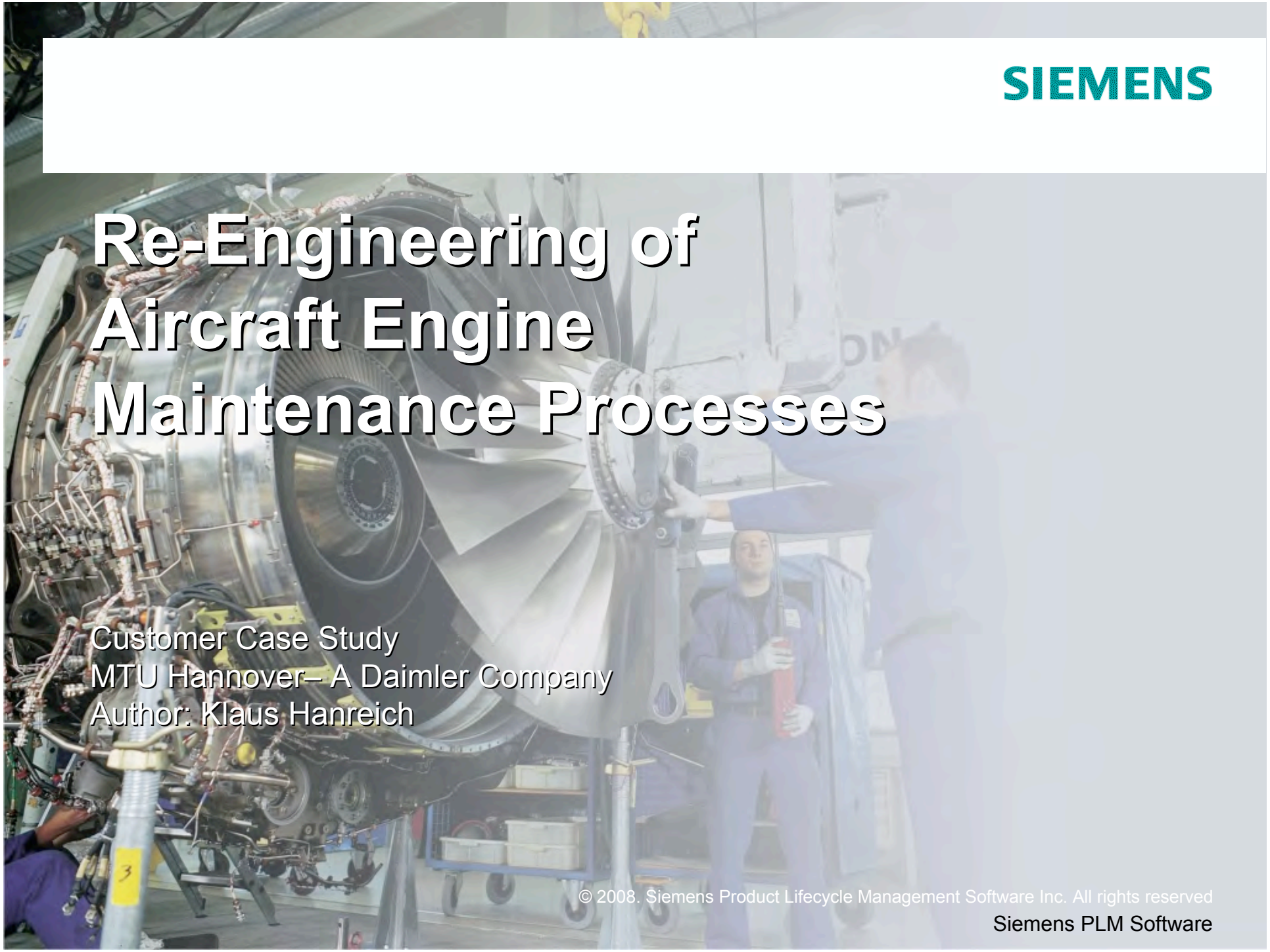

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Re-Engineering of Aircraft Engine Maintenance Processes

Customer Case Study
MTU Hannover– A Daimler Company
Author: Klaus Hanreich

Siemens PLM Software

MTU Maintenance Hannover
Drivers

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Typical market drivers that impact engine maintenance companies like MTU Maintenance Group:

- Reduced Costs
- Improved Quality
- Reduced Cycle-Times

MTU Maintenance Hannover
Langenhagen, Germany Facility Objectives

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Objectives established by MTU Maintenance Group in order to address market drivers:

- Restructure Production Processes
- Transition from Workshop Based Flow to Material Based Flow

MTU Maintenance Hannover
Langenhagen, Germany Facility

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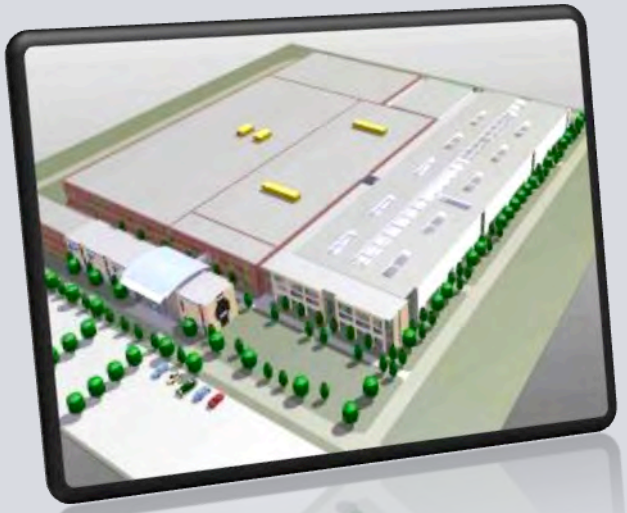

Centerpiece of MTU Maintenance group; responsible for:

- GE CF6-50, CF6-80C2,
- Pratt & Whitney PW2000
- International Aero Engines V2500, CFM56-7

Plant Features Include:

High Pressure Water Stripping ►

MTU Maintenance Hannover
Challanges

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Workshop Characterized by Numerous Individual Stations

Material Meanders from One Station to the Next

- Material Flow Difficult to Follow
- Control Factors are High and Included:
  - Personnel
  - Material
  - Deadlines
  - Tools
- Nothing is Coordinated

MTU Maintenance Hannover
Original Process (Pre Plant Simulation)

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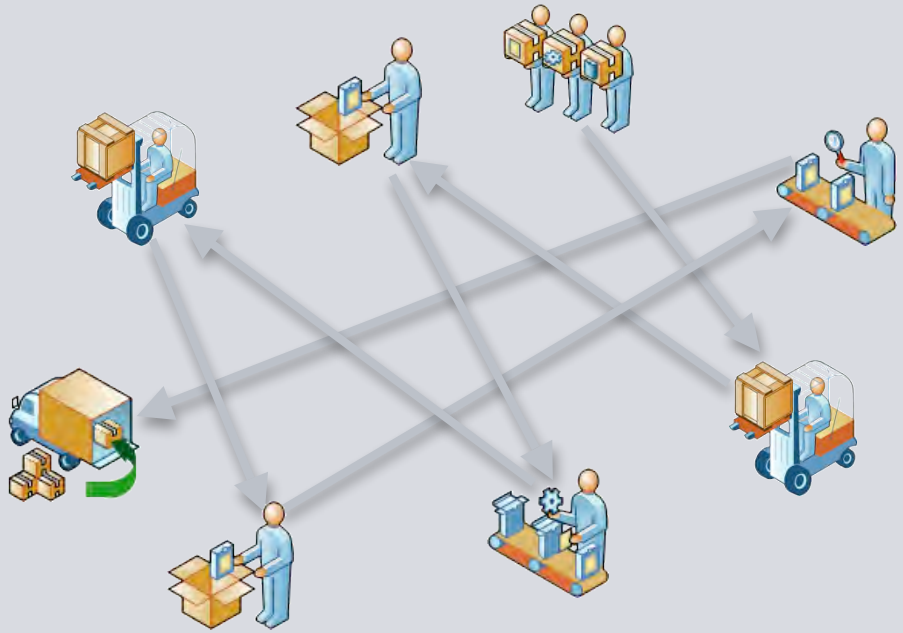
Shop-Floor Process Structure



Primary Control Element:

- Personal

MTU Maintenance Hannover
Desired Process (Post Plant Simulation)

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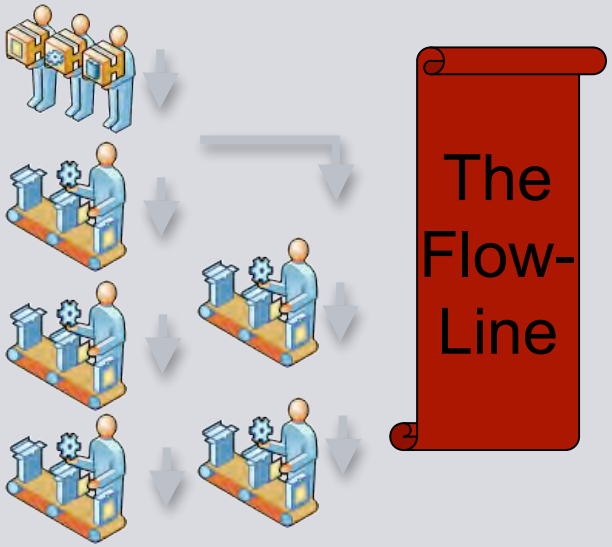
Material-Flow Process Structure



Primary Control Elements:

- Personnel
- Material
- Flight Schedules
- Tools

Plant Simulation
Optimization of Systems Characteristics

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Through the Optimization of Systems Characteristics – MTU Maintenance Hannover was able to:

- Characterize Existing Processes
- Map Out Transition from Workshop-Based to a Material-Based Flow
- Accommodate Highly Complex Models
  - 12,000 Working Plan Lines
  - 600 Bill-of-Material Positions
  - 120 Qualified Workers
  - 3,000 Individual Engine Components
    - Each with Unique Identification Numbers

MTU Maintenance Hannover
New Structure for Combustor Line

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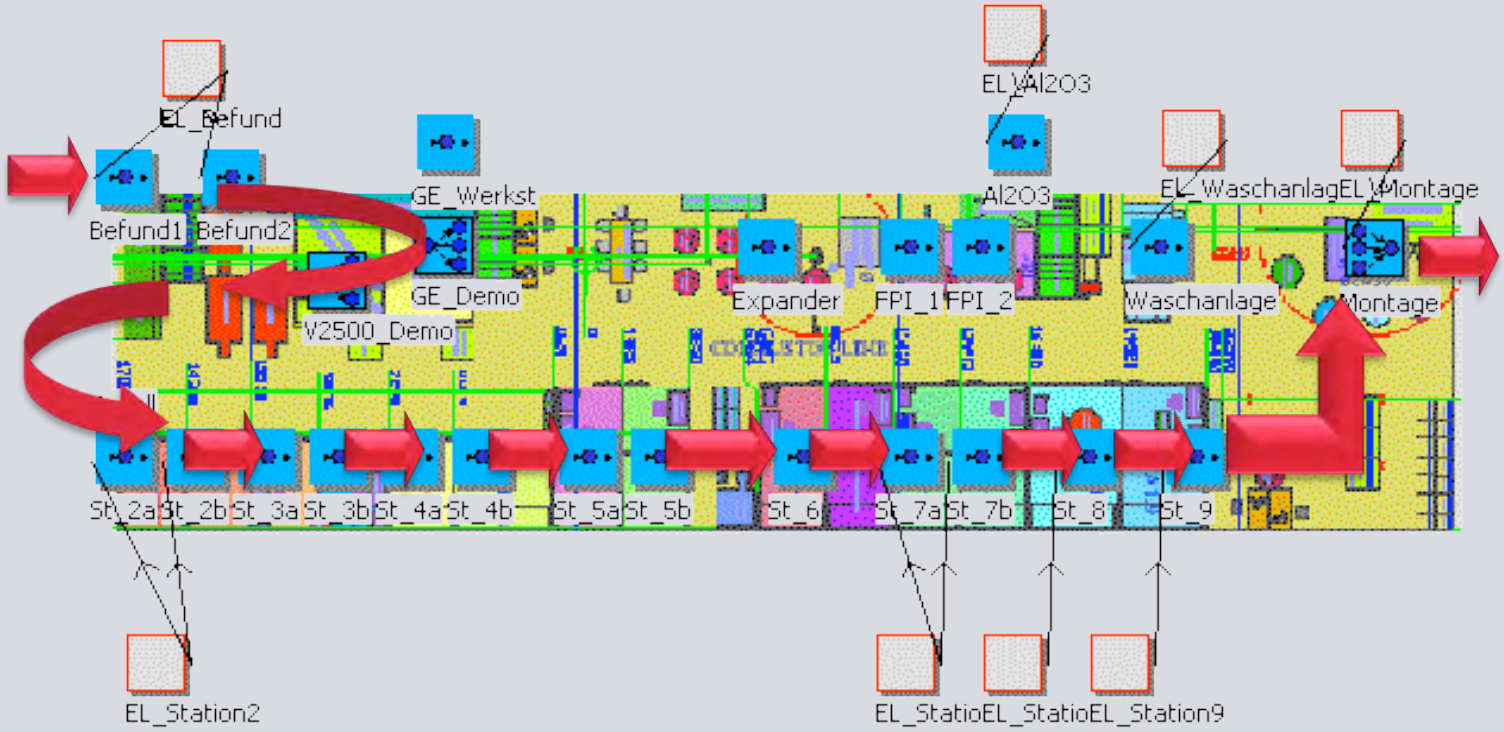

MTU Maintenance Hannover
Resulting Shop Structure

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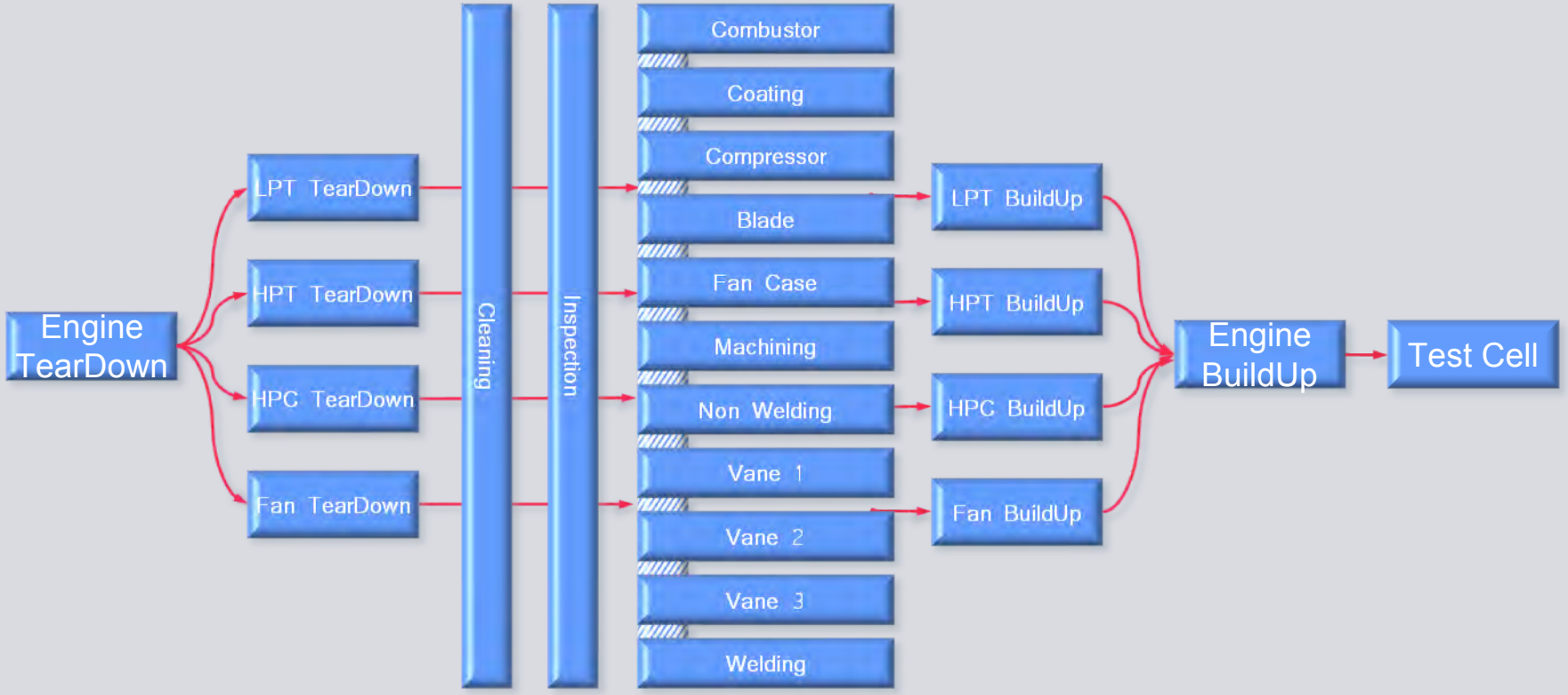

MTU Maintenance Hannover
Resulting Gains

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40% Reduction in Process Times

More Efficient Utilization of Personnel

Better On-Time Delivery of Maintained Engines