MxD 15-05-08	Category: ECO, Recurring Manufacturing, Quoting Process
Title:	Predictive Modeling for Digitally-enabled, Multi-criteria Decision making in Innovative Product Design and Analysis with Total Lifecycle Sustainability
Completion Date:	2018-08-31
Project Team:	University of Kentucky, Siemens
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Problem:

Data needed for rapid, seamless product/supply chain design collaboration is still being stored in disparate, sometimes incompatible systems. Poor interoperability and the lack of a digital thread linking systems impedes the use of powerful tools like alternate design assessments, total lifecycle-based performance analysis and generally limits incorporating all relevant design requirements into decision making.

Objective:

The project's goal is to enable data sharing about the total product lifecycle between supply chain partners and end-users in order to develop transformative capabilities for digitally-enabled, total lifecycle-based next generation product design. The project partners are University of Kentucky (UK), Siemens Corporation Corporate Technology (SCCT) and Lexmark International. UK (as lead) will coordinate all activities and will develop a set of predictive computational modeling tools for total lifecycle product design optimization, simulation and uncertainty and risk analysis. SCCT will develop an integrated software platform with a digital thread, based on Siemens Teamcenter, to enable collaboration between various stakeholders from across different lifecycle stages, and enable data exchange clients to use the UK-developed predictive models for total lifecycle-based product design. Lexmark will serve as the project testbed to validate the models and their implementation through the digitally linked software platform.

The technical goals are to develop and validate: (a) an integrated software platform with a "digital thread", (b) a set of predictive computational modeling tools for total lifecycle product design optimization, simulation and uncertainty and risk analysis integrated to access data through the digital thread. The key milestones are developing the digital thread (M1), completion of validated predictive performance models (M2, M3, M4), testbed validation (M5), delivery of one-day training workshops (M6) and online learning modules (M7) and submission of final report (M8). Upon successful project completion, MxD and its members, including the wider DoD supply chain, will benefit through access to a comprehensive, digitally integrated software platform with embedded decision support tools to perform modeling, optimization, simulation and various "ilities" analyses to help develop more sustainable products, processes and systems for total lifecycle value optimization. These digitally-enabled capabilities will provide the increased data visibility and platform interoperability vital for enhancing US global competitiveness.

A variety of products will be generated: Software (a prototype, add-on to the current commercial Siemens Teamcenter and NX product), Algorithms (for total lifecycle product optimization, predictive performance simulation and risk and uncertainty analysis), Knowledge Products (online educational modules on "Total Lifecycle-based Product Design", conference proceedings, journal publications and reports) as well as Training Materials (one-day workshops). Upon successful project completion, the technology will transition to industry members of MxD who will have access to the validated software prototype and modeling tools. The technology will be disseminated to MxD members through one-day workshops and online learning modules and other publications for continuing education.