

# Locus<sup>®</sup> DFM<sub>x</sub> for SolidWorks<sup>®</sup>

Predicting tolerance outcomes for annotated 3D models before machining

Locus DFMx estimates machining requirements for 3D part models for all toleranced features. Machine tool precision requirements and tolerance consumption estimates are provided for instant manufacturability feedback. Identification of difficult to manufacture part features during the product design process helps to guide design refinements before becoming costly and time-consuming production issues.

## Recommended Applications:

- Design for Manufacture (DFM) Analysis
- Identification of Difficult to Manufacture Features
- Machine Tool Tolerance Consumption Analysis

**How it works:** Locus DFMx divides the 3D model into a set of individual toleranced features (AFPs). Each AFP represents a design requirement ( i.e. toleranced attribute) and associated machined surfaces. The AFPs are then analyzed to determine the machine tool performance requirement for a user selected tolerance consumption target. Analysis results showing the required level of machine tool performance to successfully produce the part as well as tolerance consumption for each feature is displayed. The most difficult features to machine are identified, providing the designer with an interactive tool for refining part design.

Locus DFMx analysis uses five (5) generic machine tool performance grades representing the most common machine tool types (VMC & HMC) based upon IQL's extensive Machine Tool Performance Library.

The screenshot shows the SolidWorks Professional 2010 x64 Edition interface with the Locus DFMx analysis tool active. The main 3D view shows a part with various tolerances and dimensions. The Locus DFMx interface is overlaid on the right side, showing a table of results and a summary of machine tool performance grades.

Attribute	Feature	Machine Grade	Orientation	Design Tolerance	Adjusted Tolerance	Machine Consumption	Consp Level	Consp Target	Next Grade Tolerance
Diameter7	Simple Hole3	AAA	1	0.00500	0.00500	0.00112	22.4 %	25.0 %	AA) 0.007211
Diameter7	Simple Hole2	AAA	1	0.00500	0.00500	0.00112	22.4 %	25.0 %	AA) 0.007211
Diameter7	Simple Hole4	AAA	1	0.00500	0.00500	0.00112	22.4 %	25.0 %	AA) 0.007211
Diameter7	Simple Hole5	AAA	1	0.00500	0.00500	0.00112	22.4 %	25.0 %	AA) 0.007211
Diameter5	Cylinder6	AA	1	0.01000	0.01000	0.00180	18.0 %	25.0 %	A) 0.015620
Diameter5	Cylinder5	AA	1	0.01000	0.01000	0.00180	18.0 %	25.0 %	A) 0.015620
Diameter5	Cylinder7	AA	1	0.01000	0.01000	0.00180	18.0 %	25.0 %	A) 0.015620
Diameter5	Cylinder8	AA	1	0.01000	0.01000	0.00180	18.0 %	25.0 %	A) 0.015620

Machine Selection: VMC YxyXsym\_ZzzSt

Machine Error Consumption: Active Level 25 %

Hide Log

Time	Event
1:35 PM	Locus <sup>®</sup> DFM Initialized.
1:36 PM	Analysis completed.
1:37 PM	Analysis completed.
1:16 PM	Analysis completed.
1:17 PM	Analysis completed.

Locus DFMx – Results Output Display

A BETTER WAY TO ACHIEVE TOLERANCES





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IQL helps leading manufacturers to improve the most challenging manufacturing processes. Incorporated in 1985, IQL is a CAE development and engineering services resource that improves manufacturing productivity by focusing on manufacturing equipment performance and its impact on achieving desired part tolerances. Over time we have developed a comprehensive knowledge base of actual machine performance and specific design behavior which is the foundation upon which we build all of our research, development and support activities.

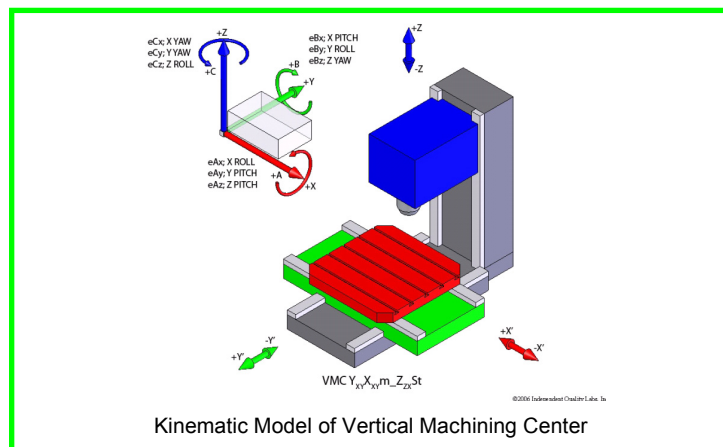
We work with advanced global manufacturers, including ABM Gulfstream, BAE, BMW, Boeing, Caterpillar, EDAC/SNI, Franklin Fueling Systems, GE, GM, Kohler, Lockheed Martin, Mitsubishi, Northrop Grumman, Okay Industries, Pratt & Whitney, Primus International, Siemens, Sikorsky, Tecomet, Timken, Volvo, W.L. Gore, Westinghouse and many others. We actively contribute to the development of national and international standards for the characterization of machine tools and inspection equipment: ASME B5.54 (Machining Centers), ASME B5.57 (Lathes & Turning Centers), ISO 230 (Metal Cutting Machine Tools) and ASME B89.1.12 (Coordinate Measuring Machines). IQL has also been the machine tool metrology resource for several DoD programs including: Smart Machine Platform Initiative (SMPI), National Center for Defense Manufacturing and Machining (NCDMM) and US Army Network Centric Manufacturing Program (NCM).

**Services:** Machine tool calibration (including laser, level, and spindle alignment), manufacturing process modeling, machine optimization, evaluation and adjustment, procurement specification support, machine capability evaluation, manufacturing process diagnostics as well as machine design reviews and recommendations.

**Training:** Courses and customer-tailored training in the latest methods for basic and advanced manufacturing process and machine tool evaluation.

**Measurement Products:** Instruments and artifacts (including lasers, electronic levels, ball bars, rotary calibrators, spindle analyzers, master squares) and custom kits used for machine characterization as well as standalone software for measurement and evaluation.

**IQL is the preferred resource for those striving toward First Part Correct manufacturing processes.**



## Locus® eM Software

A comprehensive machine tool measurement and alignment software package, Locus eM includes a wide range of measurement tests, 3D color graphic outputs, easy to navigate data storage, and step-by-step task Sequences. Locus eM is compatible with Electronic Amplifiers, Levels, and Gages, ML10 Laser System, and HP Laser System.

## IQL SuperTune™ for Machining Centers

IQL SuperTune enhances Volumetric Positioning Performance for basic Haas Vertical Machining Center and Horizontal Machining Center models. IQL SuperTune is a multi-point process that more than doubles the volumetric accuracy of general purpose machine tools, approaching positioning performance of high precision European and Japanese machine tools at a fraction of the cost. When high accuracy is required to meet tight tolerance applications, IQL SuperTune is the answer.

## IQL CalibrationPlus™

Today's complex machine tools have unique behaviors, with different effects on machine precision. The value of laser calibration is very limited, without first diagnosing the root cause of the problems. IQL CalibrationPlus is a comprehensive diagnostic service developed upon field experience with hundreds of machine tools. Our unique approach takes into consideration your manufacturing needs and then applies an extensive IQL knowledge base of machine designs and behavior to identify those machine elements having the greatest impact.