Solving Data Analysis Challenges Using MATLAB® and Statistics Products

Marta Wilczkowiak

Application Engineer

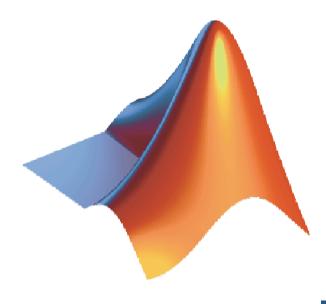
© 2008 The MathWorks Limited





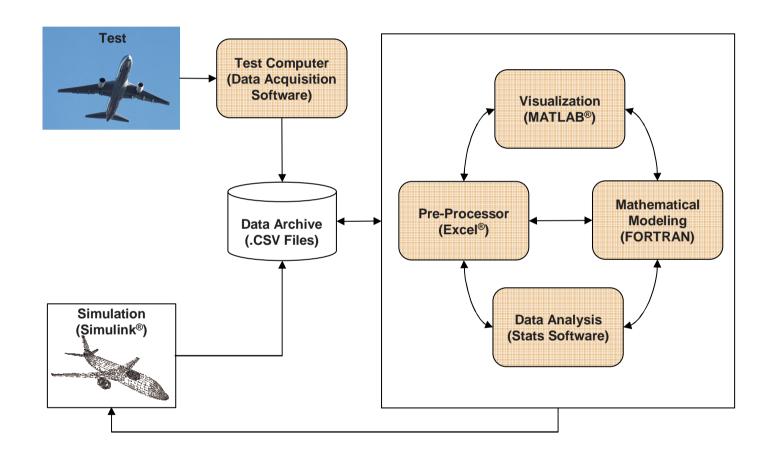
Agenda

- Example data analysis workflow
- Demonstration: Analysis of aircraft wing stress
- Summary
- Question and answer



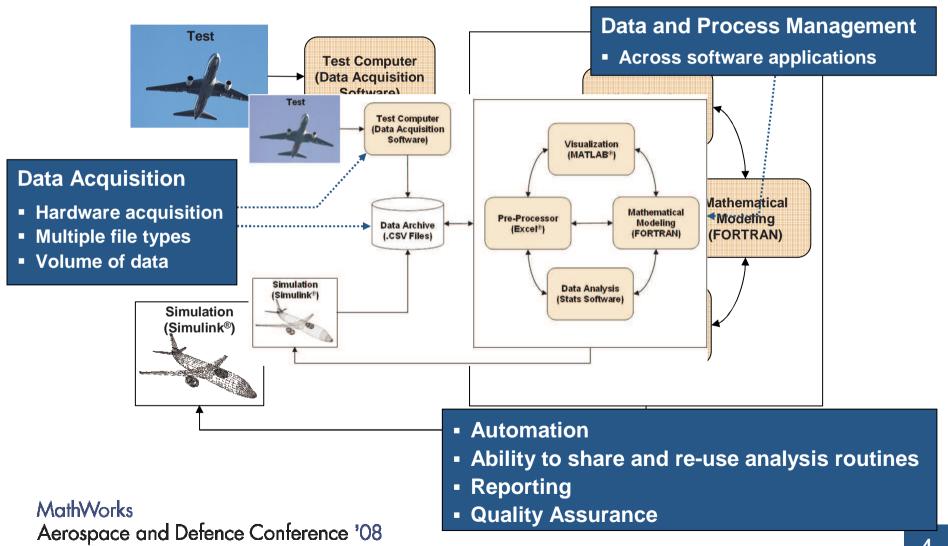


Example Data Analysis Workflow





What are the challenges in this workflow?

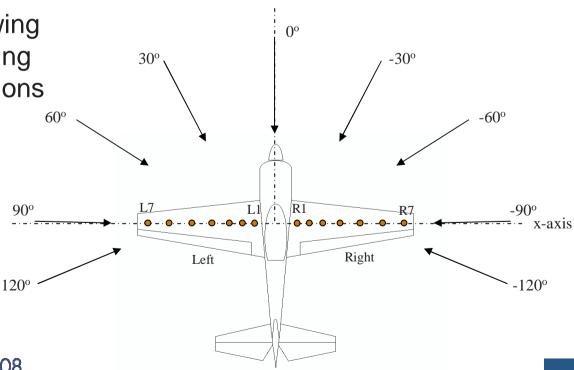






Demonstration: Wing Stress Analysis

- Identify sensor failures and data anomalies
- Determine if:
 - Stress levels on left and right wings are the same
 - Shear force on the wing exceeds 160 kN during extreme wind conditions



y-axis

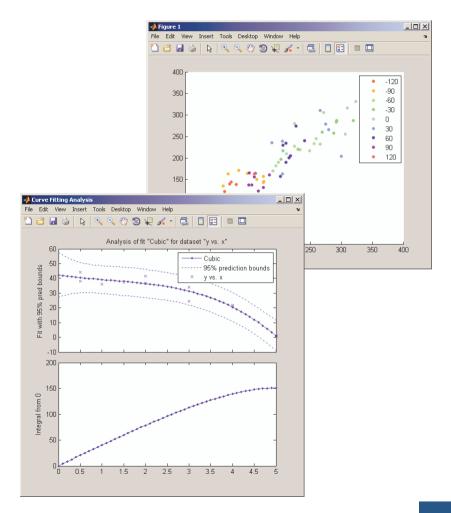
MathWorks

Aerospace and Defence Conference '08



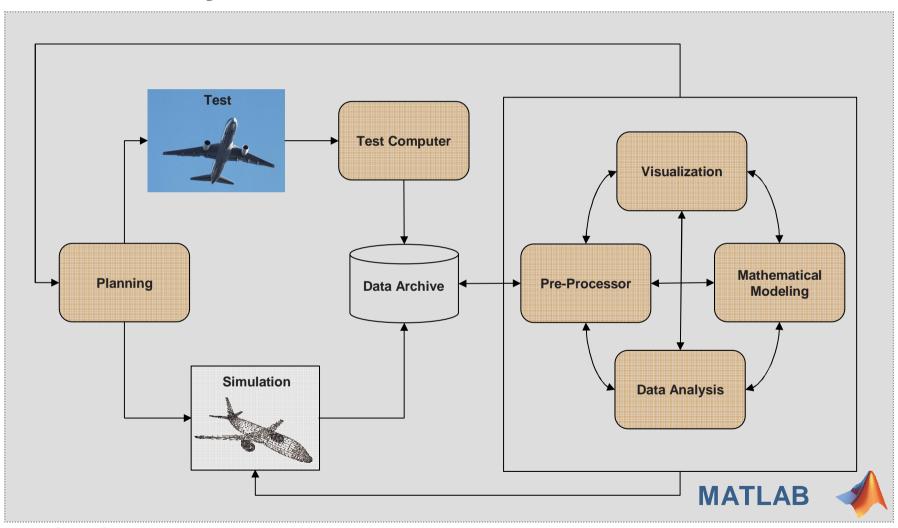
Summary – Wing Stress Analysis

- Imported and visually inspected data
- Used statistics functionality to support the analysis
 - Hypothesis testing
 - Dataset and categorical arrays
 - Specialized visualizations and analysis techniques
- Used curve fitting analysis to estimate shear force



MathWorks

Summary



MathWorks

Questions?





Statistics Toolbox™

Statistics Toolbox[™] provides interactive

and command line tools for:

Data collection and management

- Descriptive statistics
- Multivariate statistics
- Probability distribution fitting and modeling
- Hypothesis testing
- Analysis of variance/covariance
- Linear and nonlinear modeling
- Visualization
- Statistical Process Control

View Tools Desktop Window Help **∌**|••••|**□**|| - Data Norma t Incation-scale t location-scale sigma (scale nu (shape) Apply Distribution: t location-scale 120.728 Log likelihood: Domain: -Inf < v < Inf 63.0097 Mean: Variance: Inf Parameter Estimate Std. Err. 63,0097 0,00388729 0.0260764 0.00452895 1.48711 0.366126 Estimated covariance of parameter estimates: sigma 1.5111e-005 2.03128e-006 0.000150985 sigma 2.03128e-006 2.05114e-005 0.0010028 0.000150985 0.0010028 Manage Fits Close



Curve Fitting Toolbox™

Graphical user interface and command line functions for:

- Previewing and preprocessing data
- Developing, comparing, and managing models
- Extensive library of linear, nonlinear, and nonparametric models
- Customizable model fitting
- Interpolation, extrapolation, differentiation, and integration

