

Shifting towards Disruptive Business Model with Industry 4.0

K-One Technology Berhad



K-One Technology Berhad (together with its subsidiaries, jointly known as K-One) is a technology solutions provider. It is driven by two key businesses; a) OEM/ ODM of Internet of Things (IoT) devices, healthcare/ medical devices, consumer electronic lifestyle products, automotive aggregates, security/surveillance gadgets, industrial products and mobile phone accessories and b) provision of cloud computing services.

K-One started out its business in the innovation, design, development and manufacturing of mobile phone accessories and consumer electronic products in 2001. In 2006, K-One was listed on the MESDAQ Market of Bursa Malaysia (presently known as the ACE Market).

Presently, in line with technological trends and market demands, K-One has recalibrated its business strategies to focus on IoT, healthcare/medical, industrial and the automotive business segments. By anchoring on these market segments, K-One has tapped into the fastest growing businesses in the world. In order to maintain its relevance in the fast-paced and ever-growing electronics OEM/ODM markets, K-One would have to adapt to the changes – both in the customer demands and its existing work processes. This adaptation is vital for sustaining competitive advantage, as K-One is export-oriented, with more than 95% of its sales derived predominantly from Europe and the US wherein these customers' requirements are highly stringent and demanding.





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When we talk about productivity, it is not just about increasing the production output but also effective resource management that optimises workforce utilisation, reduction of product cycle time without neglecting product quality and efficient use of raw materials to reduce wastages in the factories. As a first step in attaining Industry 4.0 (I4.0), we have initiated the integration of IoT technology into our work processes to achieve real-time performance monitoring which aligns with our key objective of improving productivity. K-One's positive reception and adoption of these digitalisation changes in tandem with new technological advancements have made us more agile, efficient and dynamic.

Mr Goo Kok Khian Chief Operating Officer (COO) K-One Technology Berhad



Implementing Lean Initiative as a First Step to I4.0

K-One first implemented its Lean initiative in 2017 with the aim to reduce wastages in the manufacturing process. By incorporating Lean Six Sigma in its manufacturing process, the eight wastes known as DOWNTIME – (D) efects, (O)verproduction, (W)aiting, (N)on-Utilised Talent, (T)ransportation, (I)nventory, (M)otion, (E)xtra-Processing – were minimised from the factories.

'Lean Game' was one of the initiatives conducted by the task force aimed to facilitate the introduction of the Lean approach to the production floor. Participants of this game involve staff from all levels, from managerial to operators. This simple yet thought-provoking game demonstrates the importance of having a Standard Operating Procedure (SOP) in the production line process.

The 'Lean Game' challenges the participants to assemble a product – a LEGO car – without being provided with any instruction manuals. The challenge proved without proper guidance and instructions, it was nearly impossible to construct a complete product without making timeconsuming and costly mistakes. A job rotation concept was also incorporated during the 'Lean Game' whereby it displayed the effectiveness of allowing operators to rotate process responsibilities to reduce headcounts, bottleneck time and waiting time. This approach also facilitates K-One in introducing new SOPs derived from the improved work processes. Additionally, the game fosters a harmonious and efficient working relationship among the staff.

The journey of transforming the entire manufacturing operation to be more productive via Lean implementation has posed various challenges. However, with the support from the Federation of Malaysian Manufacturers (FMM) and the Malaysia Productivity Corporation (MPC), through continuous learning and attendance of workshops eased the transformation process.

K-One's top management's commitment was also crucial in the success of the transformation process. Relevant and suitable training also plays an important role in preparing the staff to be more receptive, knowledgeable and supportive of the initiative. Additionally, the establishment of a Lean task force consisting of members from different departments also hastened this cultural transformation.





It is imperative for K-One to restructure its work processes to fulfil the growing and sophisticated demands of its customers. In its previous practice, the production floor utilised an immobile and linear assembly line that consumes excessive space. This poses difficulties in implementing new improvements or conducting major repairs. For instance, a singular breakdown in the assembly line would adversely affect the entire production output.

By embracing the principles of Lean manufacturing which emphasises on the elimination of wastes – zero waiting time, zero inventory, reduced process time and increased product cycle time –K-One transformed its production floor into a group of cells, each with its own respective tasks.

This approach fully utilises the production floor space and significantly improves the production output with minimal disruption in the event of a breakdown. Improvement works can also be performed by isolating the cell, hence avoiding major interruptions whilst maintaining the production output target. The cells are also flexible and mobile wherein the cells can be modified or rearranged according to the type of products it manufactures. In order to ensure the cells are functioning at an optimal level, each of the process cycle time in the cell is recorded and analysed via a Pareto chart. In the X-Process Time (XPT) time-file, each cell will have their process cycle time data analysed – before and after any improvements were made. The Pareto chart then depicts the frequency of problems which occurs within a process. This method provides substantial information on the operator's performance as well as how to mitigate and resolve certain issues.

Furthermore, K-One also implemented a solution to automate the work processes within the cells. For example, the installation of screws into a product is performed – both manually and semi-automatically – by placing the two processes together. The two processes are compared and evaluated to determine the possible areas available for man and machine integration. Lean implementation has allowed K-One to record a reduction of 20% in its operation costs while the product cycle time has been improved by up to 10% since then.



K-OneImage: 10:4Mobile Application

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The Lean approach which started as a way to increase productivity set the vital platform for K-One to embrace the I4.0 revolution and paved its path towards becoming a Smart Factory.

After implementing a Lean manufacturing approach into the production floor, K-One decided to further enhance its work processes by integrating elements from the 9 pillars of I4.0; IoT, cloud computing, big data analytics, amongst others. Driven by its passion for excellence, an I4.0 task force was established to initiate a production digitisation transformation by developing a mobile application called K-One Mobile Application. The initial prototype of the mobile application was developed in June 2018, entered beta release in November 2018 and subsequently began its live stage in January 2019.

The K-One Mobile Application project was a result from K-One's participation in the Industrial Internet of Things (IIoT) PLUGFEST programme which was organised by the Electrical & Electronics Productivity Nexus (EEPN). K-One was among the selected 60 companies in the E&E sector to be included in this programme which aims to support, coach, prepare and enable them to carry out their own IIoT projects within their companies. The IIoT PLUGFEST programme was also joined by some of the big industry players, who have successfully implemented I4.0 elements in their organisations, to help facilitate the knowledge transfer among the participants; providing K-One with a valuable opportunity to gain more insights about IoT and how to integrate the elements in its work process.

The mobile application operates as a platform to share information seamlessly within the organisation which allows informed decision-making by the management, enables work processes to be monitored remotely and accurately, and reduces the administration cost of filing voluminous information inefficiently.

All cells are equipped with sensors distributed in each station to allow the data to be captured in real-time as well as enabling a closed loop system within the cell. The sensors are interconnected to a gateway device which acts as an intermediary to relay data to the cloud. Both management and production floor staff would be able to track the performance of the cells in real-time on the production floor or through the Mobile Application dashboards.

An overview of the cell performance such as the line efficiency, overall yield, defect breakdown is aggregated and retained in the cloud database for greater traceability and transparency. The management is then able to retrieve the historical information collected from the production floor.

The K-One Mobile Application consists of numerous features to expedite the transition towards an autonomous manufacturing factory. Such functionalities include a revamp of the maintenance management system. The revamp improves on the existing system through new features such as Downtime Calling and Tracking System, Preventive Maintenance Scheduling System, and the Maintenance Key Performance Indicator (KPI) Dashboard which includes the Mean Time to Repair (MTTR) and Mean Time between Failures (MTBF).

The effectiveness of IoT implementation is clearly shown in the increase of Overall Equipment Effectiveness (OEE) from 80% to 90% after the implementation of the K-One Mobile Application on the production floor. Remote and real-time monitoring of the cells eliminates wasted time and improves productivity. Moreover, the manufacturing data is aggregated more frequently and reliably for analysis and to identify immediate improvement areas.



Innovating for the Future & Attainment of I4.0 Status

The K-One Mobile Application project also reflects K-One's commitment towards its green initiatives by eliminating the usage of papers to record daily production floor activities. This initiative also signifies K-One's first step towards becoming a Smart Factory through the utilisation of IoT concepts and integration of all the systems into one centralised platform.

In its next phase, it will venture into fully automated production processes backed with advanced cloud solutions in each assembly line. The final goal is to establish K-One as one of I4.0's progressive innovators.



Paving a Lean Road towards Industry 4.0



