

# A Data-Driven Solution for Performance Improvement

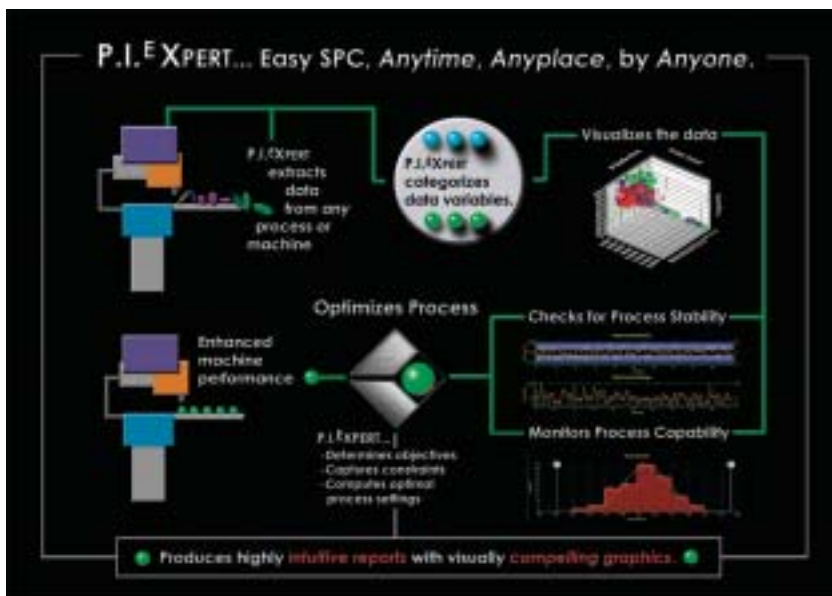
Intelligent software utilized by NASA to monitor and improve Space Shuttle maintenance operations is now available for the very first time to companies seeking to enhance overall performance. Marketed as the “Software of the Future,” Optimal Engineering Systems’ P.I.<sup>E</sup>XPERT™ technology offers statistical process control (SPC) and optimization techniques that are critical to businesses looking to restructure or accelerate operations in order to gain a competitive edge.

Based in Daytona Beach, Florida, Optimal Engineering Systems was founded by three former Embry-Riddle Aeronautical University professors who recognized a growing need for a versatile software application that can provide unparalleled SPC analysis. The founding professors went to work on a conceptual platform for process monitoring and improvement, and the potential impact of their vision soon caught the attention of NASA.

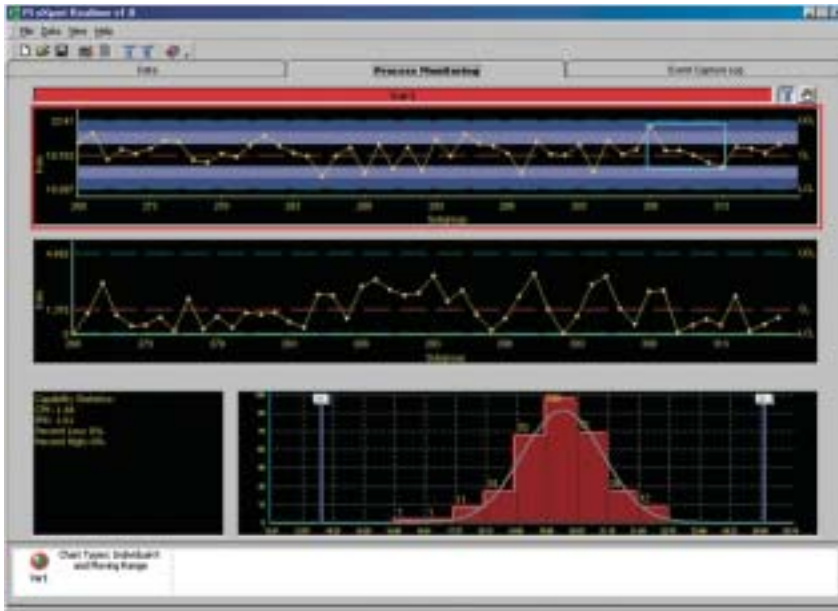
Through a Phase I **Small Business Innovation Research (SBIR)** contract with NASA’s Kennedy Space Center, Optimal Engineering Systems obtained the funding and aid necessary to develop a prototype of the process monitoring and improvement software. Completion of this prototype demonstrated that it was possible to integrate traditional statistical quality assurance tools with robust optimization techniques in a user-friendly format that is visually compelling.

Kennedy expressed satisfaction with Optimal Engineering Systems’ work on the prototype, and granted the company additional funding through a Phase II SBIR contract to create a version specifically for NASA’s use. As a result, Kennedy engineers have been employing P.I.<sup>E</sup>XPERT since February 2001, to ensure that Shuttle maintenance operations are run more efficiently.

One Kennedy project that yielded considerable savings concentrated on the structural bonding process used on a Shuttle orbiter. Over a period of time, Kennedy workers realized that a significant number of bonds required rework because the shear strength of the components being attached to the orbiter was less than the minimum allowable shear strength for a bond. A preliminary analysis showed that one particular bonding agent was responsible for most of these failures. For this particular adhesive, over two-thirds of the bonds failed, necessitating removal and replacement of the component, which could potentially further damage the orbiter, making the problem even more costly. Based on the preliminary analysis, a set of designed experiments was implemented in a laboratory setting over a 4-day period to determine the most effective bonding method for the orbiter’s components. In order to measure the conditions that resulted in the maximum pull strength of the bond, Kennedy scientists and engineers depended on P.I.<sup>E</sup>XPERT. The software application identified the problems and offered a solution, allowing the engineers to decrease the number of adhesive failures from more than 66 percent to less than 10 percent.



*P.I.<sup>E</sup>XPERT™ automatically imports data, selects the appropriate technique for analyzing the data, computes the solution, interprets the results, and prepares a fully formatted report.*



The software can interpret data with scatter plots, box plots, histograms, pie charts, and bar charts that are visually attractive and easy to comprehend.

Optimal Engineering Systems' crowning achievement with NASA prepared the company for launch of the P.I.<sup>EXP</sup>ERT technology within the commercial sector. This software, using an expert system knowledge base, allows the user to determine objectives, capture constraints and out-of-control processes, predict results, and compute optimal process settings. The tool takes just minutes to install, and is capable of automatically importing data from other software, such as Excel, Access, Oracle,<sup>®</sup> SQL, as well as text files, thereby reducing the burden of data entry. With point-and-click accessibility, P.I.<sup>EXP</sup>ERT is able to generate professional Microsoft<sup>®</sup> Word or HTML reports, complete with formatted graphics, tables, and narrative content. Furthermore, the software can capture dynamic, 5D graphics that are fully rotatable, with zoom and edit features, and can interpret data with scatter plots, box plots, histograms, pie charts, and bar charts that are visually attractive and easy to comprehend.

P.I.<sup>EXP</sup>ERT also possesses real-time functionality that can monitor up to 20 processes simultaneously. This option can be applied across an

entire organization or a manufacturing plant. For instance, a plant manager may select specific processes to be monitored, and the status of each of these processes is presented in a simple color-coded format. The manager may then view the current data stream exactly how it is presented on the shop floor, in addition to receiving audio alarms and e-mail alerts when corrective action is needed.

The software has the ability to provide improvement solutions for a variety of fields, including service organizations and health care facilities. Whether the goal is reducing costs, maximizing profits, saving lives, or producing quality products, Optimum Engineering Systems' P.I.<sup>EXP</sup>ERT technology provides companies with the luxury of focusing solely on process improvement as an alternative to being preoccupied with laborious data analysis. ❖

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