



# ESTECH Supporting the Noise and Vibration Needs

**Toshiro Abe**  
**President**  
**ESTECH Corp.**

Asia Pacific Operations



# Company Profile

- Name: Estech Corporation

Engineering Solution and Technology

- Location: Yokohama, Japan
- Established: February 28, 1989
- Employees: 45 (as of November, 2001)
- Shareholder:  
Mechanical Dynamics Inc.(100%)



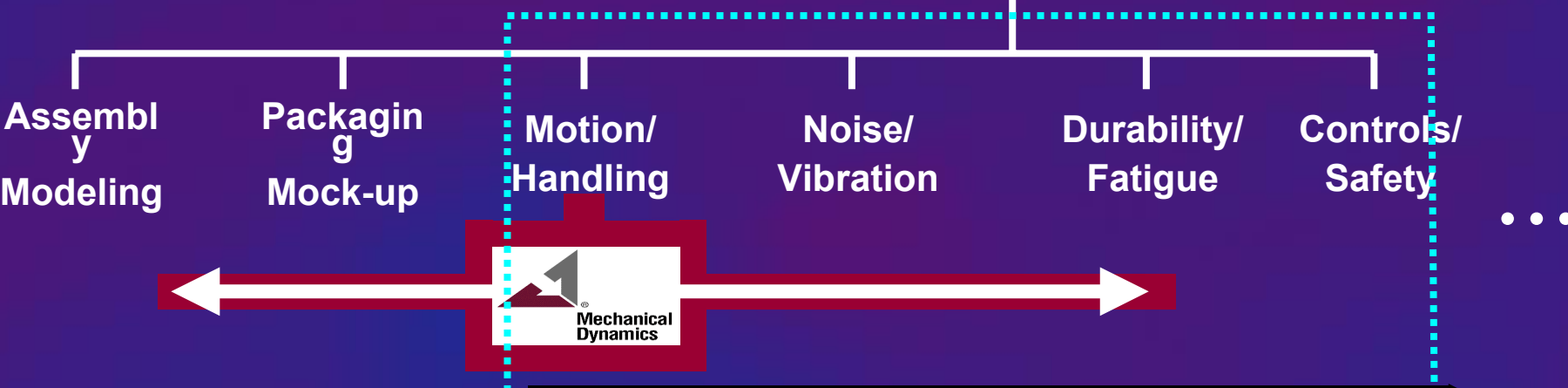
# Technology Enhancement MDI+ESTECH



**System-Level Prototype Market  
Build, Test, & Refinement**

**Hardware Prototyping  
(Physical Prototyping)**

**Software Prototyping  
(Virtual Prototyping)**



**ESTECH**

**Asia Pacific Operations**



# Synergy by "MDI+ESTECH"



**ESTECH**

**ADAMS Appl.**

**NVH**

**Structural & Fatigue**

**Heat Xfer & Thermal Flow**

**Stamping, Forging & Casting**

**Experimental Capability**

**FE Analysis**

**MDI/MDJ**

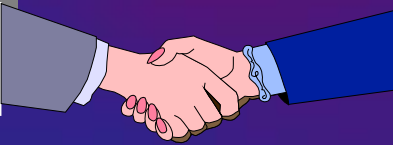
**Advanced FDP**

**ADAMS Toolbox**

**Advanced ADAMS**

**Physical World**

**Functional Digital Prototyping**



**Synergy**



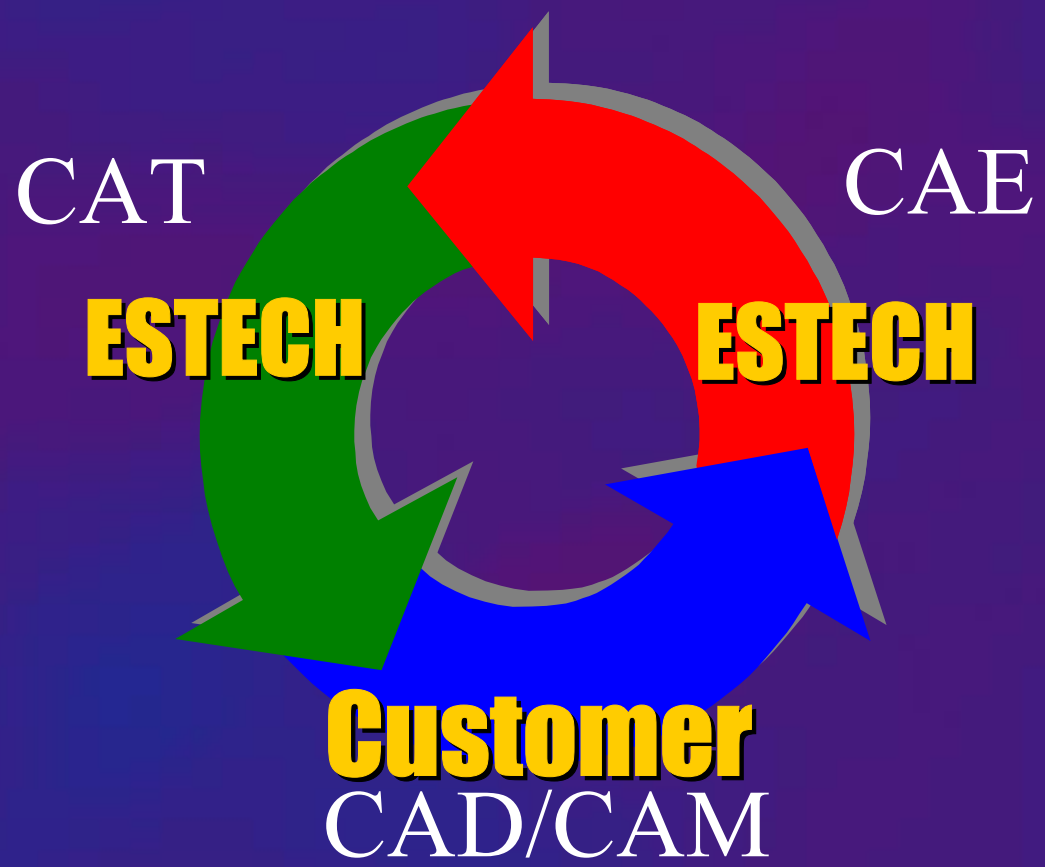
# ESTECH Business Activities -1-

- Engineering Consulting
- Solve mechanical problems by the combination of TEST and COMPUTER ANALYSIS

- continued -



# CAD/CAM/CAE/CAT





# Valuable CAE DIAMOND



Empirical Dynamics Modeling

Virtual Test Laboratory

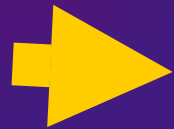
RPC Pro Fatigue Tools



Integrated ADAMS loads transfer to FE-Fatigue tools



FE-Fatigue



Customer

Asia Pacific Operations



# **ESTECH Services**

- 1. Testing (Modal, Noise & Vibration, Strain)**
- 2. FE and/or ADAMS model creation**
- 3. Design validation and mechanical problem prediction for product design and manufacturing process**
- 4. Trouble shooting**
- 5. Training for client's engineers focussing on problem solving utilizing CAE tools**





# ESTECH Philosophy

The essence of **CAE** lies  
in its synergy with  
**Testing**



# ESTECH Analysis & Simulation Procedure



Analysis Model Creation (1),(2)

- FE Model
- ADAMS Model

Testing

- (1) Clarify Phenomena
- (2) Model Development
- (3) Correlation

Accuracy Check/Correlation

Parametric Study/Sensitivity Analysis

Propose Optimized Design

**The essence of CAE lies in its synergy with Testing**

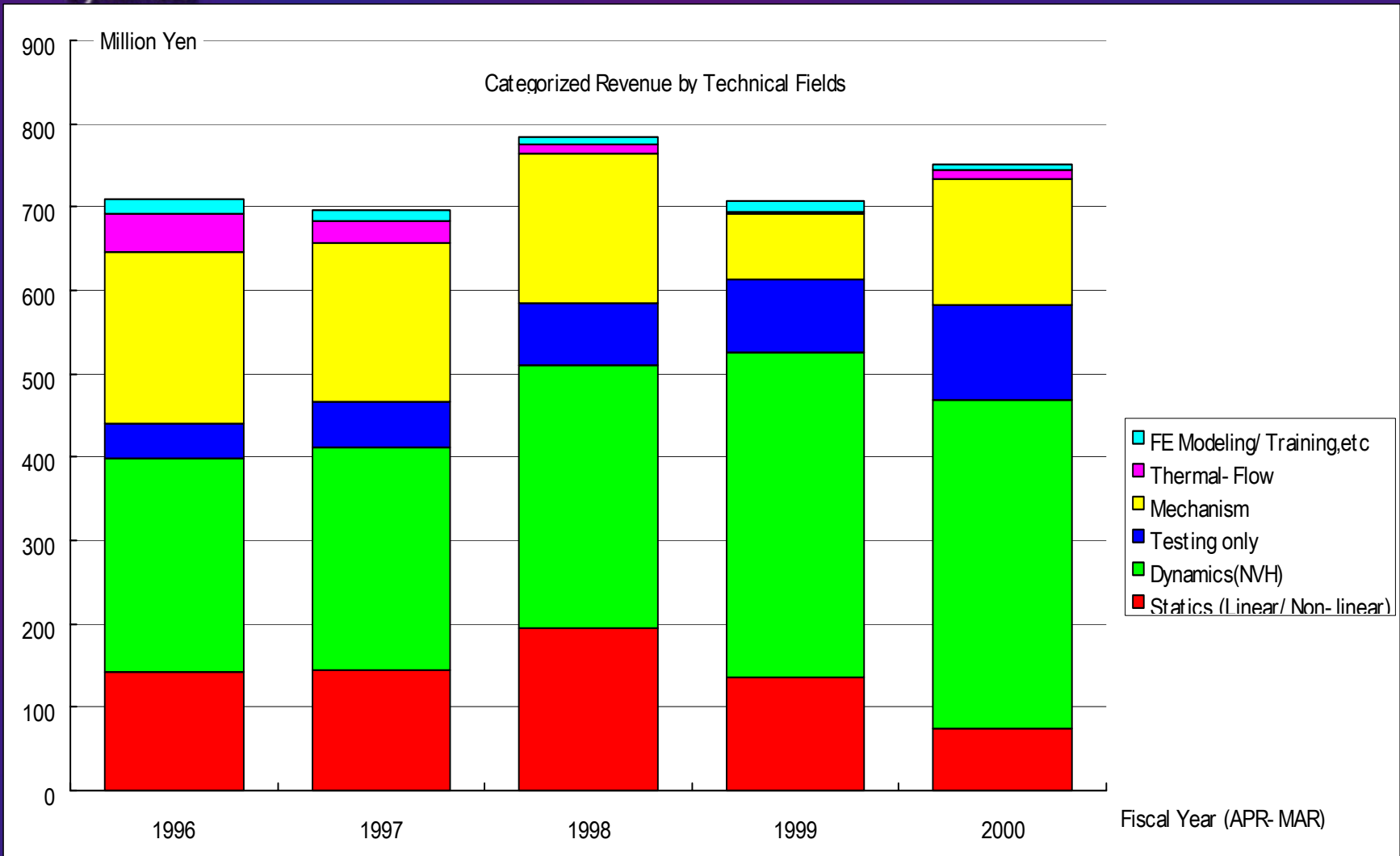


# ESTECH Technologies

- Noise & Vibration Analysis and Test
- Linear & Nonlinear Structural Analysis
- Durability Analysis
- Mechanical System Dynamics Analysis
- Thermal & Thermal Flow Analysis
- Stamping, Casting & Forging Analysis

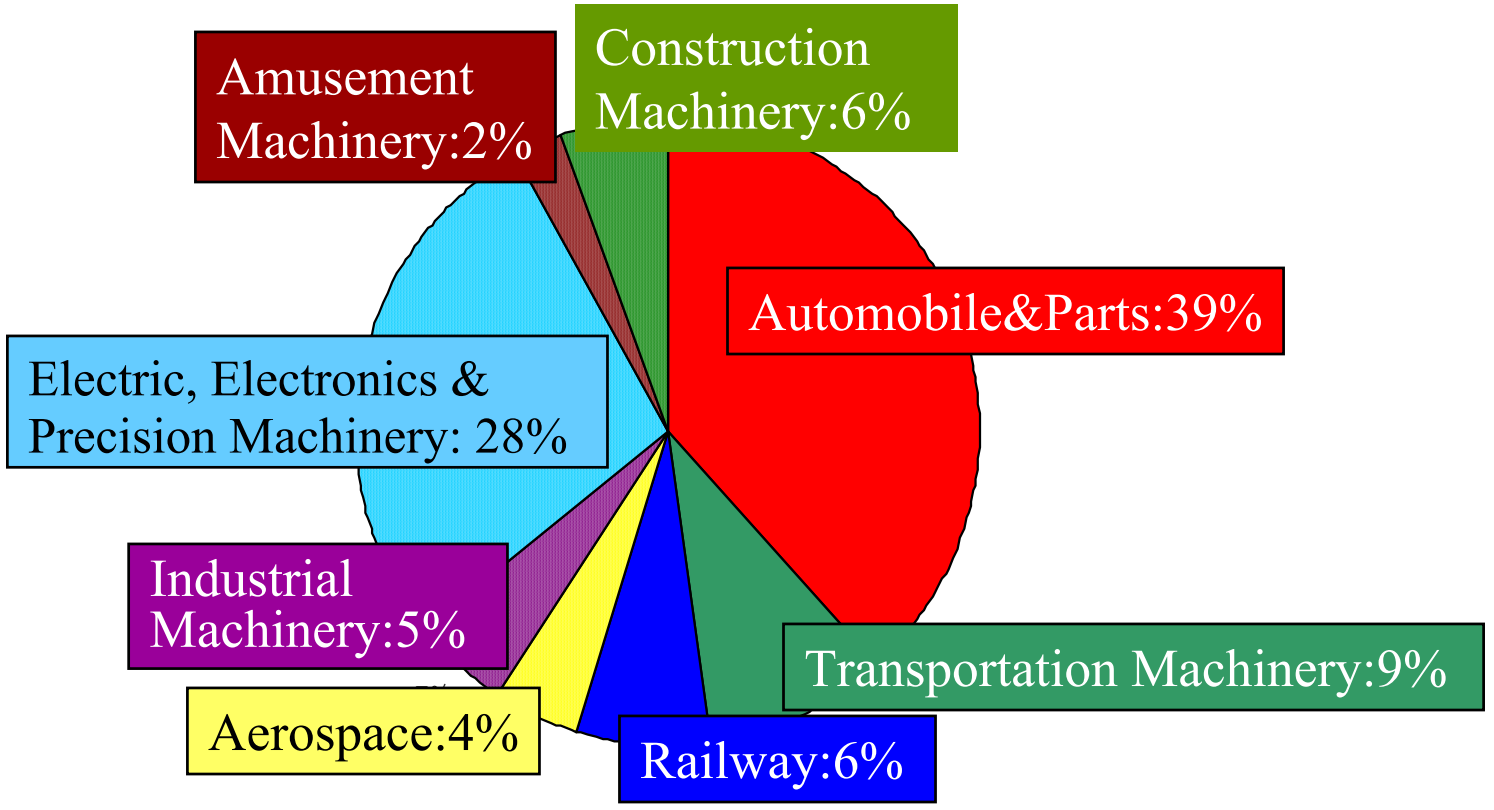


# Technology Segment





# Industrial Segment





# Test Site & Equipment



- Data Acquisition System / HP EWS+HP35650-32ch  
Gateway PC+B&K IDA-64ch  
Compaq PC+ HP35650-24ch  
DEC PC+HP VXI-64ch
- Portable FFT / Ono-Sokki CF-3200,3400
- Shaker Controller / IMV RC1120
- Shaker / Modal 50 (4sets), VTS100(2sets), US-2(2sets)
- Hammering Kit / B&K, PCB, DYTRAN
- Charge Amplifier / B&K, etc.
- Laser Doppler Vibrometer / Polytec OFV3001
- Strain Gage / Kyowa (-5K, -10K)
- Force Gage, Acceleration Pick-up / B&K, PCB, YAMCO etc.
- Microphone / B&K, Intensity Probe / Ono-Sokki
- SGI O2+MTS Sound Quality System
- DAT Recorder / TEAC, SONY
- Excitation Rooms (2 rooms)
- A Semi-anechoic Chamber



# Computer Resources



## Computer Hardware

- SGI ORIGIN2000
- SGI ( Octane and others, 22sets )
- HP9000 (180CX and others, 17sets)
- PC/AT[Windows] (Hitachi, Dell, 8sets)
- Macintosh (56sets)

## Computer Software

- SDRC/I-DEAS Master Series
- ANSYS
- MDI/ADAMS
- HKS/ABAQUS
- MSC/NASTRAN
- MSC/MARC
- MTS/Sound Quality
- MTS/Noise Path Analysis
- MTS/Vibro Acoustics
- MTS/SMART
- MTS/FSI
- MTS/CORDS, FRFCORR
- ESTECH/RIDE(Nonlinear Subroutine for NASTRAN)
- ESTECH/NASDAS(NASTRAN/I-DEAS Data Link Operations)



# Number of Projects Conducted by ESTECH

In past 12 years  
ESTECH Conducted  
more than  
1500 projects





# **ESTECH Past Project Case History 1**

## **Noise & Vibration Analysis**



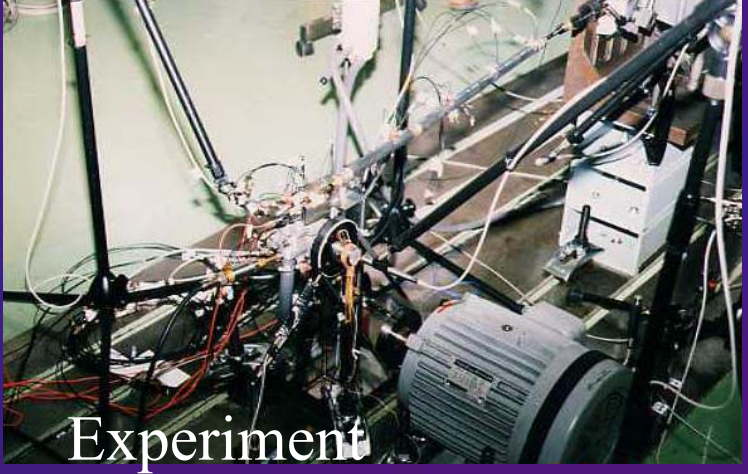
# Noise & Vibration Analysis of a Hydraulic Vane Pump

## OBJECTIVE:

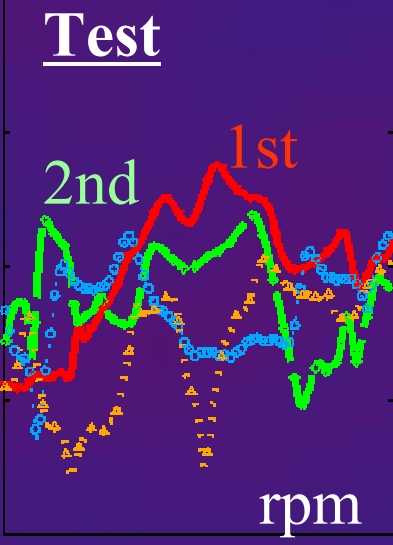
To identify the noise generating mechanism of a hydraulic vane pump and predict the effect of its design modification



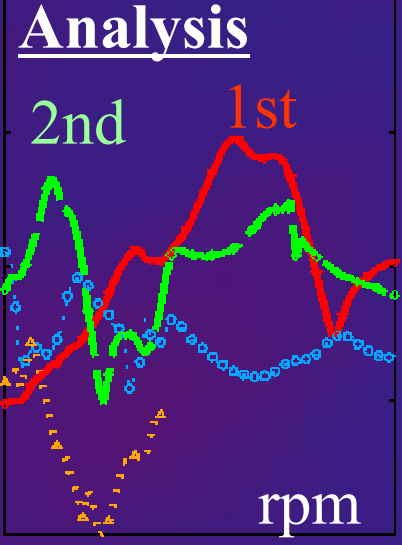
# Noise & Vibration Analysis of a Hydraulic Vane Pump



Acceleration Level

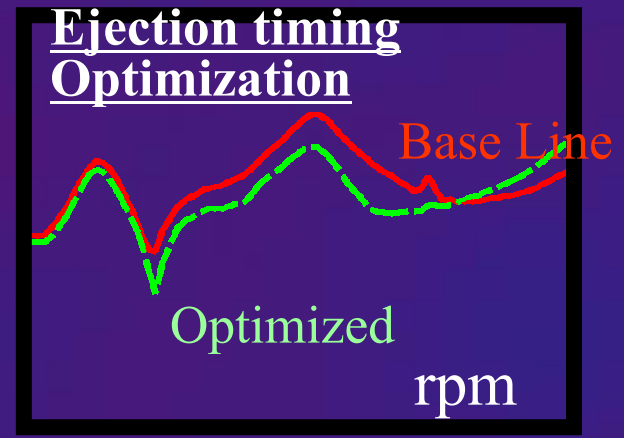


Acceleration Level



Vibration Mode

Acceleration Level





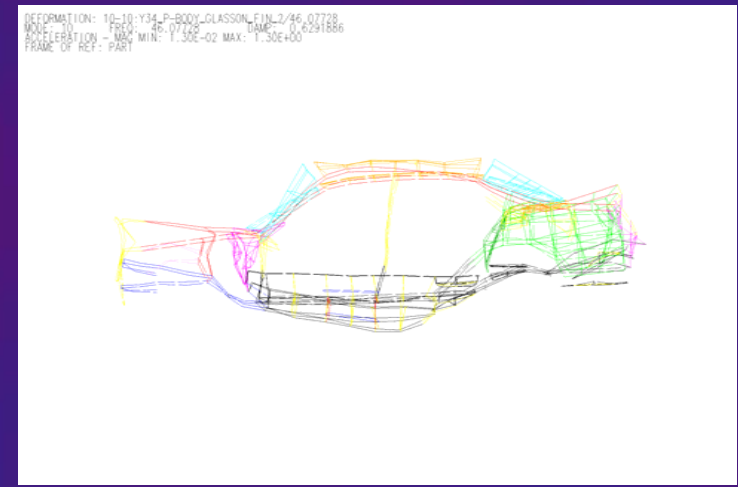
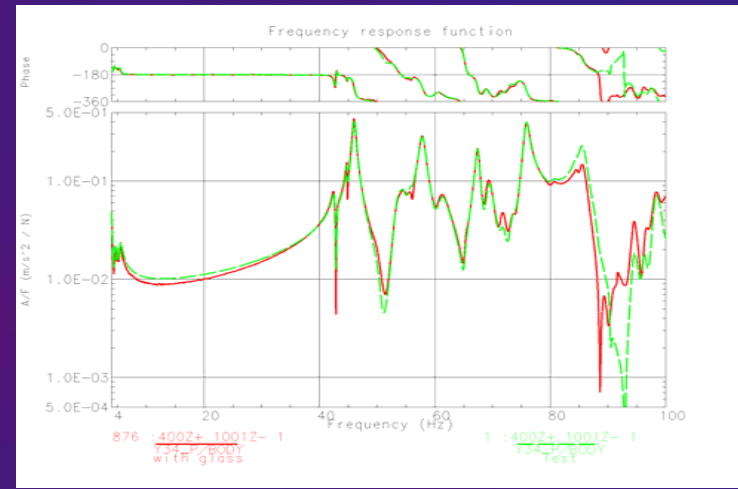
# Modal Test and Analysis of a Vehicle Body

## OBJECTIVES:

1. To obtain the accurate vehicle body FRF data through artificial excitation.
2. To extract reliable dynamic characteristics of the vehicle body by curve-fitting measured data.



# Modal Test and Analysis of a Vehicle Body



Excitation Points : 4 Points  
Measuring Points :  
300 Points x 3 Directions



# **ESTECH Past Project Case History 2**

## **ABAQUS Application**

### **- Nonlinear Analysis -**



# Fatigue Test & Analysis of Forklift

## OBJECTIVES :

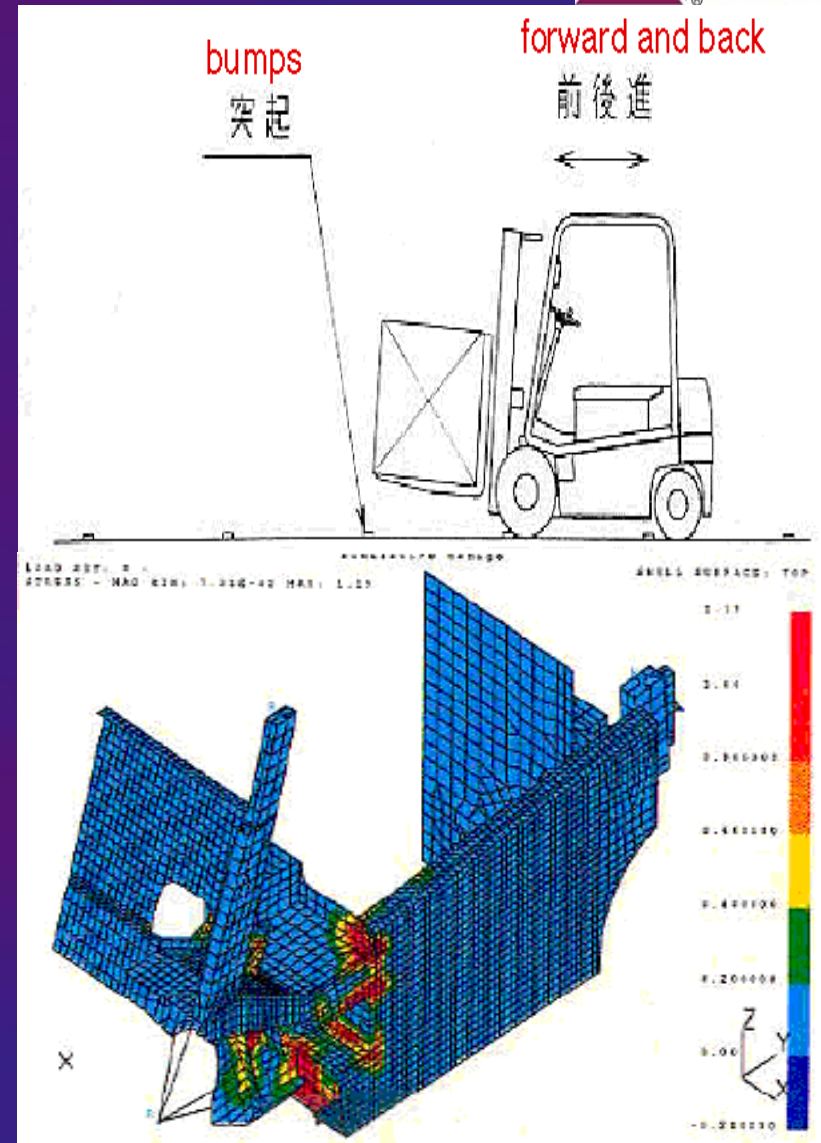
1. To investigate maximum strain value of forklift frame during its operation over a hump.
2. To investigate the operating mode shape of the frame at the instance when maximum strain is detected.



# Fatigue Test & Analysis of Forklift



Operational Test







# A Laptop Computer Drop Test

## OBJECTIVES:

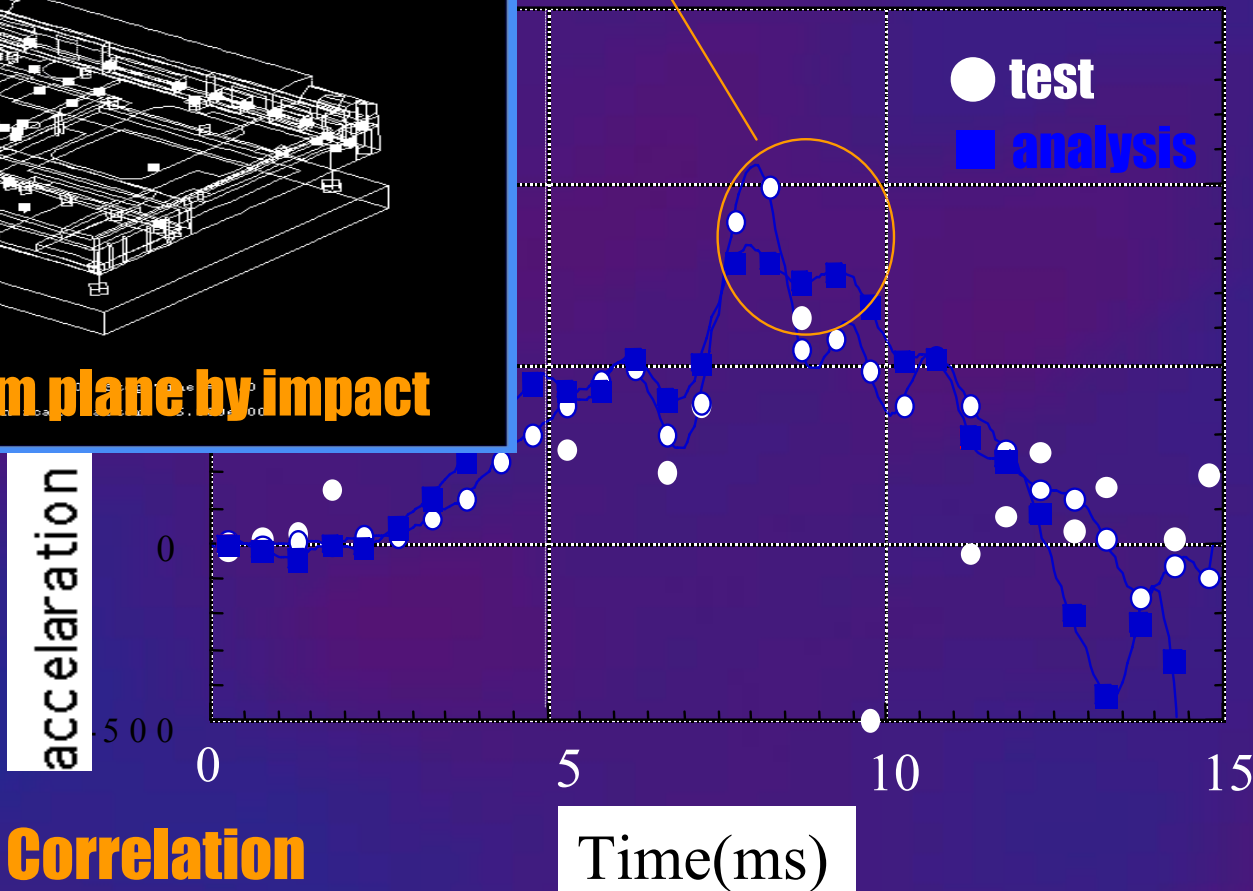
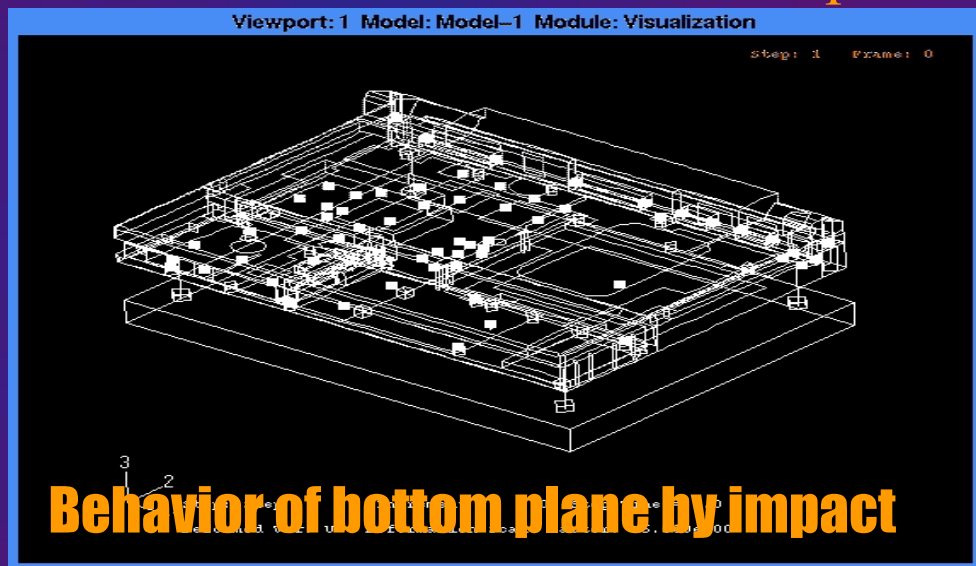
1. To investigate maximum acceleration value of hard disc caused by drop impact.
2. To investigate the operating mode shape of the laptop computer caused by drop impact.



# A Laptop Computer Drop Test



A peak by rebound of bottom plane



**Correlation  
between Test and  
Analysis**



# Exhaust manifold Thermal strain Analysis

## OBJECTIVE:

To predict failure point and strength of exhaust manifold during the following engine running test condition

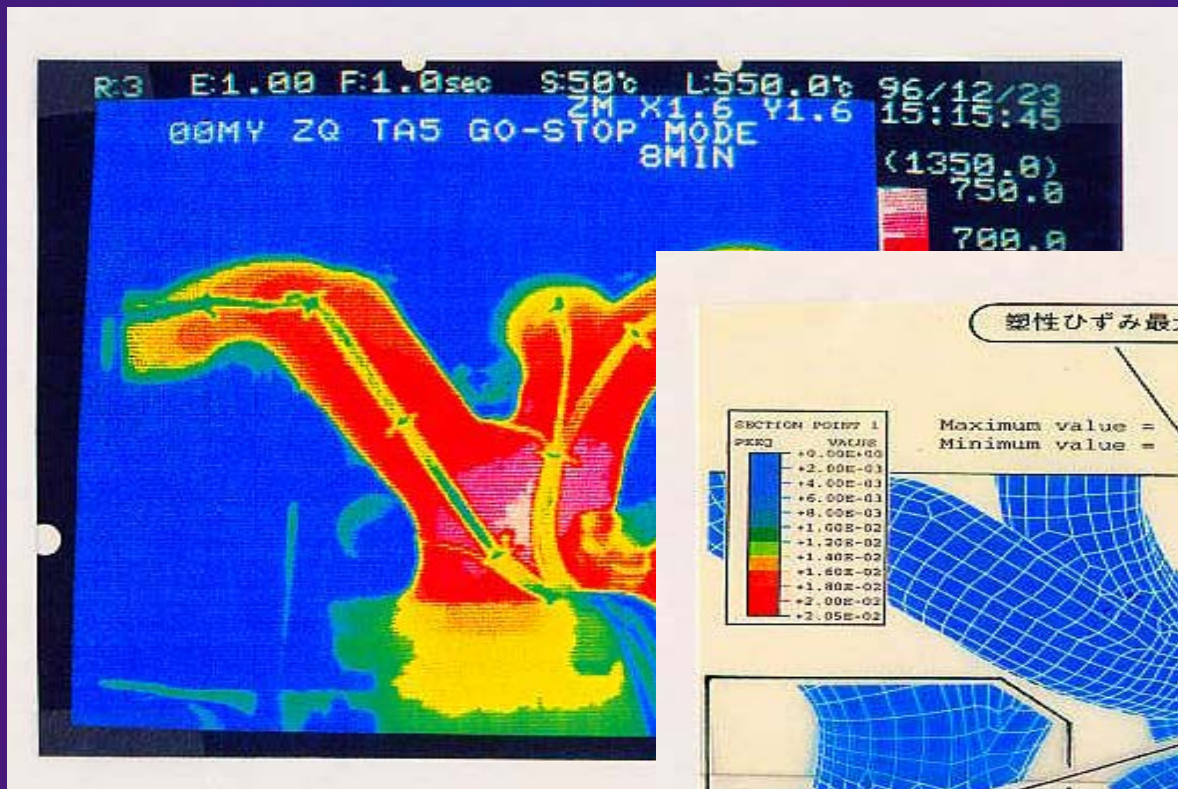
engine idling  $\Rightarrow$  wide open throttle  $\Rightarrow$  engine stop  $\Rightarrow$  engine idling  $\Rightarrow$  wide... •



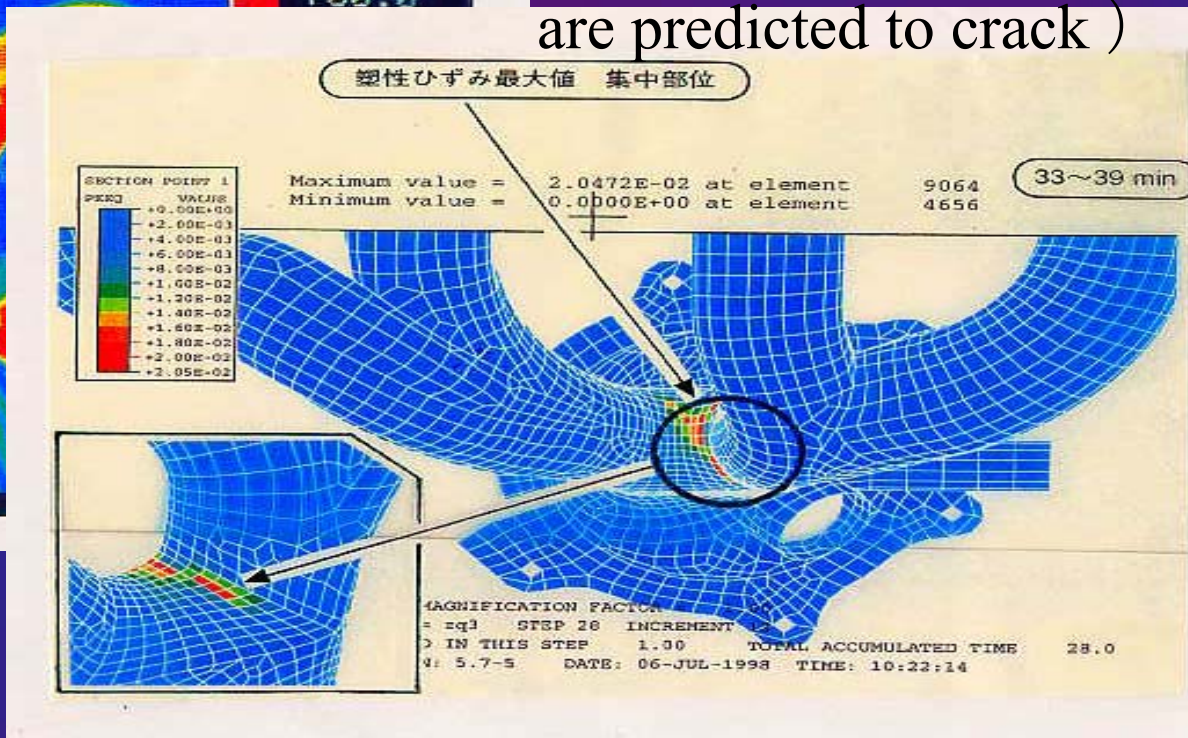
# Exhaust manifold Thermal Strain Analysis



Analysis Result( large plastic strain is concentrated at junction of four tubes. this region are predicted to crack )



Measured Temperature distribution on exhaust manifold





# **ESTECH Past Project Case History 3**

## **ADAMS Application**



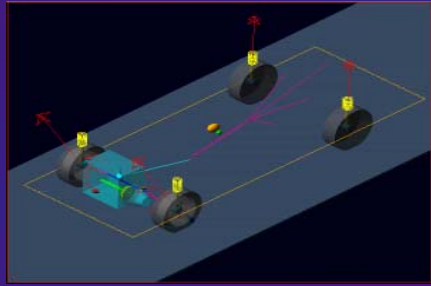
# Gaku-Gaku Simulation

2001 Korea Auto-AS User Conference, 2001. 11. 8~9

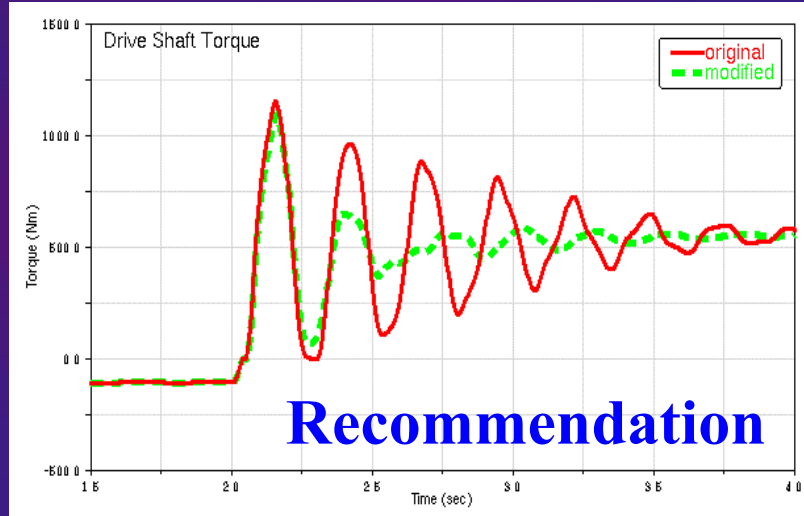
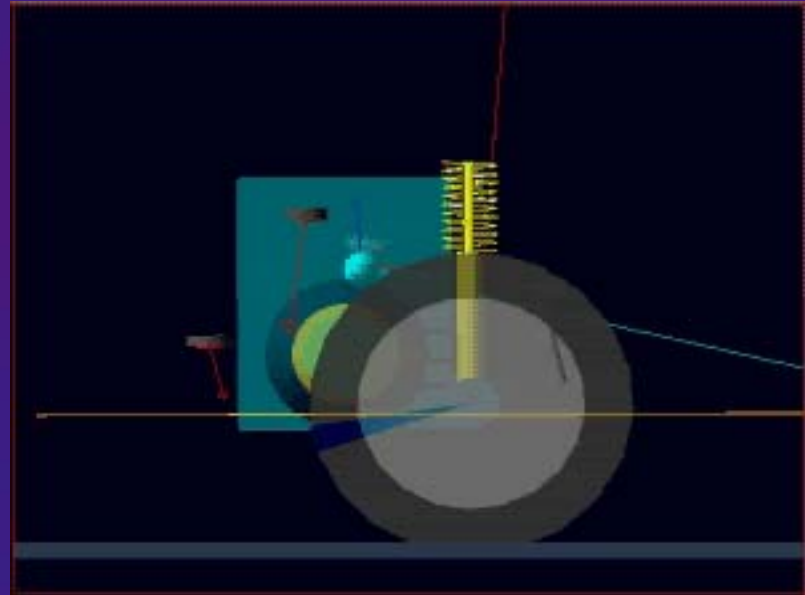
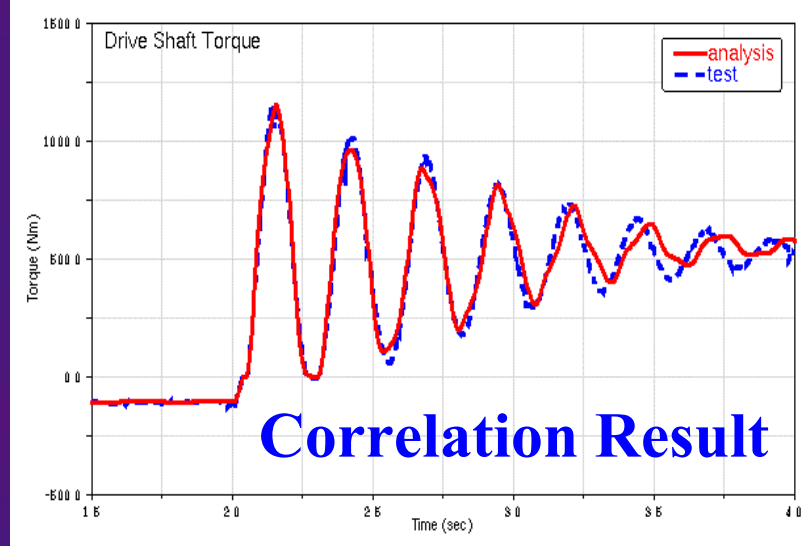


## -Vehicle Fore-Aft Shock Reduction-

### Design Modification



- Engine Mounts
- Drive Train
- Engine Ignition
- Timing Control

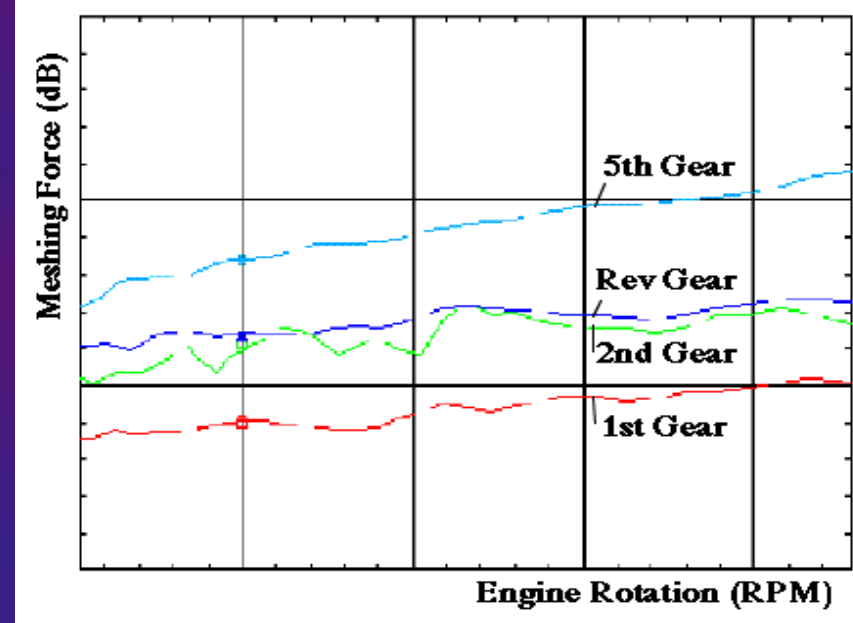
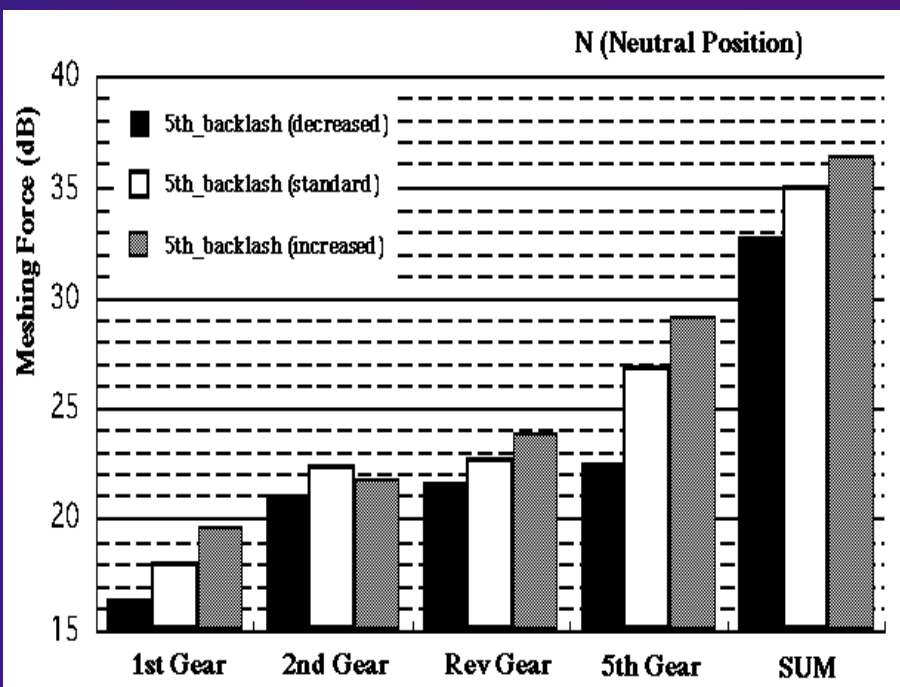
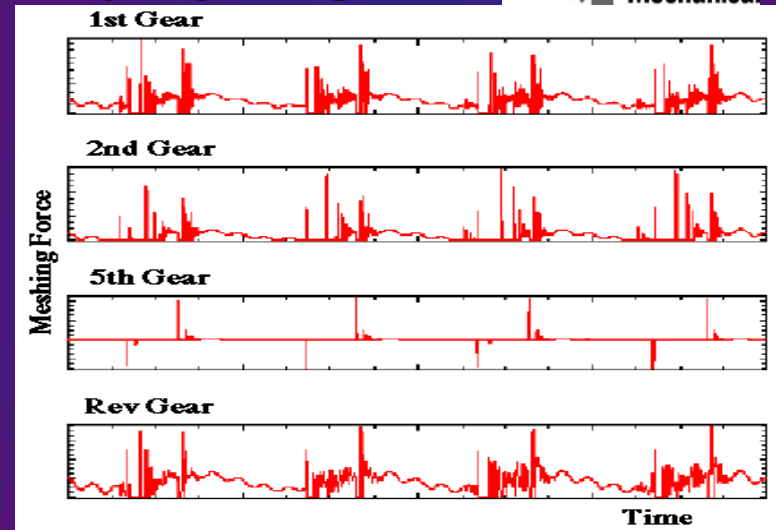
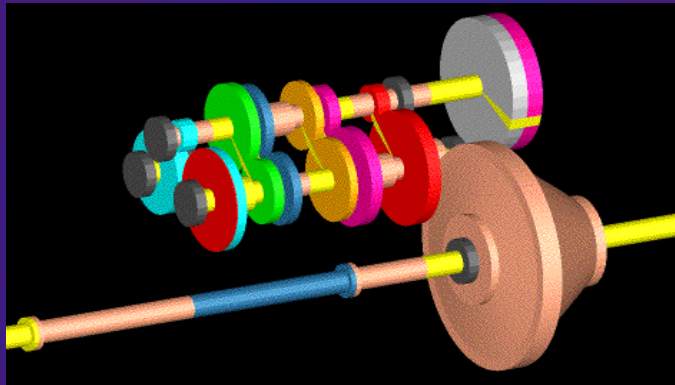




# Gear Rattle Simulation

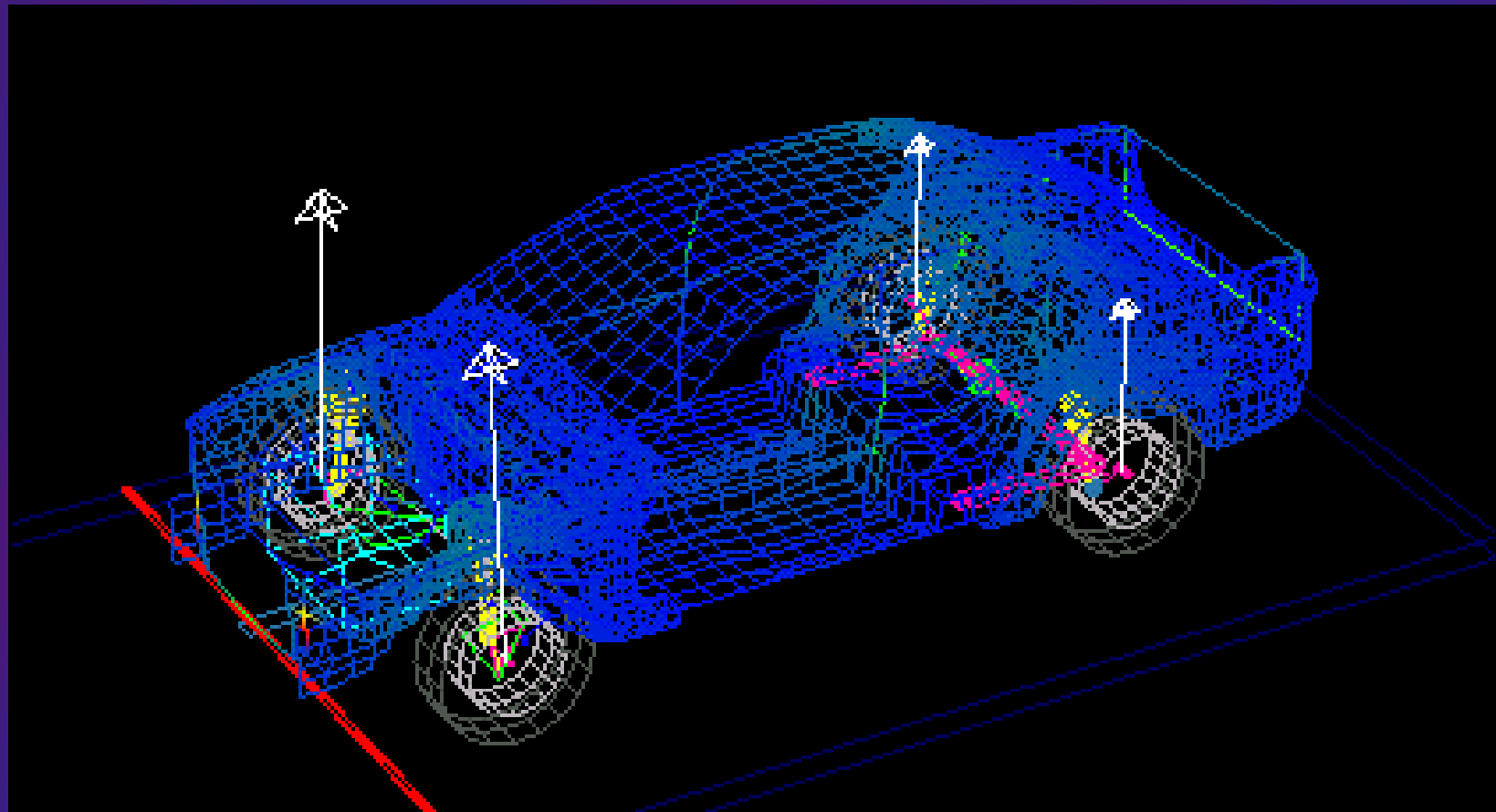


## Reduction of Noise & Vibration





# Vehicle Harshness Analysis



harshness.mov





# Machinery Dynamics

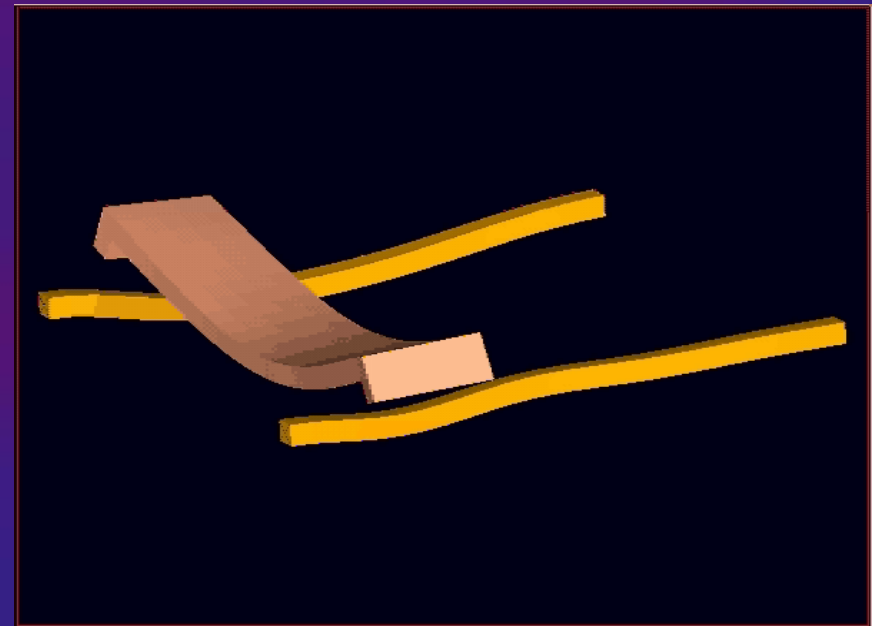
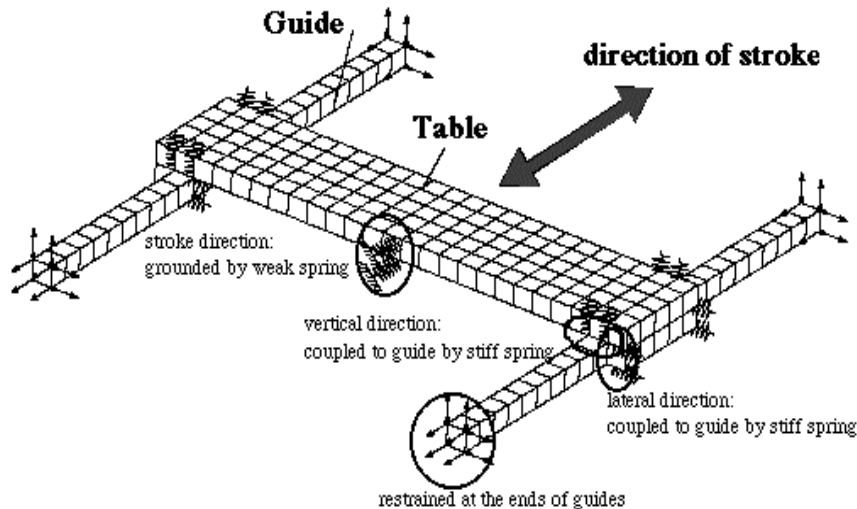


- ADAMS + Flexibility -

ADAMS + NASTRAN

NASTRAN + MATLAB

## Validation model





**Thank you very much !!**

Please contact:

[toshiro.abe@estech.co.jp](mailto:toshiro.abe@estech.co.jp)

or

[tabe@adams.com](mailto:tabe@adams.com)