

BETTER INNOVATION *on tour*
POWERED BY TATA TECHNOLOGIES

BETTER INNOVATION



Tata Nano looks neat, but will world's car come to U.S.?





TATA

- India's best known group, with highest standards of ethical practices and business commitment

- 96 companies in 7 business sectors
- Revenues in excess of US\$ 62.5 billion
- Serving countries for more than 126 years
- More than 350,000 employees
- Trusted by more than 3.2 million shareholders
- Revenues equivalent to 5% of India's GDP
- More than 61% of revenue comes from overseas markets
- Operations in more than 80 countries across 6 continents

Tata Technologies



Engineering



IT & Telecom



Materials



Chemicals



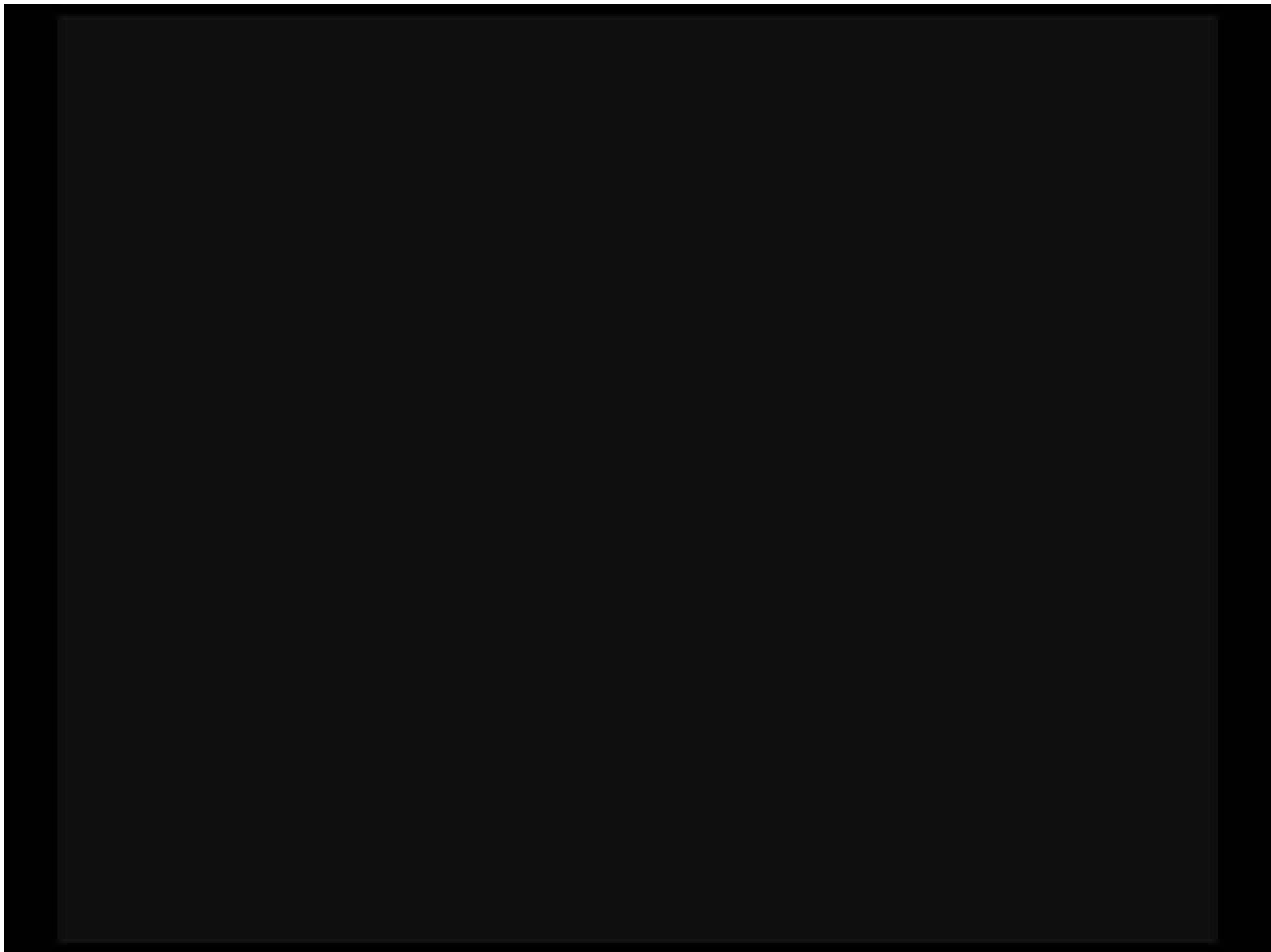
Energy



Consumer Goods



Hotels





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The Nano Program: Vehicle Highlights

TATA nano SPECIFICATIONS



- Stylish appearance
- Best-in-class leg and head room
- Mono-volume design
- Comfortably seats four persons
- Environmentally friendly
- Minimum weight-in-class
- High fuel efficiency
- Rear-wheel drive

The Role of Tata Technologies

BETTER INNOVATION POWERED BY TATA TECHNOLOGIES

Engineering & Design

- BMW, Exterior & Interior Trim - Engineering & Design
- CFD - Aerodynamics, Underhood & Powertrain Cooling
- HVAC Design & CFD for Optimal Passenger Comfort
- CAE Analysis for Crash & Durability
- Vehicle Handling & Characteristics Analysis
- Chassis Design, including Suspension, Steering, Wheels & Tires, Fuel & Brake Systems Development
- New Engine Design, Intake & Exhaust
- Managed Vehicle Systems & Component Level Validation
- Vehicle Integration of Electrical & Embedded Systems (including EMS, ECU & Distribution)
- Digital Manufacturing, including Plant, Line & Cell Simulation & Layouts
- Tool & Fixture Manufacturing, including Design, Simulation & Supplier Management

Product Lifecycle Management

- Managed Master Vehicle Digital Model - Gier Digital Interface
- PLM Technology Integration For CATIA * & Teamcenter
- PLM Technology & Systems Upgrades & Technical Support

Enterprise Systems Solutions

- Business Systems & ERP Program Management
- CRM Application Integration with SAP
- Small Car Integrated Production Systems Management
- Nano Web Portal Development
- Manufacturing Application Development for Quality Data Capture
- Manufacturing Application Development for Assembly Equipment, Order Management & Production Booking

TATA TECHNOLOGIES BETTER & BETTER™

FAST NANO DEVELOPMENT TEAM FACTS

- + 70+ Tata Technologies Engineers
- + 18 Tata Technologies Engineers Field (In-House of Tata Motors) as In-process at Patnitop Applications for Tata Nano

www.tatatechnologies.com

BETTER DESIGN IN THE VIRTUAL WORLD BETTER PRODUCTS FOR THE REAL WORLD

To the world's leading automotive manufacturers, new and innovative products represent success or failure for their business.

With over 50,000 person years and two decades of automotive design experience, Tata Technologies uses the latest PLM technology for sophisticated design analysis,

engineer product and tooling prototypes, optimize plant floor operations, and simulate machine tools; all in a virtual world.

The very same PLM technology that we use to help automotive clients create better products is the same technology that we also sell. Using what we sell and selling what we use enables

Tata Technologies to partner with confidence.

And that's better for our automotive clients and better for their customers because products that are optimized by experts who understand design in the virtual world, create better products for use in the real world.



TATA TECHNOLOGIES BETTER & BETTER™

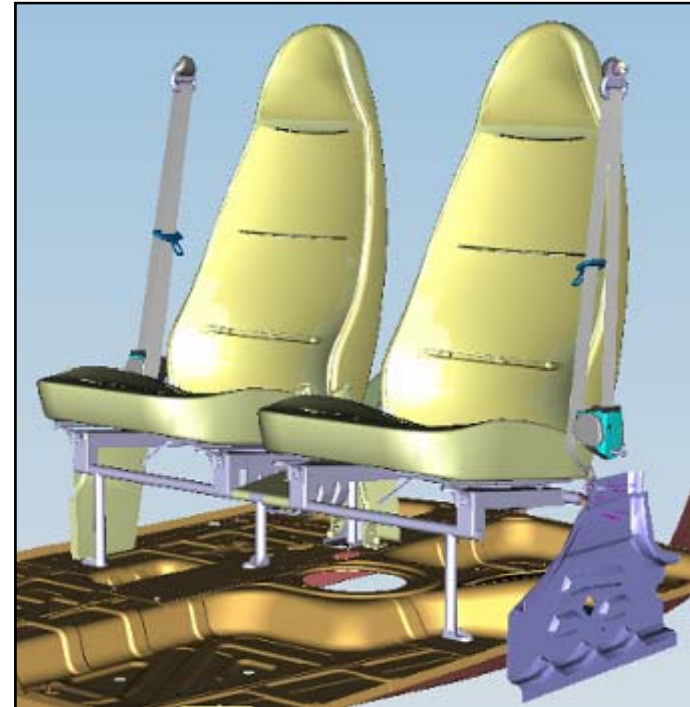
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Frugal Engineering Example: Assembly Seating



Typical

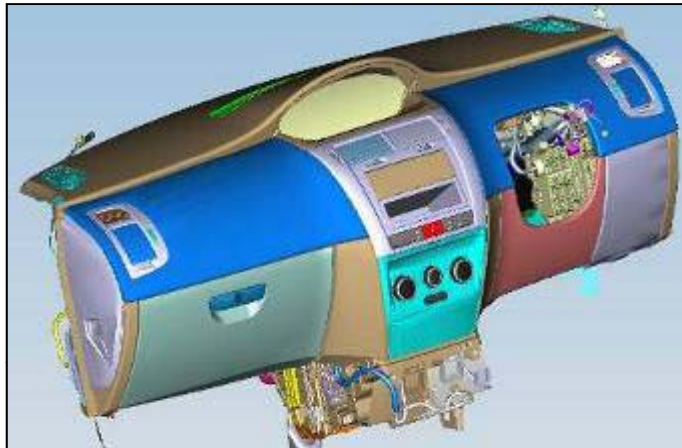
- Considerable foam thickness for more comfort
- Additional use of plastic for seat trim
- Seat back, cushion frame are pressed parts
- More costly fabric seat coverings
- Integrated seat track and recliner mechanism



Nano

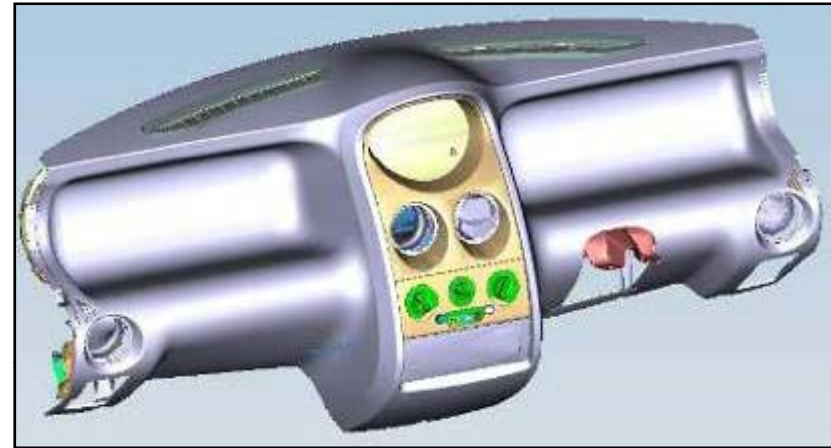
- Foam thickness is comparatively less
- Minimum use of plastic covers
- Seat back, cushion frame made from tubes
- Headrest is integrated with front back
- Track and reclining mechanism unconventional

Frugal Engineering examples: Dashboard Assembly



Typical

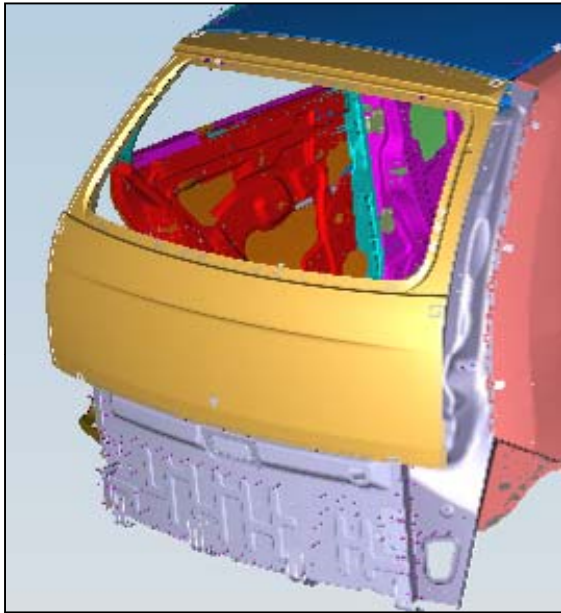
- Dashboard designed with styling attributes as high priority
- Complete dashboard designed with add-on panels to give different shade as per versions and features, leading to increased tool cost
- RHD & LHD dashboard quite different; typically weights 2.5 lb
- Glove box standard with handle and lock
- Audio sound systems – state-of-art
- Air vents styling developed specific for this product



Nano

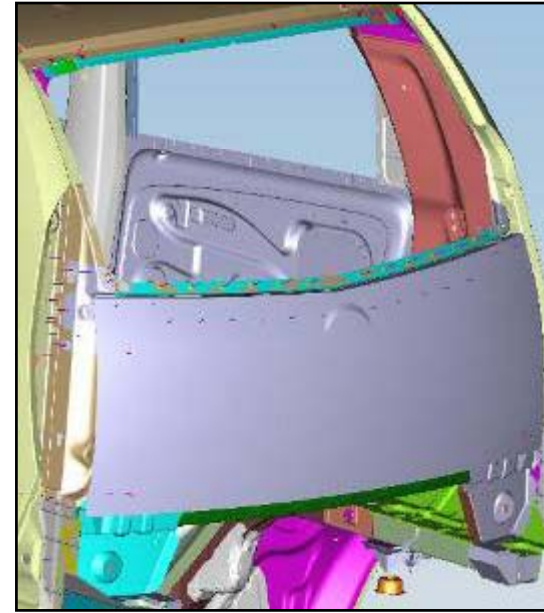
- Dashboard is primarily designed for functional attributes and secondarily styling attributes
- Dashboard is primarily one piece; leading to reduced mold tooling cost [Overall - 3X less tooling on Nano than conventional automobile]
- Central instrument cluster design makes RHD & LHD dashboard common; instrumental cluster weights less than 0.5 lb
- No glove box
- No radio – but is prewired
- Circular air vents; hence pre-assembled air vents are used

Frugal Engineering examples: Tail Gate Design



Typical

- Typical hatchback tail gate design with struts and hinges for lifting
- Tail gate has inner and outer panels
- Since it is hinged and needs to lift, accessories including gas balancer, roof beading, glass beading latch hinges, and security are required
- Surrounded frame needs to be stiff enough to sustain “slam” test of tail gate.



Nano

- Unconventional fixed tailgate
- No overhead of accessories including gas balancer, latch and hinge
- The total part count in tailgate is much less compared to conventional designs
- No special requirement of tail post and body as no “slam” is involved

Frugal Engineering examples: Others



Innovation and Frugality in Manufacturing: The Sanand Plant

- Simplified product = simplified manufacturing
- 3,000 parts v. 4,000+
- Balance between manual and automated assembly
- Initial capacity **250,000 vehicles/year**;
Expandable to **350,000 vehicles/year**
- Reduce number of tools;
Increase life of tools



Tata Nanos being built at Tata Motors' plant for the Tata Nano at Sanand, Gujarat, inaugurated on June 2, 2010.



The Nano Program: The Importance Of Vision

3 persons



4 persons



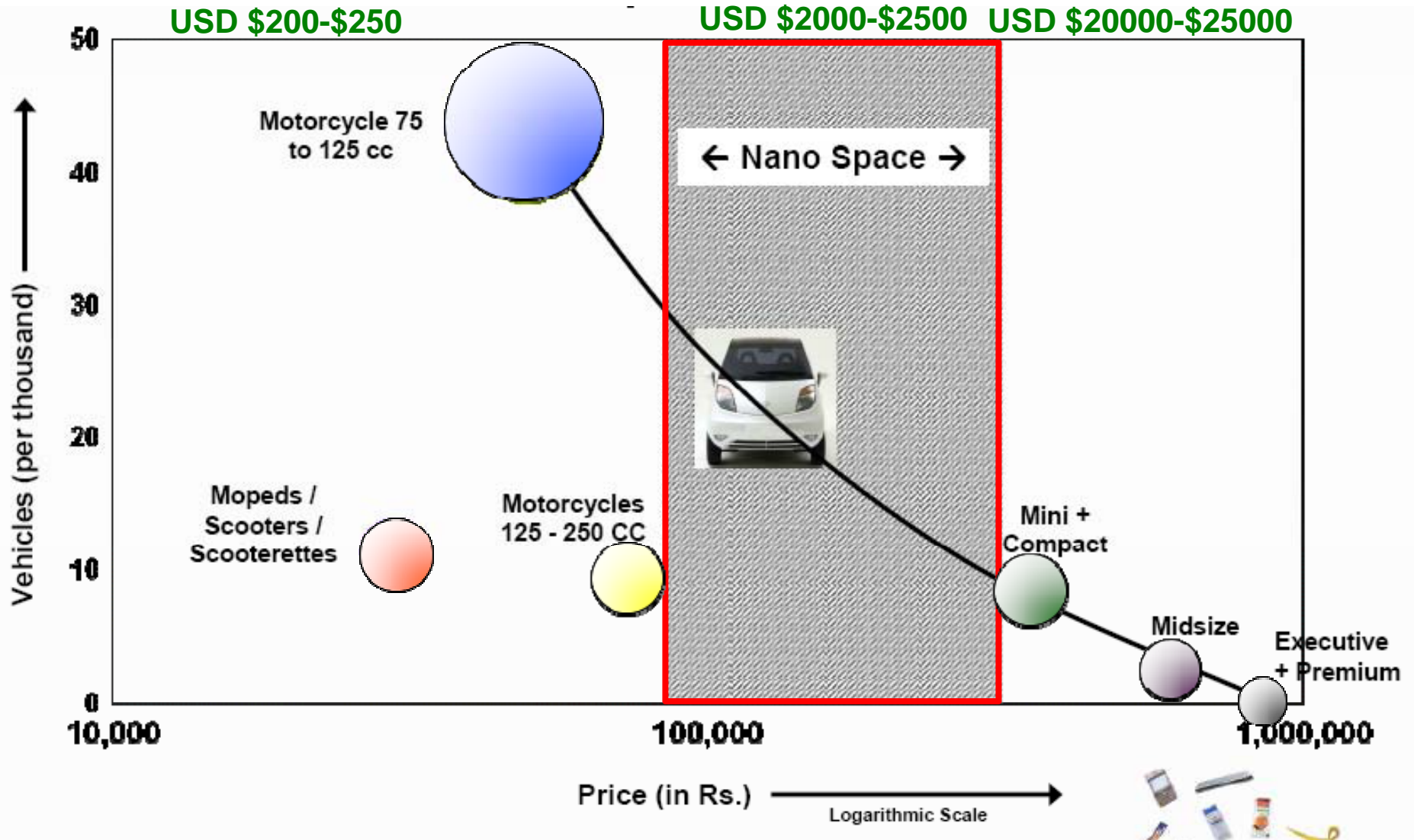
7 persons



- **Safe, comfortable and affordable** transportation for the masses
- Do what hasn't been done before – do the **seemingly impossible**
- Who would have thought a **\$2500** car was possible?

The Nano Program

Finding the Sweet Spot



The Nano Program Understanding The Customer



The Nano Program

Rethink Conventional Partnerships and Supply Chains

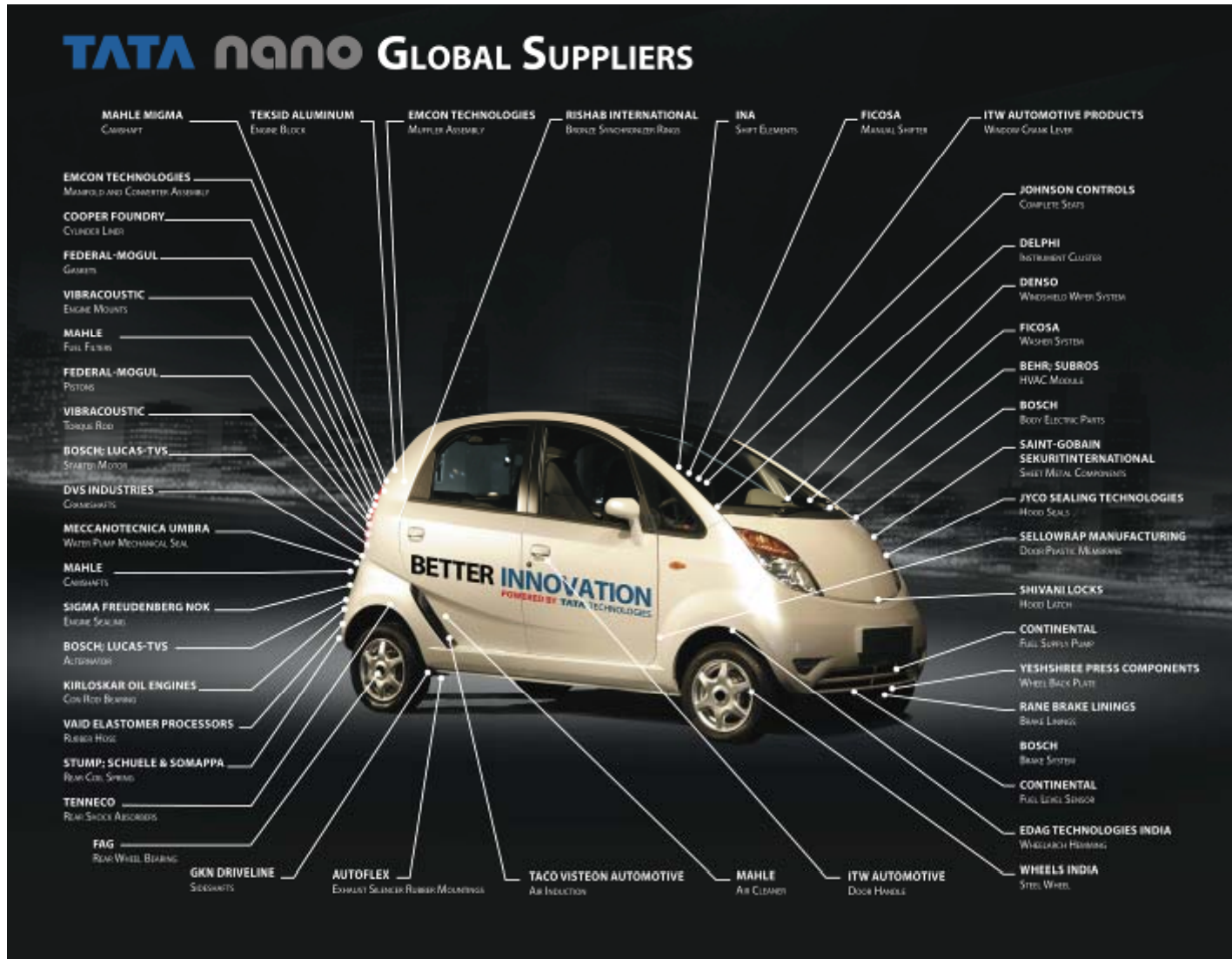


The Nano Program

Learning From Other – *and New* – Innovative Business Models



Summary



Better and better:
it's our way of life.

BETTER INNOVATION *on tour*
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The logo for the Motor Business Summit (MBS) is displayed in large, bold, white letters with a slight shadow effect. The letters are set against a background of a blurred, golden-yellow car wheel and body, suggesting motion and automotive industry focus.

MBS

2010 CAR Management Briefing Seminars

August 2-5, 2010

Grand Traverse Resort & Spa, Traverse City, Michigan USA

CAR
CENTER FOR AUTOMOTIVE RESEARCH