



UG/Mechanisms

Design and Analysis of Cam-Driven Mechanisms for High Speed Assembly Machines

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Speed and More Speed



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Case Study: 3M, Assembly Machinery

- Problem: The demand for a 3M abrasive product is greater than the production capacity.
- 3M Tools:
 - ◆ Unigraphics
 - ◆ UG/Mechanisms
 - ◆ ADAMS



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Problem Resolution

- Develop a new assembly capability
- 2 Requirements: Speed
 - ◆ Time-to-Market
 - ◆ High-speed assembly machinery



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Tools



“We would not be able to attempt a project like this without these tools.”
Greg Schrank, 3M



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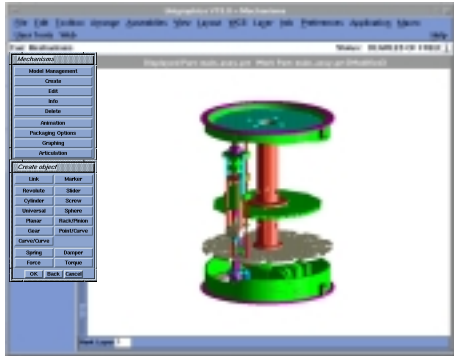
Overview

- Mechanical System Simulation
- Case Study: 3M
- UG/Mechanism
- ADAMS

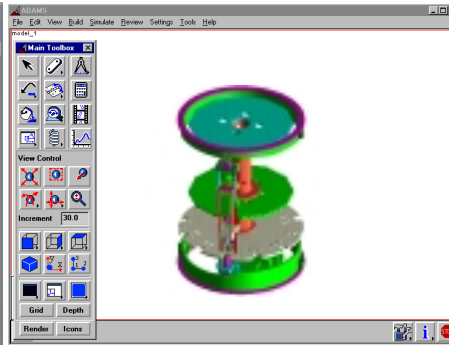


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What are UG/Mechanisms and ADAMS?



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ADAMS/View

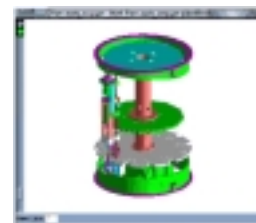
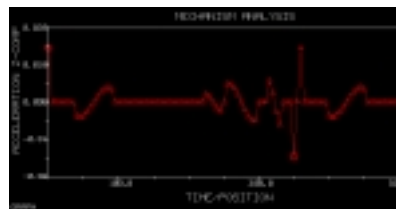


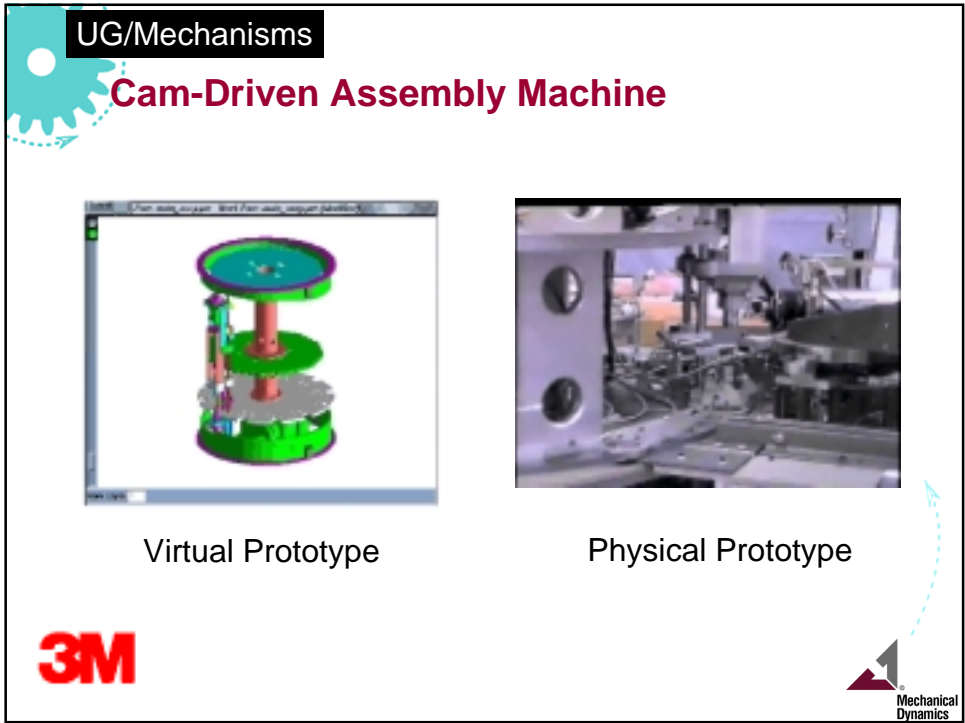
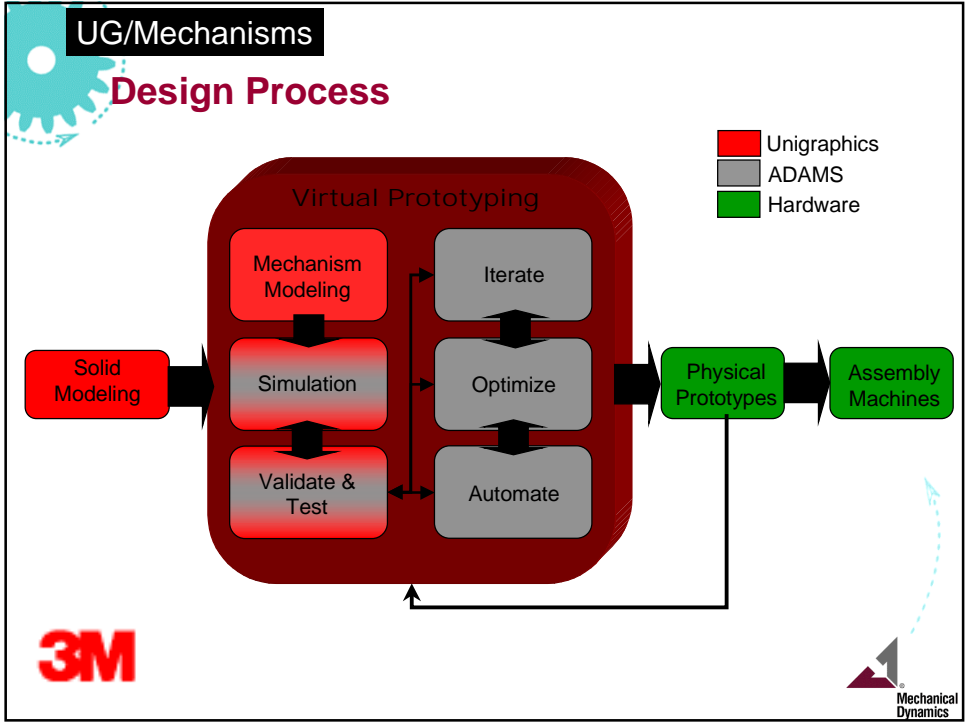
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Requirements for UG/Mechanisms and ADAMS



- Quickly explore new concepts
- Communicate designs
- Analyze design





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The Mechanism

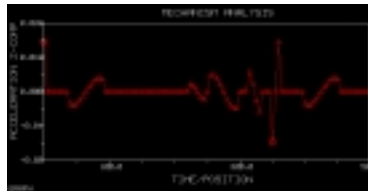
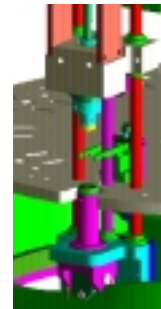
- 5 Rigid Bodies (30 DOF)
- 7 Joints (-27 DOF)
 - ◆ 2 Revolute (-10 DOF)
 - ◆ 2 Cylindrical (-8 DOF)
 - ◆ 1 Slider (-5 DOF)
 - ◆ 2 Point-to-Curve (-4 DOF)
- 3 Motions (-3 DOF)



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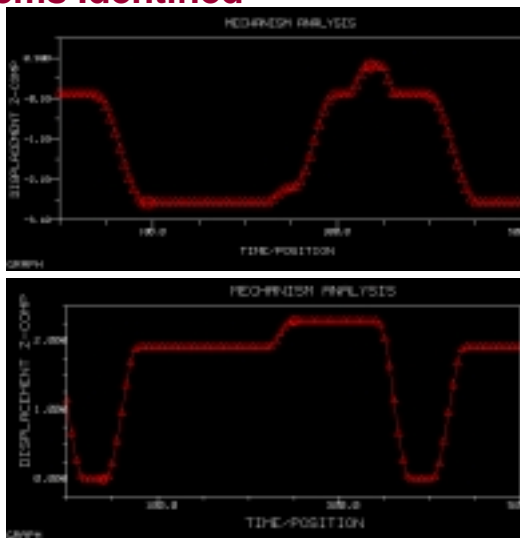
Using UG/Mechanism

- Verify cam and other motion
- Check for interference
- Analyze design



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Problems Identified

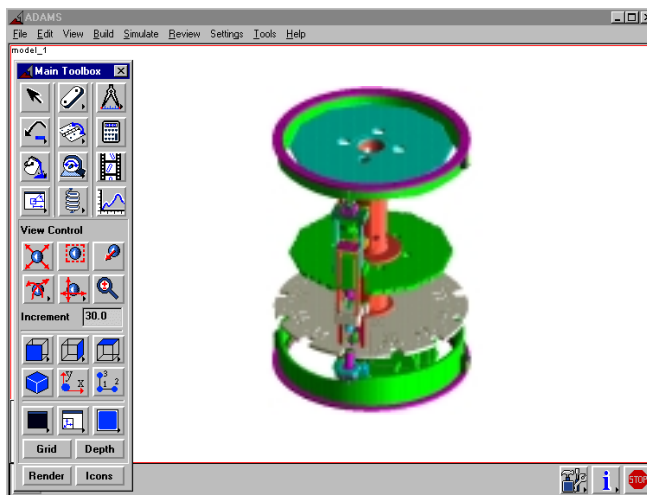


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Advanced Mechanical System Simulation



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Benefits of Virtual Prototyping at 3M

- **Speed:** decreased time-to-market

- ◆ Caught problems early
- ◆ Required only one physical prototype

- **Speed:** Ability to quickly design one-of-a-kind high-speed assembly machines.

- Reduced development cost
- Increased capacity



Conclusions



- You can benefit from a process similar to 3M's!
- UG/Mechanisms and ADAMS helped save time and money.
- Not possible without UG/Mechanisms and ADAMS.
- 3M is pushing this process into other parts of the organization.
- Helps engineers be more competitive.

