Solving Data Analysis Challenges Using MATLAB® and Statistics Products

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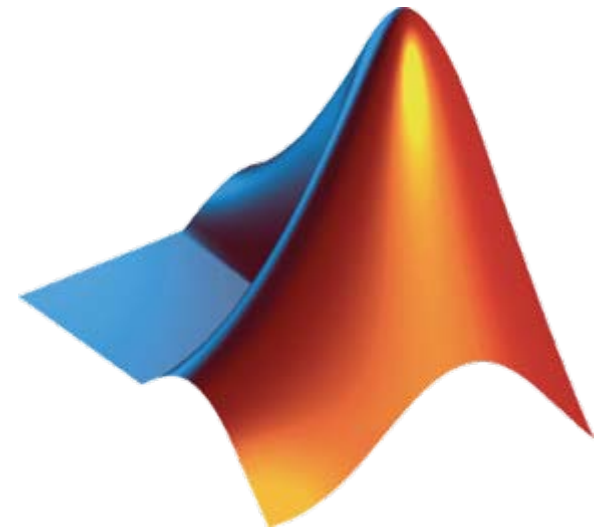
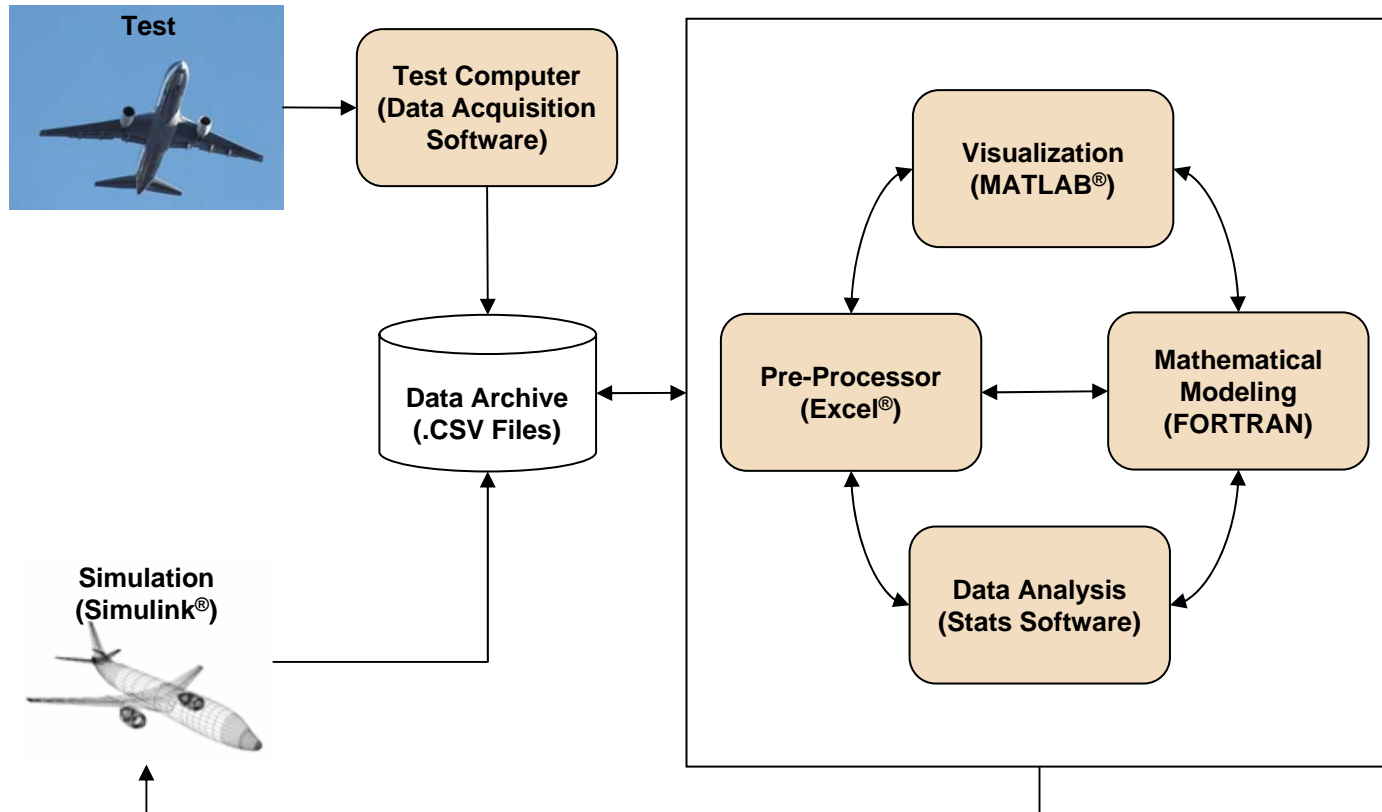**The MathWorks, Inc.**

MathWorks Symposium

Adopting Model-Based Design within Aerospace and Defense

Agenda

- Example data analysis workflow

- Demonstration: Analysis of aircraft wing stress
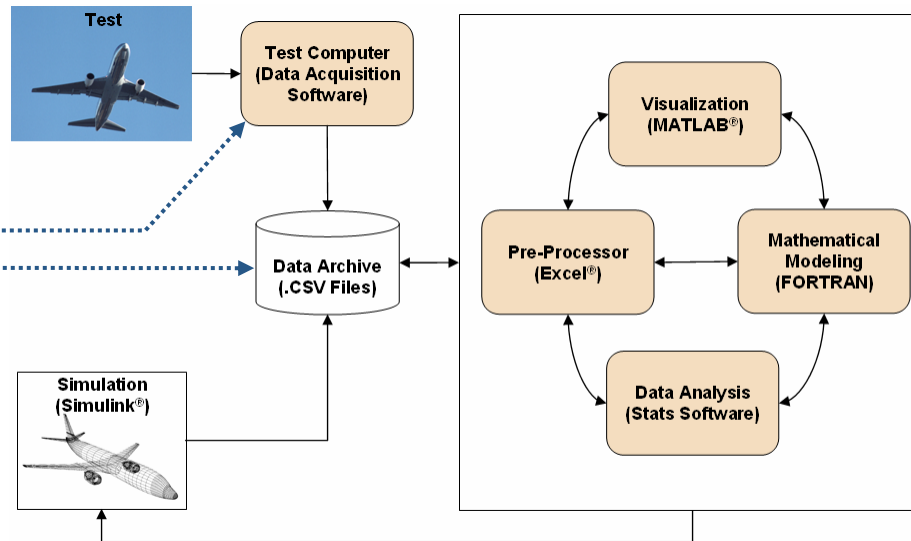
- Summary

- Question and answer

Example Data Analysis Workflow

What are the challenges in this workflow?

Data and Process Management

▪ **Across software applications**

Data Acquisition

▪ **Hardware acquisition**
▪ **Multiple file types**
▪ **Volume of data**

▪ **Automation**
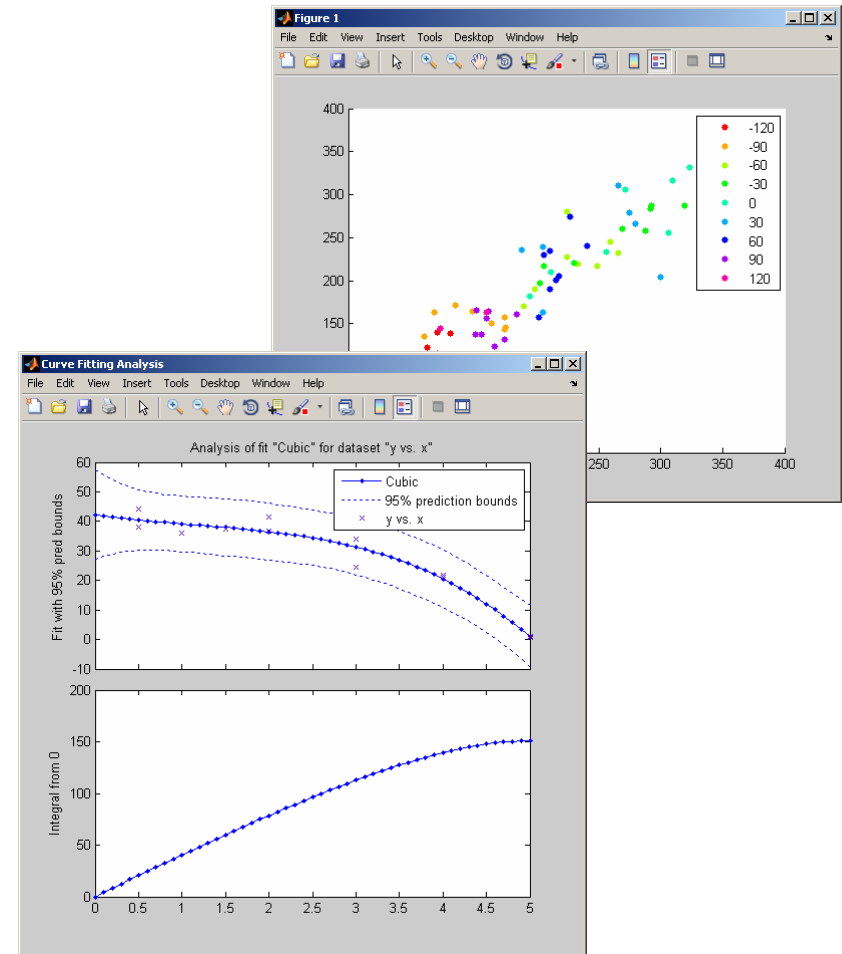▪ **Ability to share analysis routines**
▪ **Reporting**

Demonstration: Wing Stress Analysis

- ## Determine if:
  - ### Stress levels on left and right wings are the same
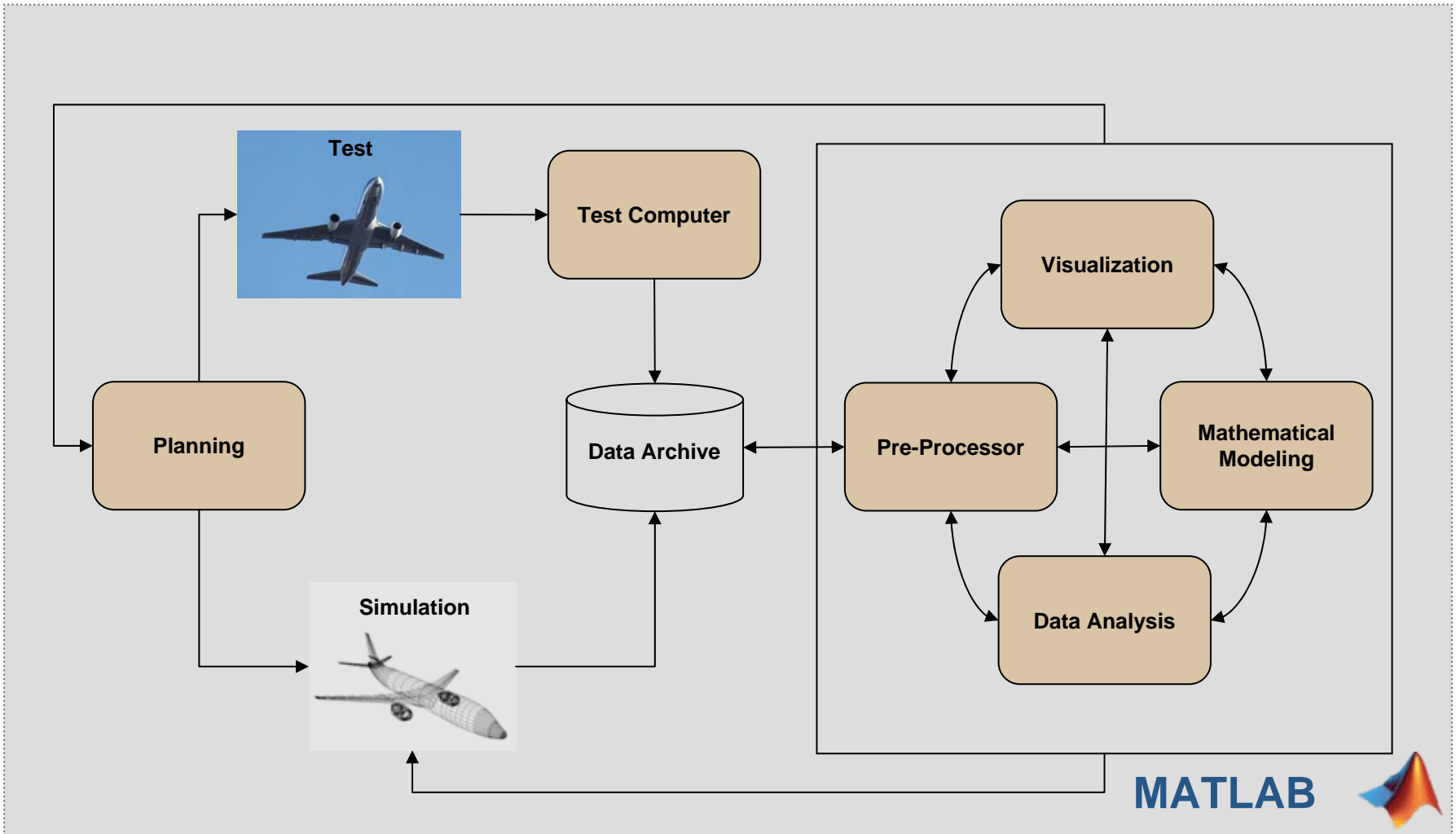 - ### Shear force on the wing exceeds 160 kN during extreme wind conditions
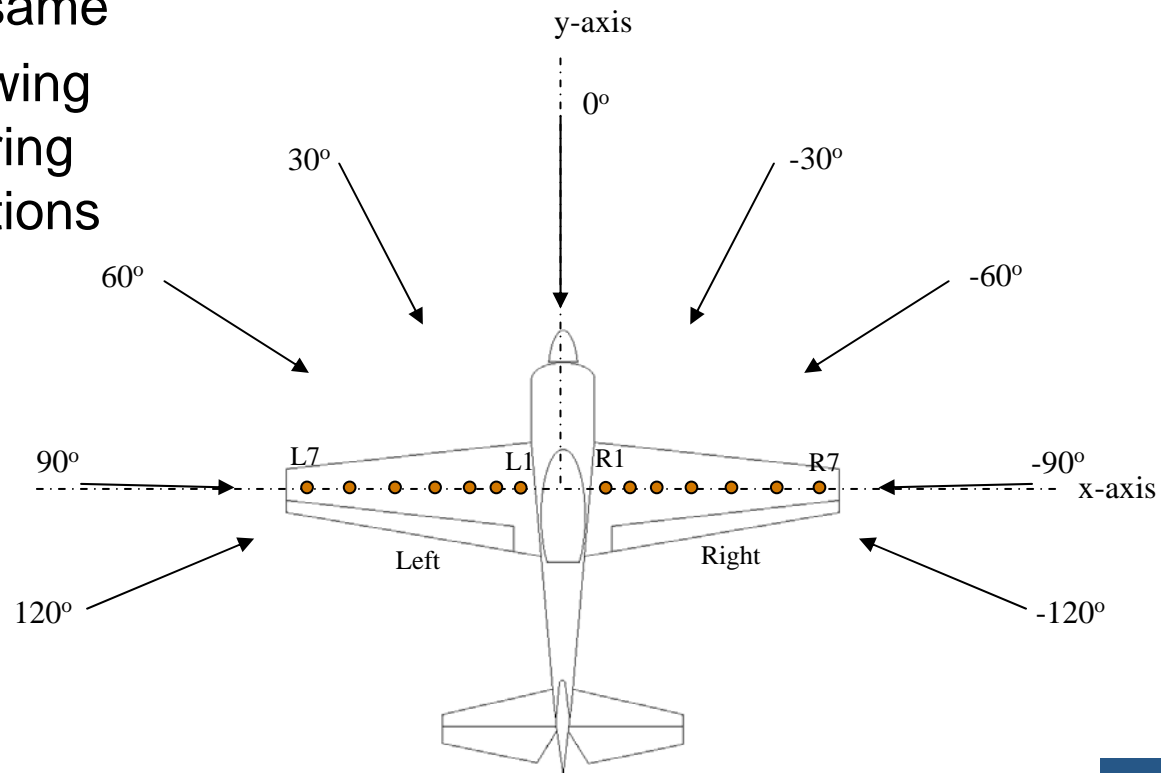
Summary – Wing Stress Analysis

■ **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**

Summary

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
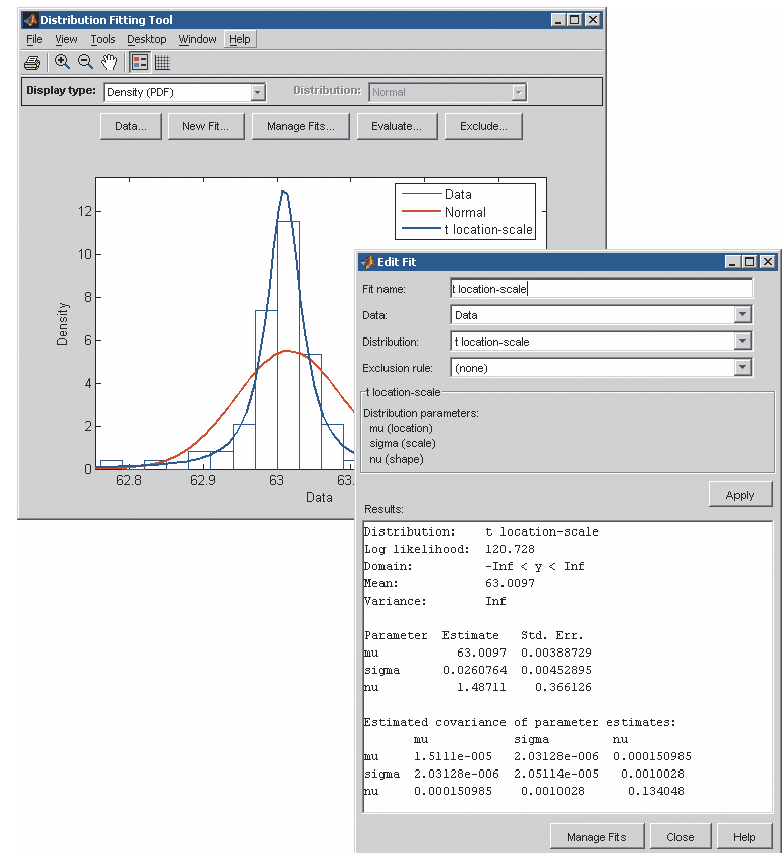
Curve Fitting Toolbox™

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