eM-TolMate – eMPower for manufacturing process management
Manufacturing tolerance design and analysis

Summary
eM-TolMate enables you to interpret and manage tolerances and design specifications throughout the manufacturing process. eM-TolMate’s easy-to-use interface and functionality transform inexperienced users into tolerance experts.

Benefits
Saves money by minimizing design changes and manufacturing reworking
Reduces time to market by helping users design products “right the first time”
Optimizes design by predicting the variation of key quality characteristics in parts and assemblies
Improves quality of the product and process by identifying assemblyability issues and helping engineers overcome them prior to manufacturing

Features
Embedded within most CAD systems
CAD model data storage
Manual and automatic tools for defining assembly sequences and methods
User-specified key characteristics simulation including distances, angles, clearances and virtual size
Analytical feature definition
Ranking of tolerances based on contribution to variation
Utilization of measurement data from the shop floor
Simulation results displayed in graphical, text and html formats
Integration with eMPower quality shop floor applications

eM-TolMate allows you to predict the effect of tolerances and mating operations on an assembly process. It identifies key characteristics of an assembly – such as the flushness of an airplane wing, the gap between a door and the fender of a car or the clearance between the removable hard disk and the bay in a portable PC – as well as the critical features of an assembly. eM-TolMate calculates the variations in these characteristics and the contribution of tolerances to these variations. Simulation and analysis tools help deliver optimal tolerances for manufacturing and assembly.

Determining assembly tolerances
eM-TolMate identifies the key characteristics of nominal component models that are critical to proper assembly. You can use eM-TolMate to analyze specific tolerance contribution to the assembly stack-up variation and to identify where tolerances need to be tightened or can be loosened.

Analyzing the assembly
eM-TolMate combines the Monte Carlo statistical simulation techniques with eMPower Tolerance Management System (TMS) technology. This combination provides a consistent method to predict variation caused by part tolerances and assembly method alterations.

Shop floor applications
eM-TolMate is part of the eMPower Quality solution that addresses the complete tolerance management process. It uses actual shop floor data, ensuring that the stack-up analysis reflects the actual distribution of measured variations. By promoting a productive dialogue between design and manufacturing, eM-TolMate improves overall quality and efficiency and promotes concurrent engineering practices.
How eM-TolMate works

eM-TolMate leads you through the process by:

- Generating – automatically or manually – an assembly tree that maps out the sequence of assembly operations and provides a clear view of assembly components.
- Defining – automatically or manually – the mating conditions of components within the selected sequence.
- Determining the key characteristics and then running a simulation to examine assembly variations. This simulation will predict variations caused by the combined effect of tolerances and the mating of assembly components within a certain sequence of operations.
- Displaying simulation results in graphical, text, html or imported Excel formats, so that you can visualize the effect of variations on assembly and conduct further CAD analysis including collisions, sectioning and minimum clearance.

eM-TolMate calculates the total variation of each measurement and identifies critical features. It then ranks component features based on their percentage of contribution. With this information, you can conduct comparative “what-if” studies, optimize tolerance and assembly methods and eliminate costly “trial and error” studies on the shop floor. Such outputs allow you to detect potential problems early, assess their severity and swiftly undertake corrective measures.

Business benefits:
eM-TolMate can help enterprises increase their competitiveness – and engineers enhance their productivity – by helping to:

- Reduce the number of engineering changes (ECN) by as much as 30 percent
- Reduce reworking activities by up to 30-40 percent
- Reduce time to market by cutting worker-hours of assembly as much as 15 percent
- Improve IQS scores as much as 30-50 percent
- Improve product quality by reducing the number of customer claims up to 40 percent, and cost-related claims as much as 30 percent

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eMPower solutions for MPM
eMPower solutions help manufacturing enterprises implement effective MPM strategies – from sharing product and process designs, to joint process planning and engineering by teams in distributed locations – allowing them to expand revenue potential by reducing costs, accelerating product introductions, shortening time to volume and optimizing production execution.

For more information about Siemens Tecnomatix® solutions, visit www.siemens.com/plm.

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