent crisis is twofold. An ageing workforce that is resistant to change and a younger digitally-savvy generation that does not favor the EPC sector due to its traditional ways of working.

Tackling EPC challenges through digitization: Role of emerging technologies

With Industry 4.0 ushering in rapid disruption, digitization efforts in the EPC industry will need to go beyond cost improvements and operational efficiency. EPC companies must embrace the risk of transitioning from manual and legacy systems to agile, automated IT and business models. Here’s how next-gen technologies can help EPC companies deliver on the mandate:
- **IoT-enabled monitoring and maintenance**: With IoT enabled equipment and devices generating data every second, the growth in data volumes is expected to outpace the amount of data that can be analyzed. EPC companies must therefore enable an IT environment that can handle or connect with customer's asset monitoring systems across projects using a framework that integrates customer data with knowledge of customer’s existing systems. Today’s EPC customers demand a complete service experience that goes beyond construction and equipment installation. IoT sensors and connected devices can help EPC firms deliver quality support – a critical after-market success enabler. Machine-to-Machine (M2M) intelligence gathered through connected machine data can help field service executives deliver proactive service by identifying and rectifying issues quickly. Moreover, continuous monitoring of heavy equipment in real time enables predictive maintenance strategies to prevent equipment breakdown or malfunction, optimize spare parts inventory, and boost equipment and worker safety. Connected machines also provide information on idle time and capacity utilization, enabling companies to adjust after-hours-lighting, maximize resource utilization, and save fuel and power.

- **Big Data for smarter design and inspections**: Building Information Modeling (BIM) with Big Data integration can help EPC teams seamlessly plan, design, construct, and manage building structures using 3D virtual models. Once a 3D model is generated, site images with dimensions can be pulled up in a mobile app. This helps inspectors take a
picture or video in real time and check the dimensions, saving considerable time and money. Drones can be used to measure dimensions of tall structures such as bridges and cell towers or other risky areas, providing a safe and secure means of inspection. Drones also help in delivering tools, parts, and consumables to workers. Camera feeds from drones can be used to comply with Health, Safety, Security, and Environmental (HSSE) requirements by analyzing the data gathered from inspection sites. According to PwC, the infrastructure sector is leading other industries in the rate of adoption of drones at over 35%.

- **AI-driven intelligent automation:** AI systems that are tightly integrated across functions and applications are critical for EPC firms in industries such as Oil & Gas, Utilities, Mining, Real Estate, Construction, and Transportation. Customers in these industries expect EPC companies to integrate design of new assets with state of the art analytics capabilities to improve their production efficiencies and lower total cost of ownership (TCO). For instance, solutions around design data will need to consider the context, choose the design parameters, benchmark similar designs, and mix and match iterations to arrive at the optimal design. EPC firms must also be able to assimilate and visualize the data to enable ‘optioneering’ i.e. presenting optional designs, within a short time frame. This enables decision makers to evaluate different design perspectives at the proposal stage in order to iterate and arrive at a final workable solution. Leveraging AI solutions, EPC companies can also integrate and analyze data from architects, engineers, and construction professionals to accelerate the design, verification, and planning phases. AI can assist project managers in demand forecasting and scheduling during the long design and planning lifecycle. AI-driven on-site automation can further boost worker productivity by leveraging transportation route optimization algorithms for time and fuel efficiencies. Volvo Construction Equipment leverages Volvo Co-Pilot, an AI application that delivers a range of intelligent machine services such as Load Assist, Dig Assist, Compact Assist, and Pave Assist on various machines like excavators and pavers.

- **AR and VR for superior safety, communication, and training:** AR and VR applications enable EPC companies to improve overall construction outcomes. Use cases of VR technology in EPC range from creating structure walkthroughs and plan reviews to addressing the training
needs of new project inductees and disseminating real-time knowledge from older workforce to younger on-site field staff. AR on the other hand, can help superimpose construction blueprints over the existing elements, minimizing chances of jobsite error simultaneously enabling virtual feedback on real-world progress.\textsuperscript{v} Engineering leader Atkins extensively leverages VR to engage stakeholders in the design process, improve project collaboration, and drive innovation.\textsuperscript{vi}

**Building the next-gen operating model**

As tech startups in the industry create new tools and applications to change the way EPC companies plan, design and build, incumbent players must ditch the ‘operating within contract scope’ mentality and adopt an ecosystem approach. In line with the Business 4.0 framework that emphasizes leveraging an ecosystem approach for large-scale transformation, EPC firms should forge non-traditional partnerships with universities, or other industries such as retail, or telecom, where data-driven applications have matured. Take for instance, the partnership between engineering firm Atkins and EE, Britain’s largest mobile operator. Atkins leverages EE’s mobile usage data to create better driving experiences for road users in the UK.\textsuperscript{vii}

For digital transformation to take hold successfully, solid commitment from all stakeholders and complete executive buy-in are critical prerequisites. DX will create exponential value for each stakeholder. While for the business, it would translate into superior customer knowledge and optimized operations, costs, and risks; for customers, it would mean an unmatched experience across touchpoints and channels. Emphasizing the value that digital transformation is likely to create for each stakeholder and providing training opportunities to help employees upgrade their skill sets can rapidly drive positive transformation outcomes. EPC players that place the right bets on digital transformation today by transitioning to a Business 4.0 model will be the frontrunners in the age of Industry 4.0.
References


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Pramod Mirji is Lead EPC Domain SME in Energy & Resources ISU of TCS with 23 Years of EPC industry experience in engineering consulting, project management, overseas market development for Oil & Gas E & C, Petrochemicals, Power & Cement sectors. He has been engaged with TCS for 4+ years providing IT consulting to customers in Capital Projects with total industry experience of 27+ years. He is a Mechanical Engineer of 1990 batch with an E-MBA from SPJIMR, PGD in Geomatics from C-DAC and Fellow with Institution of Engineers, India. He is a Life member of Indian Society of Geomatics and Indian Society of Remote Sensing.

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