EXL

# HOW DIGITAL IMPROVES ENGINEERING AND MANUFACTURING ORGANIZATIONS

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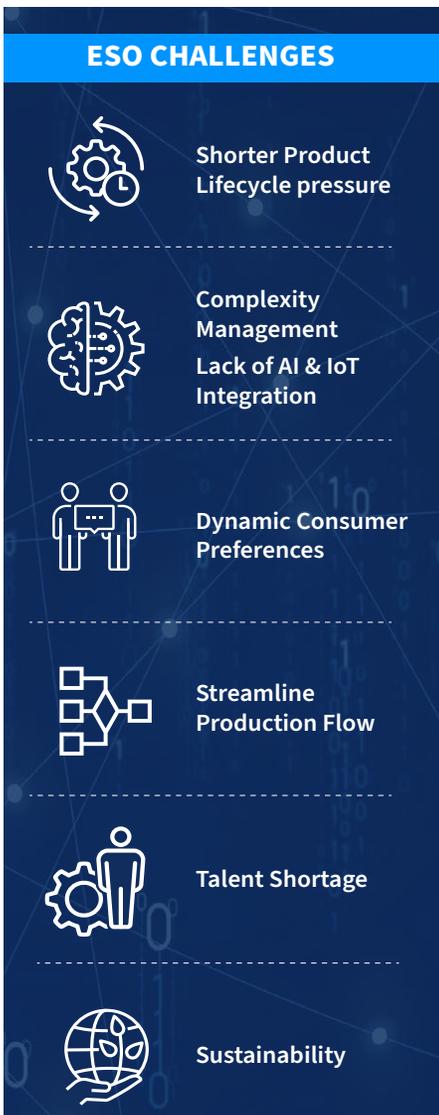Engineering Services Offerings
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# Introduction

The global engineering services offerings (ESO) market crossed USD 1.6 trillion in 2020, and is expected to grow at a CAGR of ~23% from 2021 to 2028. This increase has been driven by digital engineering becoming a new growth engine for the industry. The combination of next-generation technologies and the use of engineering and product data analytics is transforming the entire value chain, delivering a multi-fold impact on cost and efficiency. Organizations that are able to adopt transformative tools and technology solutions through strategic partnerships with ESO partners will be well-positioned for success in the future.

| Before 2002 | 2002 - 2009 | 2010 - 2017 | 2018 onwards |
|---|---|---|---|
| Cost Advantage | Capacity Extension | Team Expansion | Collaborative Innovations |

**ENGINEERING SERVICE OFFERINGS JOURNEY**

# Pain Points/Key challenges within the Industry

## ESO CHALLENGES

- Shorter Product Lifecycle pressure
- Complexity Management Lack of AI & IoT Integration
- Dynamic Consumer Preferences
- Streamline Production Flow
- Talent Shortage
- Sustainability

1. **Shorter product lifecycles** Organizations are facing pressure to accelerate their product-to-market speeds. This can create a strain on engineering workforces, as well as higher costs associated with developing quicker design and manufacturing processes.

2. **Complexity management** The design process, as well as their associated products, can be highly complex. This complexity may result in redundancies and errors during development, hindering productivity.

3. **Lack of effective AI & IoT Integration** A critical challenge facing manufacturers is finding the right tools to support their operations. With the advent of AI, the Internet of Things (IoT), and other innovative technologies, manufacturers are under strain to find ways to integrate these new tools with their current processes.

4. **Dynamic consumer preferences** Manufacturers must account for ever-changing consumer preferences that can necessitate rapid changes in product designs.

5. **Streamline production flow** Today's business environment demands agility and scalability. Additionally, the need for standardization and constant re-evaluation of existing practices also becomes an important factor when improving the engineering design process.

6. **Talent Shortage** There's a growing demand for a shrinking pool of engineering talent, resulting in a large skills gap in the manufacturing industry. Many organizations are seeking trusted partners to help them overcome this challenge

7. **Sustainability** The demand for sustainable products is increasing multi-fold on both an economic and environment level. Reducing product costs while maintaining sustainability has become essential.

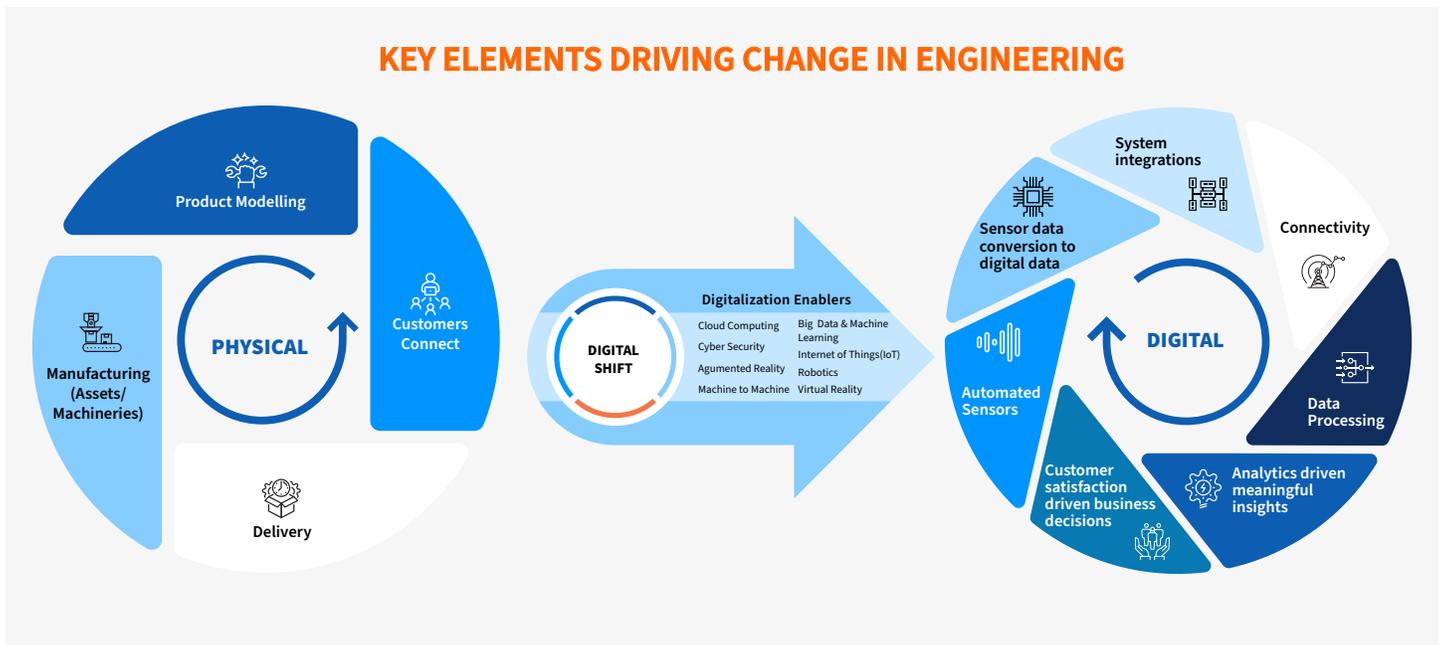## COVID-19 and the need to speed up Digitalization

COVID-19 tested every businesses, but the engineering and manufacturing sector was one of the hardest hit segments. Disrupted supply chains, reduced demand, and a shortage of workers and raw material brought several production houses to standstill.

As the world recovers from COVID-19 enters a new normal, digital transformation has become a priority for the engineering industry. The engineering and manufacturing sector has realized they require speedy digital interventions for improved resilience and to stay competitive in the new environment.

**"Expensive quick fixes are helping the companies endure COVID-19 but they are not sustainable over a prolonged period of heightened volatility"** CEO Rohit Kapoor, EXL

With most of the customer and company interactions moving online, it has become imperative for organizations to improve their technology and digital transformation initiatives beyond just traditional cost-cutting efforts. The epidemic has shown the industry it needs to develop flexibility for times when workers can't physically be in factories or plants. Increasing synchronization by leveraging AI has also become a new focus area as organizations look realize the benefits of a lean and resilient supply chain. Additionally, digital transformation can improve the overall visibility on the processes for a manufacturing company, helping companies create a command center for their distributed plants and warehouses.

Digitalization is going to play a key role to help build agile factories of the future by extending automation and analytics to all parts of the supply chain. Those who have not yet begun their digital initiatives are at risk of lagging behind to those who are aggressively pursuing digital transformation.



KEY ELEMENTS DRIVING CHANGE IN ENGINEERING

## Digitalization

Engineering service providers (ESPs) have changed their focus from providing traditional solutions to original equipment manufacturers (OEMs) to offering advanced solutions for each product, catering to the ever-changing customer needs. With the advent of technological disruptors, ESPs are currently leveraging these partnerships for product design and development. Digital transformation services and technological improvement ensure innovation and operational integrity, and have become an important part of ESPs portfolios. These technologies include:

**Artificial Intelligence (AI):** Most engineering information is in the form of drawings, documents, 3D models, letting the AI technologies like machine learning and NLP (natural language processing) can enable computers to read and process engineering documents and drawings effectively. This can help reduce the amount of manual interventions and improve productivity. By using different algorithms and data, AI can play a critical role in product design services including designing 3D structures, quality control, and product manufacturing.

**Robotics Process Automation (RPA):** Engineering and manufacturing firms often issue thousands of monthly invoices, with each invoice requiring multiple supporting documents. The whole process, if done manually, can be prone to errors and inefficiency. This can also lead to days sales outstanding (DSO) delays. With the help of RPA, a solution can be developed to streamline these activities. RPA can fetch all the required information from a database. The implementation of RPA can help in reducing turnaround times and reduce manual errors.

## Data Analytics

Emerging digital trends, the need for a reduced time-to-market, and increasing competition have augmented the need for engineering analytics. With the availability of vast amounts of data, business decisions based on analytics have become essential. In engineering world, some of the vital areas where data analytics has been of tremendous help are:

**Product Cost Optimization:** Engineering analytics can be applied to various phases of product development to reduce costs. Using analytics techniques, the optimum cost for designing and developing various models can be determined. Product longevity analysis that tests different design models and measures product feature compatibility with customer demands can also help create a product at minimal cost that meets end-customer expectations.

**Predictive Maintenance:** The Internet of Things and machine learning enables organizations to capture data from different machines, sensors, and equipment. This data can be used to perform predictive maintenance to avoid equipment failures and reduce maintenance cost. This kind of analytics involves both structured (information about the machines) and unstructured data (information about the machine maintenance) to gain meaningful insights.

**Project Risk Analytics:** A proactive approach to identify the feasibility of big engineering projects is always useful when making decisions. Data modelling by analyzing historical data on project size, labor type, contracts, project spending can be used to develop what-if scenarios that help determine the probability of a project's success.

**Master Data Management and Visualization:** Most engineering organizations have multiple systems, sensors, and applications generating humongous amounts of data. However, this data is of no value unless it can be converted into meaningful insights. Engineering analytics can integrate and transform data from multiple platforms into an easy-to-understand format. Further, the data can be made visually effective by using dashboards to get the insights at a glance.

## Benefits of Digital Transformation

1. **Access to Data, Anywhere, Anytime:** The amount of remote workers has increased. Having data on the cloud lets employees access it remotely and collaborate with their teams in real time.

2. **Enhanced Productivity:** Digitization leads to automated processes, allowing employees to focus on critical work rather than repetitive tasks, resulting in more productive team.

3. **Evolution in Design:** With the advent of virtual and augmented reality, smart technologies have made virtual models and simulations feasible.

4. **Cost-Effective Processes:** Technology building information modelling enables engineers to create and test digital models, reducing the overall cost of product designing and manufacturing.

5. **Improved Customer Experience:** Building digital models allows engineers to share the models with customers in real-time and take their inputs. The customer's higher involvement in product design often leads to a better customer experience.

6. **Efficient and Secure Process:** Digitized data is more secure than the physical models or paper designs. Also, any change requests from customers can be efficiently dealt with in real time.

## Conclusion

Digital transformation in the engineering world is radically changing industrial manufacturing. Factors including remote access to data, virtual designing, incorporating customer feedback in real time, automating processes using AI, machine learning, and cloud computing are revolutionizing ESO. This includes areas including designing process, sale quote creation, order management, and master data management. It is essential that the industry swiftly adapts to these changes to drive innovation and optimize business processes.

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