AN INDUSTRY 4.0 PERSPECTIVE ON DEFECTS, QUALITY AND DATA SCIENCE

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Product recalls often make it to the headlines. A mobile phone that catches fire, an automobile whose braking system malfunctions at high speed, and processed food that contains a hazardous substance beyond the allowable limit are some such events we witnessed in the recent past. Manufacturers suffer massive financial and reputation costs if they have to repair or replace products used by the customers. Product recalls adversely affect all stakeholders. So, why do they happen? In most cases, it is due to a defect or more that went undetected. Such eventualities happen even for the businesses that swear by the quality of their products and processes.

In a competitive market, a manufacturer cannot compromise with either quality or volume. Therefore, every product goes through quality checks before its release to the market. A product is considered of high quality when consumers do not find any defects in them. Interestingly, the testing process aims to ensure that by trying to achieve the opposite. A successful test detects all latent defects. The process, therefore, maximizes the probability of defect detection.

The growth in volume poses a significant challenge. Even when it is not destructive, testing is a time-consuming process. It quickly adds to the overall manufacturing cost when volumes are large. Manufacturers need solutions that can reduce costs and increase the effectiveness of testing. Data science can help. Along with the transition from industry 3.0 to 4.0, the availability of real-time data has increased manifold. In the process of manufacturing, data is captured on a large number of attributes of the products. These data are analyzed using predictive and deep learning algorithms. One of the purposes of this use of analytics is to predict the defect early and minimize the necessity of more elaborate costly testing.

Products in the hands of a customer must be defect-free. At the same time, exhaustive testing of every product can be prohibitive. Precision sensors and the use of data science can find an optimal tradeoff between the two. The success of such solutions would depend on the technology and algorithms and how defects once identified are managed. It is crucial to establish and execute a learning loop.