The Auto Future: Round or Flat?

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The MathWorks Automotive Conference

Hyatt Regency
Dearborn, Michigan

June 19, 2007
The Perfect Storm

Competent New Players: China, India, ...

Benefits

Auto Industry

Tools

Materials

Hyper Competition
Auto Industry of the Future

A World of Vanishing Boundaries
Demographics

“Boomers go Boom”

- Consumer Behavior
- Socio / Political
- Health Care
- Skilled Workers
- World Issue
Competition

Relentless

Unforgiving
Industry, Highly Unstable —
Not in Final Form
There is Good News & Bad News: We Have a Crisis
U.S. Automotive
Capacity Utilization and Profits
1978 – 2006

Capacity Utilization

Profits $ Bil.

Year

Cap. Util.  Profits

Source: Federal Reserve, U.S. DOC/BEA
The Old Business Model is Broken
It’s Change or Die & Shrink to Grow
Auto Industry 2008+

- Successful manufacturers and suppliers
- Strong market
- Great products
- But—not everyone made it
The Future —

It’s not what it used to be
Foundation for Excellence

- Smarter Industry
- Platform / Component Set Rationalization
- Faster, Better Product Development
- Manufacturing Flexibility
- Stronger Processes
- Discipline
- Supplier Competence
- Lean Everything
Market Share is Nice

Profits are Essential
Cost Reduction — Survival Issue

- Low Investment
- Subsystem Optimization
- Global Sourcing
- Flexible, Lean Manufacturing
- Fast Product Development
- High Volume Platforms and Component Sets
Economies of Scale Important

- Platforms
- Component Sets
- Parts
- Production Equipment
- Software
Economies of Scale

- Economies of scale in software – through reuse is necessary
- New external and internal standards could help
Old Business Model

- Vertical Integration
- Paper
- Slow
- Physical Prototypes
- Control
- Sequential
- Job for Life
- Kings
- Competition
- Acquisitions
- Legalistic
- Individual
- Regional
- Structured

- Talk
- Bureaucracy
- Linear
- Lean
New Business Model

Virtual Integration

Paperless

Anti-bureaucracy

Collaboration

Fast

Lean

Agile

Virtual Prototypes

Empowerment e-enabled

Trust Team

People Flow

Coaches

Parallel Global

Coopetition

Alliances

Flexible
Lean / Agile

- Investment
- Engineering
- Manufacturing
- Everything
Collaboration Driven by Resource Shortage

- Natural
- Financial
- Human
- Time
Examples: New Business Model

- Ford/GM Transmission Collaboration
- GM – DCX – BMW Hybrid Collaboration
- DCX – Toledo Plant
- GM Body Tooling
- Tool and Die Consortia
- Auto/Steel Partnership
Old Labor/Mgt Model
Is Obsolete

Confrontation → Collaboration
Knowledge

The Competitive Edge
It’s nice to be smart and rich, but smart is more important than rich.
Do what you know.
Customer Pull

Cars and Trucks

Technology Push

Product and Process
Knowledge

Innovation

Knowledge Application

Time
Information Technology

The Ride is Just Beginning
Comprehensive Software Strategy is Critical
Software - Everywhere

- External – Design, Manufacturing, Business Systems
- Internal/Embedded - Everywhere
Product Development

♦ 12 Months is Goal
♦ Real Time Collaboration
♦ Math Tools
Virtual Prototyping

The Savings are **HUGE**

in Time and Money
Drafting to CAD and PLM

- 1980’s mechanical engineering moved from drafting → to static finite element analysis
- Then from FEA to full Computer Aided Design
- Finally from CAD to Product Lifecycle Management
Embedded Systems Development has moved from machine language → to assembly language → to C/C++ → Model-Based Design
Need to continue to get more from existing resources

♦ Not much left to squeeze out of manufacturing … need to turn to design to meet cost and efficiency target
60 – 80% Reduction in Physical Prototypes
Good Art Beats Bad Art

Good Science Beats Good Art
Fast | Spectator | Have a chance
---|---|---
Slow | Dead | Parade has gone
Dumb | Smart
Faster  The Future

Fast

Smart  Smarter
Fastest

Faster

Winner (temporarily)

Smarter

Smartest
Fast-paced change demands leverage of all resources
Communication

Collaboration

Cooperation

Alliances

Teamwork
Change is Tough

Not Changing is Tougher
Product Technology

At the edge of a revolution?
Future Power Plants

- Gasoline
- Diesel
- Hybrid

The Answer – ?
Technological Progress—When to Commercialize

$\text{Current Technology} \quad \text{A} \quad \text{B} \quad \text{Too early}$

$\text{Time}$
Future Fuels

- Petroleum
- Bio
- Hydrogen

The Answer – ?
Future Gasoline Price – $ 1.50 – $ 3.50 /gallon
2 Key Developments

- Lithium Batteries
- Cellulosic Biofuels
More Electronics

- Key Enabler
  - 1970: Electronics 10% of Cost
  - 2010: Electronics 40% of Cost
  - Cars in development queue - 10 million lines of code, projected to reach 20 million lines by 2013.
- High quality embedded systems are challenging the industry.
Success Factors

- Risk
- Obsolete Own Products
- Tough Problems
- Systems
- Knowledge
- Collaboration
- Software
World Class

is a Moving Target
An Automotive Industry Tradition

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