Technology and Innovation: Paths to Success

UMTRI “Focus on the Future”
Inside China: Understanding China’s Current and Future Automotive Industry

November 11, 2015
• We are Global Automotive people
• We enable clients to grow businesses
  – Engineering services
  – Acquiring technology
  – Leveraging industry knowledge and relationships to deliver sales
  – Mapping paths to JVs and M&A opportunities
• AI is a Service Disabled Veteran Owned Small Business
Knowledge-based Services
Our Points of View about China

• We can see the Engineering challenges – both domestically and globally
  - Skills and Experience shortfalls
  - Competition for talent
  - Culture of “different thinking”
• The Path to Success is increased levels of technology and innovation
• The economic slowdown has focused attention on the need for technology and R&D
• Government, Industry and Academia R&D Collaboration holds untapped potential
• The opportunities for those who can adapt are many
Technology & Innovation -- Path to Success

- Long-term and sustainable growth
- Market presence
- Brand recognition/reputation
- Technology innovation and know-how

Today

2020
Increasing Technology & Innovation Capability

2025
High Value Products
Global Markets

Low Cost Make to
Prints Domestic
Quality

New Technology
Acquisition

Understand Customer
Wants & Needs

Internal R&D Design
& Innovation

IP Generation

Technology & Innovation Capability

HR-Education & Training

Marketing & Branding

Capital Investment

Quality Control

Manufacturing

Program Management

Engineering

Higher Value Technology Products
China Entices, but Doing Business Proves Hard

By DAN LEVIN

BEIJING — With the blessing of local officials, Amir Porat, an Israeli entrepreneur, set up a surgical supply factory in 2013 in China’s coastal Jiangsu Province, training workers and taking orders. All he needed to start production was $250,000 of specially designed molding equipment from Israel.

More than two years and $1 million in costs later, he is still waiting for the shipment. Chinese growth, Beijing has sought to assure foreign companies that China is a welcoming place to do business. In a speech to American business leaders in September, China’s president, Xi Jinping, pledged to protect the rights of overseas investors and to provide “a level playing field.”

But the plight of Mr. Porat and other overseas entrepreneurs underscores some of the challenges small and midsize businesses face once they arrive. While Chi-
Our Experience – Case Studies

A common thread in our case studies is the need for greater engineering skills and experience

- New Energy Vehicles (NEVs)
- EV Batteries
- Suspension Components Sales Representation
- New Spring Technology
- Investment Due Diligence – NEV Delivery Van
- Fuel Economy Improvement
- 4x4 Driveline
- Manufacturing Readiness
- Collaboration Proposal
Develop a PHEV (Plug-in Hybrid electric vehicle) for demonstration in China.

PROJECT
1. Innovative, 4x4 Architecture—based on modeling and evaluation
2. Hybrid System Components Procured, Engineered and Installed in Prototype Build
3. Software Developed for Vehicle and Battery Controls

LESSONS LEARNED
1. Vehicle Shipping to China takes time
2. Operators Handbook necessary for devaluations of the system
3. “Prototype” does not mean “Production Ready”. Need for “test and development awareness among smaller OEMs
4. Field issue resolution is difficult.
5. Demonstrations continue – contracts take time!
Assist an OEM to integrate a battery and control system in a NEV.

PROJECT
1. Diagnose battery installation and recommend improvements
2. Identify technical challenges for the controls strategy
3. Recommend procedures for installation and integration

LESSONS LEARNED
1. OEM engineering team’s first EV experience
2. Reviews of benchmark vehicles not conducted
3. Team eager to learn and compete
4. Prototype build and test plan established
PROJECT
1. Represent Chinese manufacturers to sell suspension components in China and globally

LESSONS LEARNED
1. Technology is well known – lower-value parts
2. The supply base is mature
3. Breaking into market requires
   a. Lower cost
   b. Global footprint
   c. New engineering and innovations
4. Success requires persistence!
New Spring Technology & Manufacturing Development

Assist a China supplier to upgrade steel springs and develop new composite springs

PROJECT
1. Conduct plant reviews of present steel efficiency and designs
2. Recommend improvements
3. Benchmark composites development and select architecture for new springs

LEssonS LEARNED
1. Difficult to collect data long distance
2. Building trust requires on-site meetings
3. New R&D viewed as risky – preference is JV or M&
4. Trust has been building over two years
Assess the business and technical potential of an innovative, aluminum, PHEV (Plug-in Hybrid electric vehicle) developed in the UK and the US for production and sale in China.

SCOPE
1. Financial Analysis of China Investment, Unit Cost, Market Price and Volume
2. Assessment of Electric Propulsion and Battery Architecture
3. Technical “Due Diligence” for Unique Aluminum and Composite Construction

OUTCOME
1. Joint technical team formed and On-site Reviews Conducted
2. Manufacturing Risk for Aluminum Construction and NEV powertrain were challenges
3. Investment acquisition for new, NEV vehicle considered too high-- Not Recommended
Fuel Efficiency Technologies Assessments

Survey technology options for vehicle fuel efficiency improvements.

PROJECT
1. Review the Government requirements
2. Survey the technologies for potential benefits, based on modeling
3. Assess key challenges to implementation
4. Identify future application potential
5. Work with team on-site to implement agreed technologies

LESSONS LEARNED
1. Processes to Review plans, approaches and engineering prioritizing weak
2. Modeling software purchase requires time
3. Contracting can be cumbersome
Provide a turnkey design and build “kit” for assembly in China.

PROJECT
1. Select OTS Transfer Case and Front Axle, and Install in Production Van
2. Requires New Front Suspension
3. New Transmission Housing with Mounting Flange
4. Engineer New Parts and Provide 3D CAD Drawings
5. Kit Shipments to China for Duplicate Build & Testing

LESSONS LEARNED
1. Communications, communications, communications
2. **Competitive requirements not available**
3. China test requirements not defined
4. Prototype designs deemed inadequate by OEM
5. Chinese engineering “judgements” not experienced based
6. Payments issues difficult to resolve
Assess Launch Readiness in support of new vehicle manufacturing Job #1.

SCOPE
1. Team of Experts Provided On-site Assessments at China Plant
3. Body Shop and Material Handling Issues Identified

OUTCOME
1. Risk Assessments Provided to Prioritize Work Efforts in Support of Job #1
2. Body Shop Fixtures and Clamping Modifications Implemented for Dimensional Control and Quality Improvement
3. New Procedures Developed with Supporting Education and Training
4. Follow-Up Assistance Planned in Support of Plant Start of Production
5. Improvements not implemented--management confidence lacking
R&D Collaboration Model

• Government, Industry, Academia
• Critical for domestic industry and long range sustainability
• Offers increasing levels of organizational and functional capability
• Payout is High-Tech products— and new companies
• Increases learning and knowledge
• Leverages local to become global
# Technology Consortia Possibilities

## NEW TECHNOLOGY CONSORTIA RESEARCH

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### Research Contents

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Ways to Start— Just do it!

• Identify/Establish Research Organizations & Centers
  - CABRI
  - CERC
• Identify Interested Companies
• Inventory Knowledge & Interest
• Design New Research Projects
• Establish Processes to “Get to Point B” (Results)
• Provide Education and Training
• Plan Events-- Rewards and Recognition
• Etc.
Summary-- Engineering Challenges

• Fuel Economy Improvement
  – Engine and Transmission Technology
  – Powertrain Selection, Installation, Calibration

• New Energy Vehicles
  – Vehicle integration
  – Battery systems
  – Component Engineering

• Controls and Systems Engineering
  – Hardware and Software Development
  – Vehicle Integration
Summary-- Product Development Challenges

- Vehicle, Systems and Component Engineering
  - Design, test, development and prove-out
  - Refinement—NVH, dynamics, chassis
  - Standardization and Processes
  - Fabrication and Prototype Build
- Supplier selection and integration
- Manufacturing and Assembly Engineering
  - Facilities & Processes
  - Quality and Productivity
Summary-- Program Management & Business Challenges

• Timing, Cost, and Quality delivery– Disciplines and Processes
• Technology Acquisition– need to be “Smart Buyers”
• Integrated Product and Business Strategies
• Education and Training– experience base and University system
• Working together to Win Together
• Building trust and management confidence to pursue engineering projects– for survival!
Management Team

Mike Thomas, Founder & CEO: 30 years at Ford directing global product strategy, powertrain and technical strategy, product development. Led USCAR fuel efficiency R&D. Delivering services in China for 4 years.


Mark Roberts, Consulting Principal: Mark has broad experience base in various disciplines within the Ford Motor Company, including Truck and Car Product Development, Ford South America Automotive Operations and joint Mazda/Ford programs.

Alan Bratt, Manufacturing Director: Over 30 years experience including periods in Europe, Africa, South America and Asia Pacific, where as Director of Manufacturing at Ford he was responsible for the development of manufacturing plans and supplier development and quality strategies.
Technical Experts


Gerald Cole, Lightweight Operations Director: Ford quality and manufacturing expert in metallurgy, metal casting and vehicle weight reduction. Organized Ford’s global magnesium strategy; and set up pilot ingot plant in Australia; led R&D programs for NASA, NIST, DOD, CANMET Canada, EUCar & Chongqing University. Adjunct professor at 6 universities. Published 150 papers and 9 patents, 400 invited talks around the world. Director 5 global technical organizations. Fellow ASM International.

Steve Thomas, Powertrain Director: 38 years at Ford Motor Company. Experience in Powertrain Engineering, leading Ford’s global automatic transmission R&D and advanced engineering. Holds 57 patents for new powertrain innovations.

Tom Smart, Technology & Strategy Director: 30 years in the US Auto Industry. Design & Development Engineering, Product Strategy, and Program Management positions. He led the Chassis Engineering and Vehicle Integration teams that developed Ford's first HEV.
Thank you!

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