If manufacturers want to sustain and grow their customer bases in a competitive environment, their products need to fulfill increasingly high quality and reliability standards. Automakers, for example, now have a target defect rate for the integrated systems of less than 1 percent. That’s putting pressure on the original equipment makers (OEMs) and their suppliers who have to meet these targets – at the same time as products and manufacturing processes are becoming increasingly complex, featuring numerous activities that impact quality, performance, and yield. To prevent failures of components, systems, and ultimately the product, these manufacturers need reliable methods to find defects.

But quality control today is in many cases still performed by human inspectors, which limits its reliability and efficiency. Components such as turbine blades and welded joints are highly safety-critical, and their manufacturers typically perform quality inspection with systems such as 3D CT scanning that produces images in 100 or more layers. Inspectors then examine each of these for possible defects, such as porosity or shrinkage. However, many engineering and manufacturing companies face difficulties leveraging advanced analytics in technical products and processes. Some may not fully leverage the data they already have. Or they invest in data-warehousing programs that do not fit their manufacturing processes. Others lack the means to extract information that reveals essential correlations and characteristics in a system or process.

There are numerous benefits for those that can implement an innovative, advanced quality-management system. Automated digital quality inspection provides early warning of any shift in production processes; it helps uncover the root causes of problems and enables engineering improvements; and it reduces the risk of shipping nonconforming parts. As a result, it helps prevent product failure and reduces the costs of substandard quality. Ultimately, this will lead to lower warranty costs and greater customer trust in a firm’s products (see Exhibit 1).

As the era of digital manufacturing arrives, advanced analytics will be a critical tool for realizing improvements in yield, particularly in areas with product and process complexity, process variability, and capacity limitations. Those manufacturing companies that successfully apply the new tools have an opportunity to set themselves apart from their competitors and generate additional value.