Consulate General of Israel
Mumbai

INDO-ISRAELI BUSINESS

EXPLORING NEW VISTAS

NEW MEDIA
connecting global wealth creators

Vol. 1 Issue 3
June - August 2010

Israel: A Centre of Excellence for the Global Automotive Industry

Electric Cars on Israeli Roads by 2011 !

Micro Technologies

Secure your Vehicle by SMS

MICRO VBB

VEHICLE SECURITY SYSTEM

Features :

- Lock, Unlock, Stop your vehicle
- **SMS*** Alerts in case of entry in your vehicle/Tampering with stereo set
- Get exact location of vehicle (Navigator Model only)

Email : info@microshoppe.biz
www.microshoppe.biz

*Conditions apply

YOUR SECURITY IS OUR CONCERN

Call Toll Free
1800 209 2000

SMS*
MICRO VBB to 56363
*Rates as applicable

Available at your nearest
Micro SHOPPE
Your Security Zone

For Dealership, Distributorship, DSA Enquiries Call 022-40743000

Founder Chairman
Late Shri R.K. Prasad

Distributed by:
New Media Communication Pvt. Ltd.
in association with
Consulate General of Israel, Mumbai

Managing Editor: Satya Swaroop
Directors: B.K. Sinha
Cdr. P.S. Amar
Group Editor: Dev Varam
Consulting Editors: Prabhuu Sinha,
Md. Sabir Nishat, Tripat Oberoi
Editors: Uday Tarra Nayar & Nicholas
Deputy Editors: Tripti Chakravorty &
Neelima Meermira
Assistant Editors: Prajwala Poojary &
Subhajit Bhattacharya

Head-Business Development: Veerendra Bhargava
Strategic Advisor: Vinaya Shetty
Head - Admin & Finance: Sunil Kumar
Liaison Officer: Vrunda Gurav
Special Projects: Manjeet Bhawsar
Executive Database: Madhavi Singh
Circulation: Jawaharlal, Santosh Gangurde &
Vijay Wangade

Art Director: Santosh Nawar
Associate Art Director: Sagar Banawalikar
Visualizer: Maya Vichare
Web Designer: Balwinder
Photographer: Bilal Ahmed Khan & Kishan Singh

BRANCHES:
Kolkata:
Anurag Sinha, Regional Head,
Mob: 098300 43339
Email:anurag@newmediacomm.biz

Pune:
Jagdish Khaladkar, Regional Director,
Mobile: 098230 38315
Email: pune@newmediacomm.biz

Australia Office:
Bandhana Kumari Prasad, 129 Camboon Road,
Noranda, Perth, W.A. 6062 Tel: 0061 892757447
Email: bandhana@newmediacomm.biz

New Media Communication Pvt. Ltd.,
New Media House, 1 Akbar Villa,
Near Old State Bank, Moral-Maroshi Road,
Andheri (E), Mumbai - 400 059
Tel: +91-22-2925 0690. Telefax: +91-22-2925 5279
E-mail: enquiry@newmediacomm.biz
www.newmediacomm.com

Consulate General of Israel, Mumbai
Earnest House, 16th Floor, N.C.P.A. Marg
194, Nariman Point, Mumbai - 400 021.
Tel: +91-22-22822822. Fax: +91-22-22824727.

Printed & Published by
Satya Swaroop and printed at: Jayant Printery
352/54, Girgaum Road, Thakurdwar, Mumbai 400002
and published from New Media House, 1 Akbar Villa, Near
Old State Bank, Marol-Maroshi Road, Andheri (East),
Mumbai 400 059. India
Tel: +91-22-2925 0690 Telefax: +91-22-2925 5279

In This Issue

Dear Reader,

Greetings!

In this issue of the Indo-Israeli Business, we zero in on the Israeli automotive sector. As our cover story declares: Israel is an excellence centre for the global automotive sector. After all, there are over 200 Israeli companies supplying systems, parts, modules and tooling to both leading manufacturers such as Daimler, Jaguar, BMW, VW, PSA, GM, MAN, International Truck & Engine, Renault-Nissan, FORD and Volvo; as well as Tier 1 suppliers such as Delphi, Bosch, Valeo, Autoliv, Faurecia, Johnson Controls and Magna Styer. Israel has also been at the forefront of breakthrough technologies involving specialized materials, advanced electronics, communication systems, driver awareness systems, automotive IT and security, to name a few. No wonder then that in recent times, Michigan, better known as the Automotive State, has been looking to Israeli auto companies to give it a shot in the arm [we carry a report]. There is also a more specific report of Michigan giant General Motors' extensive tie-up with Israel. We also take a peek at the latest technologies developed by the renowned Ben Gurion University's BGN Technologies. And, of course, there is an exhaustive look at the major Israeli companies in different fields of the auto sector.

Then, there is also the story of the Great Electric Car; a story co-authored by Israel. Just to place on record: Israel will be the first country to put in place infrastructure for the mass running of electric cars, and this is as soon as next year! We have a few stories on the future of the electric car, including an interview by the New York Times with Israeli whizkid, Shai Agassi, of Better Place, the company that is looking to promote electric cars globally; there is also an article on how the traditional automotive industry is looking to accommodate the new kid on the block: the electric car.

The Automotive Component Manufacturers Association of India (ACMA) organized a 15-member CEOs delegation to Israel. We have a report. Another detailed report we feature is of the burgeoning Indian auto industry. India is the fastest growing automobile market in the world after China. And there are immense business opportunities between Indian and Israeli companies waiting to be exploited. The future does indeed bode well for Indo-Israeli collaboration in the auto sector.

Wish you happy reading!

Satya Swaroop
Managing Editor
satya@newmediacomm.biz

Dear Friends,

There were only 2 serious attempts to develop a local auto production facility in Israel; the last one dates back to the 1960s. Presently, aside from a relatively small special vehicles production (such as vehicles for military or police use, fire-fighting units, off-road and riot-control vehicles), Israel does not produce a single car or even a motorbike.

However, more than 350 Israeli automotive related companies, have a turnover of more than 800M USD (2008), exporting to the American, Japanese and European markets. So far, the Indian large automotive industry has not yet been exposed to the highly developed capabilities and innovative solutions of the Israeli industry.

Part of the Israeli automotive industry is a spillover from the local defence industry and some of the solutions were originally designed to serve the needs of the Israeli defence forces and police. Gradually, these solutions were transferred into civilian use and Israel has become an important hub of the worldwide network of suppliers. Currently, local companies supply parts, systems, modules and tooling to the Original Equipment Manufacturers (OEMs) and Suppliers Tier. Many companies also manufacture and supply spare parts, accessories and components to the secondary market.

A growing number of electronics and hi-tech companies are involved in the automotive industry. Israeli companies are focusing on designing, producing and supplying innovative and smart systems like Driver safety systems, Telematics, Tracking technologies, Manufacturing control software, Navigation & control systems, Diagnostics, Sensors, Testing & Measurement solutions, On-board driver assistance systems and many other sophisticated state-of-the-art equipment.

This magazine will open a window and expose this unique industrial sector in Israel.

I hope you will find it interesting and enlightening.

As the Jewish New Year approaches, I wish us all a Healthy, Happy and Prosperous New Year. Shana Tova!

Thank you.

Orna Sagiv

Consul General of Israel, Mumbai

Please send any comments or suggestions to info@mumbai.mfa.gov.il

Israel: A Centre of Excellence for the Global Automotive Industry

By **Mr. Uri Pachter**, Director, International Projects, Tenders & Automotive Dept., Israel Export & International Cooperation Institute

With the world increasingly challenged by congested roads and polluted air, Israel's ground-breaking automotive technologies are at the forefront of improving performance, efficiency, safety and cleanliness. At the same time, traditional suppliers manufacture a diverse range of the most sophisticated components and assemblies, which combine traditional engineering precision with advanced design and the latest technologies.

More than a hundred Israeli manufacturers supply systems, parts, modules and tooling to both original equipment manufacturers (OEMs) and to supplier tiers; produce tool and production line systems; design and assemble buses and vehicles; manufacture after-market products; and develop advanced automotive technologies including innovative materials, advanced electronics and automation technologies and clean-tech initiatives.

Originally established to support, among others, the security and aircraft industries, Israeli companies have successfully adapted relevant technologies that were utilized for the military to civilian uses and made themselves a prominent technology market for the international automobile industry.

Israel exports around $800 million worth of automotive parts and systems annually, many of which are utilized by leading manufacturers such as Daimler, Jaguar, BMW, VW, PSA, GM, MAN, International Truck & Engine, Renault-Nissan, Ford and Volvo as well as to Tier 1 suppliers such as: Delphi, Bosch, Valeo, Autoliv, Faurecia, Johnson Controls and Magna Styer.

Israel's highly skilled workforce, strict compliance with international quality standards, sophisticated computerized logistics and advanced R&D capabilities and investments position the country as a prime destination for outsourcing and development of new products to global vehicle manufacturers and their suppliers. In the past few years, Israel pioneered a number of breakthrough technologies including specialized materials, advanced electronics, communication systems, driver awareness systems, automotive IT and security. As electronics become an increasingly significant part of the automotive industry, having risen in recent years from 15% to 35% of total car costs, Israel is well positioned to become a leader in this niche market.

OEM & Tier 1 Suppliers

Close to 50 Israeli companies serve as OEM and Tier 1 suppliers to the world's leading automakers. These companies combine traditional engineering precision with advanced design and the latest technologies and come from many industries including plastics, rubber, metal and electronics.

Israeli companies in this field include *Ashot Ashkelon* which manufactures gears and transmission systems for the aerospace industry as well as off-road and heavy duty vehicles & trucks; while *Ditron* Precision supplies high quality volume automotive and engine machined parts using the most up-to-date CNC machining centres and lathes, single spindle, multi-spindle and Swiss type automatic

screw machines. Ein Hashofet Industries includes three industrial companies owned by Kibbutz Ein Hashofet: *Mirvag* produces a wide range of metal parts, bolts and unique metal accessories in cold forming technology; *Eltam Ein Hashofet* plays a major role in the international market for lighting accessories and metal components while *MAG* is a supplier of integrative mechanical and electro-mechanical assemblies; its products include: Electronic Parking Brake, Body and Chassis Hardware, Seat Hardware, Spare Tyre Hoist Carriers and Shift Mechanisms.

Raval specializes in the development and production of automotive fuel tank venting systems in response to new international environmental and safety regulations. *Tadir Gan Group,* comprising three companies, *Tadir- Gan (Precision Products), Ortal Diecasting* and *Tadir-Gan Europe,* covers the three High Pressure Die Casting processes: Magnesium, Aluminium and Zinc, with full synergic cooperation and higher capabilities. Tadir-Gan (Precision Products) twice won the GM Worldwide Supplier of the Year Award for its achievements in quality, service, technology and price. Ortal Diecasting won the ZFL's Best Supplier Award.

Tool and Production Line Systems

More than a handful of Israeli companies operate in this sector including *CogniTens,* which provides comprehensive three dimensional measurement solutions focused on improving engineering and manufacturing processes, and allowing its customers to significantly improve product quality, shorten development cycles, and cut manufacturing costs. In 2006 the company was awarded the Automotive News PACE Award honoring innovative automotive suppliers, and Frost & Sullivan's Technology Innovation of the Year Award.

Nextec Technologies specializes in high precision, non-contract 3D laser scanning for geometry inspection, quality control and reverse engineering applications.

Iscar, owned by Warren Buffett's Berkshire Hathaway, is one of the world's leading manufacturers and a full line supplier of fine, precision metalworking tools. Its unique and innovative cutting tools cover most applications including cut-off, face grooving and other turning applications, milling, drilling, hole-making, threading and operations requiring solid carbide tools.

PLT Plasma Laser Technologies specializes in the development and validation of hybrid welding technologies and applications. PLT has developed two main hybrid innovative systems, both patented and trademarked worldwide. Super-MIG® based on the combination of a MIG/MAG welding process and plasma-arc in one processing head, and Weldone™ based on the combination of a laser beam and a powerful plasma-arc in one processing head.

Also in this sector are: *EVS-Scanmaster Systems,* which develops and manufactures ultrasonic inspection, imaging systems and transducers and *Object Geometrics,* developer and manufacturer of ultra-thin layer, high-resolution 3-dimensional printing solutions for rapid prototyping and rapid manufacturing.

Bus and Vehicle Bodybuilders

Israel has around a dozen bus, minibus and special utility vehicle manufacturers and bodybuilders. Some of these companies specialize in the production of military vehicles including *Hatehof,* which manufactures armored vehicles, tankers, aircraft refuellers and fire fighting trucks; and *Automotive Industries,* which manufactures all terrain tactical vehicles.

In the civilian sector, *Merkavim Transport Technologies* and *Haargaz Group* are engaged in the design and production of passenger buses and railways cars. *Agam Garage and Trailers* manufactures trailers and heavy metal work components and *Beit*

Alfa Technologies produces special purpose vehicles including for riot control.

Shaldot Metal Works also manufactures special purpose vehicles including trailers, tankers, truck bodies, and command shelters. *Feldman Vehicle Conversions specializes* in producing and fitting seats, and other accessories for commercial vehicles, while *TOMCAR* designs and manufactures off-road vehicles for civilian and military markets.

After Market Manufacturers

Israel has a diverse range of some several dozen aftermarket manufacturers including *E. Schnapp & Co.* which manufactures automotive and deep cycle lead acid batteries for European, Japanese and American vehicles in the range of 12v 36ah to 12v 230ah and 6v batteries. *Alex Original* designs, develops and manufactures mobile HVAC solutions and systems for 700 different vehicle models, and *Hadaikan,* produces such parts as axial shafts, tie rod ends, ball joints, stabilizer links and more. *Ein Shemer Rubber Industries* produces rubber hoses and profiles, rubber tire treads and compounds; and *D.S. Rebuilt Electrical Car Parts* manufactures starters and alternators. *King Engine Bearings* produces sleeve-type half bearings and *Lehavot Fire Protection* manufactures portable and mobile fire extinguishers.

Innovative Material Technologies

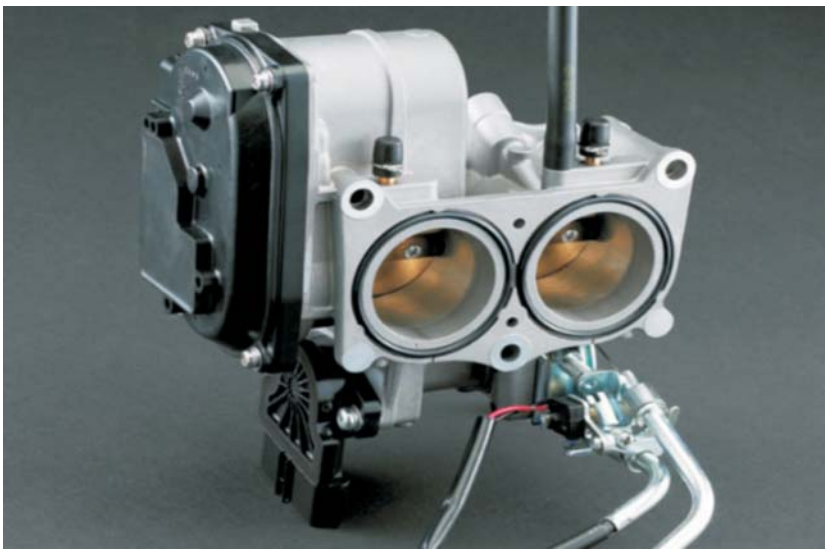
Israeli companies have developed innovative materials, which combine increased safety with the utmost in comfort. Breakthroughs have included *TexoPlast*'s tough, lightweight fabric featuring a soft, luxurious-to-the-touch material on one side with a hard plastic shell on the other.

BGN Technologies, the technology transfer company of Ben Gurion University of the Negev is developing and commercializing a range of start-up projects in the automotive related technologies sector including innovative materials such as: lightweight, high strength boron-carbide armor; consolidated light alloys with nano/sub-micron structure light materials based on aluminum, magnesium and titanium; and cellular magnesium foam for special energy absorbing applications.

FriCSo provides patented environmentally friendly nano-layer based surface treatment that significantly reduces friction between moving parts. *ApNano Materials* in collaboration with the Weizmann Institute of Technology has developed NanoLub, the world's first synthetic lubricant to be based on spherical inorganic nano-particles. The company was selected by Red Herring, the US investing journal, as one of the top innovators driving global markets in 2005. *Plasan Carbon Composites* supplies strong and resilient parts made of carbon fiber whose light weight allows for overall reduction in vehicle weight.

Advanced Electronics and Automation Technologies

Israeli companies offer electronic systems, equipment and products which improve the accuracy, quality and efficiency of vehicle production. They are leaders in the field of driver vision systems, biometric-based security and integrative communication systems, including night vision systems, on-board driver assistance systems, telematics, fleet management solutions, navigation & control systems, sensors, voice processing solutions and testing & measurement solutions.



MobilEye Vision Technologies has pioneered the development of vision-based Advanced Driver Assistance Systems (ADAS), providing data for applications such as lane departure warning, forward collision warning, headway monitoring, pedestrian detection, high beam assist, traffic sign recognition, adaptive cruise control and more.

TowerJazz is a specialty foundry manufacturing integrated circuits and is a major supplier of semiconductors for the automotive market. *PrimeSense* has developed a revolutionary low-cost 3D capturing device. Other car applications include: controlled air bag activation based on spatial detection of occupants' position and movement; driver awareness detection based on head and eyelids spatial position and movement; driver attention monitor; child abandon detection; and easy and reliable operation of car systems with hand or head gestures.

Israeli software companies are joining the automotive scene in growing numbers. Israeli software companies provide, amongst others, software for Digital Broadcast Receiving applications; Robust embedded security solutions as well as process-oriented software linking product engineering with all manufacturing disciplines.

Yamar is a fabless semiconductor company based on its unique DC-BUS™ technology for communication over battery power lines. Its semiconductors compete with the cost of wires; reduce the harness wiring size that is a strategic problem in many industries.

Sphericon develops a system that monitors driver alertness and sounds an alarm when it diagnoses a dangerous situation, such as drowsiness, a driver under the influence of alcohol or drugs, etc.

New Israeli Vehicle to Vehicle, Vehicle to Infrastructure and Vehicle to Environment communication systems, including satellite TV reception, promise to change the entire driving experience. Performance improvement features include engine control modules, an electronic voltage regulator, and a system to monitor fluid quality and temperature (using microwave transmissions).

Clean-Tech Initiatives

Limited by scarce natural resources, Israel's pioneering status in environmentally friendly technologies has also carried over to its automotive industry. One example is BGN Technologies at Ben Gurion University, which together with Exxon Mobil Corporation manufactures a container for alternative hydrogen fuel that is exceptional in its content ability as well as in the amount of security it provides.

ETV Motors is an Israeli start-up that develops innovative electric vehicle propulsion technology. The company's activity is focused on a novel, high-efficiency, dualpower micro-turbine and a proprietary high voltage lithium-ion battery. Integration of these optimized components will result in an unparalleled electric vehicle propulsion platform.

Newton Propulsion Technologies has developed an innovative and remarkably efficient Engine Platform, using advanced integration of volumetric internal combustion and gas turbine principles into one engine. This results in vastly improved efficiency, performance and emission, utilizing multi-fuel system (including heavy and bio fuels) while conforming to the strictest clean-tech requirements.

Come with us and visit Israel! Meet these innovative companies and expand your horizons! ■

Israel: Hub of Automotive Parts and Technologies

By Sharon Kanon

Israel has some of the best automotive technologies in the world," says Paul Linden. He should know. Linden has over 20 years experience with some of the top car manufacturers, including GM, Ford and Toyota.

Linden, a native of Toronto, worked in six continents before moving to Israel. Currently Automotive Innovation Manager for Emcol Engineering and Manufacturing Co. Ltd, based in Ashdod, he is heading the effort to expand activities into advanced automotive products. Linden sees the potential growth of Israel's automotive parts and systems exports climbing to $1 billion in the next five years and is moving into high gear to make that growth happen.

Israel is already a choice source for quality aluminum-magnesium castings and steel assemblies for Jaguar, MB, BMW, GM, VW, Peugeot, and Volvo. Who would have thought that Jaguar gets its engine heads in Israel? Or, that Audi buys engine valve springs from Israel?

The goal is to make the entire global automotive industry aware that Israel is also the place for innovative materials, thermoplastic systems, advanced electronics and new technologies.

Why outsource in Israel? In a presentation to Chrysler, Linden pointed out four benefits: better technical solutions, lower costs, reliable on time delivery, high-quality parts.

One of Linden's first successes in Israel was introducing Raviv carbon fabric heated seats. The system, designed and manufactured at Kibbutz Revivim in the Negev, proved itself during a drive in freezing Michigan weather with Detroit automotive executives. The system is now in development for introduction with a major automaker.

Israeli is years ahead in materials know-how. Ready for the market is a new hardened fabric, tough and lightweight, that features a soft, luxurious-to-the-touch material on one side, and hard plastic shell on the other. TexoPlast's product stirred a lot of excitement when it was demonstrated to two manufacturers in Europe. "We suggested it for interior trim, but when they heard about its features [European commercial vehicle manufacturer] MAN, said that it was the perfect solution for the cabin floor," said Linden. "Here is a product that impacts design."

Lincoln enhances its cars with super-quiet inner door panels made by Polyram and Arkal Industries, and a luxury seating fabric produced by Magical Industries, owned by Flocktex of Kiryat Malachi. The high-end fabric, called Impala, which feels like leather and is anti-stain, has earned high marks in durability tests. Another company, Adionim has developed a super thin, low cost magnesium coating able to withstand extreme weathering and hundreds of hours of salt spray. Adionim has also developed titanium coatings for engine pistons that provide a better seal for improved fuel economy. Ben Gurion University of the Negev is developing a strong, light-weight magnesium foam that is, says Linden, "ideal for crash absorption and occupant protection."

Ben Gurion University, Negev

Electronics - the multiplier

Electronics will be the industry multiplier of the future. "Electronics used to be 15 percent of total car cost but it is edging up

to 35%. "Israel is in place to become a leader in this niche," said Linden.

Driver vision and security are strong categories. Xenlight's super efficient Xenon headlamp system, "better than Mitsubishi's," has already been picked up to enhance a major European luxury car. IPU Industries is developing a 360 degree vision system for cars that combines thermal imaging, radar warning and video cam designed to distinguish and identify child pedestrians, adult pedestrians, animals and other objects on possible collision course. Elbit and MobilEye are also developing driver vision systems for Ford, while Idesia uses driver heartbeat for a biometric-based security system and driver health monitor.

IPU recently received a major contract to provide antennas, wiring and power distribution units (PDU) for a major Japanese manufacturer. A kind of intelligent fuse box, the PDU monitors and supports auxiliary applications such as security systems, audio, GPS, satellite TV, coffee warmer, and fog lamps. IPU's product is easy to assemble, and operates safely with a minimal energy loss.

New Israeli "vehicle to environment" communications systems including satellite TV reception promise to change the whole driving experience. Perks to performance include engine control modules, an electronic voltage regulator, a system to monitor fluid quality and temperature (using microwave transmissions).

Israeli companies also offer electronic equipment to improve the accuracy, quality and efficiencies of vehicle production.

In addition, there's the strategic decision taken by the Israeli government to push forward the development of the electric car for mass transportation. Shai Agassi, the force behind Project Better Place, envisions the electric car as a viable alternative to gasoline-guzzling vehicles. Linden helped to develop the cooperative strategy for advanced electronics with Renault, Project Better Place's French partner, in building the prototype in Israel.

Besides helping to rev up Israel's automotive products industry to reach $1 billion in exports, Linden also has his own dream. "The Arava [desert] is the perfect venue for vehicle testing. It is the hottest, lowest, and most severe test environment in the world. It is the ideal location for vehicle and system testing," he says. ■

Hi-tech Breakthroughs at BGN Technologies

BGN Technologies is the Technology Transfer Company of Ben-Gurion University, continuously seeking for prospective strategic partners, licensees and investors. Total management commitment of fast responsiveness and combined with bright researchers and cutting edge inventions, BGN Technologies makes the perfect partner for companies who seek creativity and innovation.

BGN Technologies deals with a wide range of technologies such as energy, information technologies, communications, electronics and electro-optics, image processing and restoration, signal processing, remote sensing, biotechnology and biomaterials, nanotechnology, chemistry and chemical processes, and more.

BGN Technologies Selected Activities

BGN Technologies keeps close contact and on going communication with industrial partners in Israel and worldwide. These on going relationships often result in further research collaborations, technology transfer, joint ventures and discovery of new common interests not identified before.

Exxon-Mobil

Exxon Mobil Corporation partnered with Ben-Gurion University to commercialize an on-vehicle hydrogen production system for use in a fuel cell-powered lift truck application.

Deutsche Telekom

Deutsche Telekom and Ben-Gurion University established a joint research institute, known as "Deutsche Telekom Laboratories at Ben-Gurion University". Investing $12M, Deutsche Telekom established its first R&D center outside Germany.

Image Processing for Peripheral Monitoring

Driver's Vision Enhancement

An active imaging system originally developed by an Israeli industrial entity, Elbit Ltd, has been improved by BGN Technologies researchers in cooperation with its original developer. In this system infrared laser pulses are used to illuminate the road ahead up to about 250-300 meters, (far better than the 50 meters range of car headlights). The innovative techniques remove interruptions

from the image and allow the road signs to be read from much greater distances using existing car headlamps. In addition, the system enables the user to see through even in adverse weather conditions such as fog, rain, snow, etc.

Security - Driver Authentication, Data Security

Human Factors and Ergonomics in Driving and Highway Safety

Research facilities include the only full-size driving simulator laboratory in Israel, instrumentation for conducting physiological measurement and monitoring eye movements, and advanced computer systems for research on dynamic graphic displays. In addition to laboratory research, human factors research is also conducted in various field settings, including studies with instrumented vehicles and fleet studies to evaluate ITS in-vehicle technologies. One of the foci of Human Factors research at BGU is the study of human aspects of traffic safety and driving.

This research looks at a wide range of topics including: Headway judgments and passing behaviors to assist development of improved adaptive cruise control systems; Effects of in-vehicle driver information devices such as cell phones and navigation displays and the optimization of displays and information to minimize distraction; Research on the effects of psychoactive substances (alcohol, THC, caffeine, opiates, etc.) on vehicle control and crash likelihood; Research on the effects of fatigue on driver performance and evaluation of various fatigue countermeasures; Studies of novice drivers and older drivers, especially in the areas of hazard perception and recognition and sign comprehension.

Aesthetics of In-Vehicle Displays

A methodology that was developed to evaluate the aesthetics of information technology applications is being used in a study of vehicle instrument clusters. The study evaluates people's perceptions of, and reactions to, instrument cluster design and the importance of various design aspects in forming people's response to the designs. In addition the study evaluates the viability of the idea of personalized in-vehicle displays and of various forms of animating in-vehicle displays from their initial invisible state to operational state.

Machine Learning Systems / Man Machine Interface

Unmanned Ground Vehicles Platforms

LAR research concentrates in the areas of System Architecture, Sensors (Video, Sonar, Inertial, LADAR, GPS), Image Processing, Sensor Fusion, Vehicle Control, Path planning and obstacle avoidance, System Integration, Wearable Computers, MMI, Communications, and Platforms Design. The current status of this project is that it has a complete generic suit for autonomous urban and dirt road vehicles requiring a minor adjustment of the generic suit to a specific platform. Some of these technologies are strongly based on FL and NN running on RT DSP or embedded-processors and are used for adaptive control, sensor fusion, and image processing and diagnostic.

Other Technologies

Light Alloys and Composite Material Utilization and Improvements

Light weight, high strength boron-carbide armor materials. Our approach is based on a novel innovative way of manufacturing called "Reaction Bonded Boron

Carbide, (RBBC)" which produces plates 100x100 mm in size.

These plates have good ballistic resistance and withstand AP ammunition. Their overall ballistic resistance properties are comparable to the best RBBC plates manufactured in the US and are only slightly inferior to the hot-pressed boron carbide plates. Their main advantage lies in the lower manufacturing costs, since they require a processing temperature of below 1600°C contrary to hot pressing which is done at >2100°C.

Super Light Alloys for Structural and Energy Absorbing Applications

Consolidated light alloys with Nano/Sub-micron structure

Light materials based on aluminum, magnesium and titanium alloys having nano/sub-micron microstructure posses unique mechanical, physical and corrosion resistance properties that are not accessible by conventional alloys. The proposed research aims at evaluating the prospects of such alloys as new materials for structural applications.

Cellular magnesium foam for special energy absorbing applications

Super light magnesium foam introduces unique energy absorption capability that can not be obtained by regular aluminum foam. The aim of the proposed research is to develop a cost effective technology for the production of magnesium foam including in-depth characterization of its properties.

Engine Vibration Signature Analysis for Predictive Maintenance Applications

Flash-boiling, dual-fuel, effervescent, electric-field assisted and air-assisted atomization.

http://eng2.bgu.ac.il/engineering/profile.aspx?id=jddrd#Pub7

Electric Cars on Israeli Roads by 2011

Better Place, the US start up developing charging stations, expects to serve thousands of electric cars on Israeli roads by the second half of 2011, CEO Shai Agassi said. Speaking in Tel Aviv, Agassi said that a country wide test would begin towards the end of the year and would be ready for a full commercial launch by the second half of 2011 after which 1,000 cars a month will come into Israel. He said that the company chose Israel because it is "a small country but big enough to test a longer drive" and due to its "high desire to get off oil for geopolitical reasons".

California-based Better Place is looking to take advantage of plans by Nissan, Renault, General Motors and Toyota to offer rechargeable electric vehicles. Renault has plans to make 100,000 electric cars by 2016 while 'plugged-in' vehicles could capture 20% of the market by 2030, according to a report by IHS Global Insight. Better Place has signed agreements in Israel with 92 companies that lease vehicles for employees, a potential initial market of 45,000 cars, Agassi said. The company expects the majority of cars on Israeli roads to be electric by 2020.

Israeli prime minister Benjamin Netanyahu said that reducing Israel's dependence on petroleum is one of the state's vital interests. Israel Corp, a holding company that invests in energy, said last month it would invest an additional US$72m in Better Place, bringing its stake to 30%.

Israel to Power Michigan Automobiles

By Karin Kloosterman

With a little help from Israel, Michigan, the automotive state, may receive just the jolt it needs to get its industry rolling again.

Michigan meet Israel, Israel meet Michigan. In actual fact, the state of Michigan and the State of Israel don't need an introduction. In some ways the automotive heart of America has been working steadily with Israel for decades.

While it's no big secret that the Big Three automotive companies in Michigan have tanked, government incentives are now looking to transform America's battered auto industry into something new. And Israel could play a part.

Ron Perry, executive director of the Michigan Israel Business Bridge, says that Israel's history as a supplier to the Big Three - General Motors, Chrysler and Ford - is well developed. With a new focus on electric and hybrid cars, Michigan, he surmises, could benefit from collaboration with Israeli battery researchers.

Before the Michigan Israel Business Bridge was created about three years ago, a number of Israeli firms were supplying parts and solutions to the US auto industry. "The history of Michigan and Israel in the automotive industry has been one in which several kibbutz companies in Israel that produce automotive supplies, and lower level companies, sold to the Big Three and new companies, such as automotive tech companies," Perry opines, remarking that General Motors has an R&D facility in Israel.

As they restructure and build more focused and leaner brands, the Big Three in Michigan are looking to build smaller cars, as well as plug-in hybrids and electric cars.

"Going forward, Michigan will always be an automotive state - people are looking at hybrid vehicles and electrical vehicles and have put a stake in the ground worth a billion dollars of federal funding," says Perry.

Connecting via batteries

Some $1.3 billion in federal stimulus monies has been channeled into batteries to make Michigan the battery manufacturing capital of the world. Dow Chemical is getting into batteries, Perry relates, asserting that it's batteries that will bring Michigan and Israel together.

In batteries, there is an opportunity for Israeli companies,

4 Automotive companies in Michigan are looking to Israeli battery and electric car innovators, like Better Place, to help revive their ailing car industry.

says Perry, who is a consultant on water technologies, biotech, clean tech and security. "We've made a call out to Israel - to many Israeli companies and researchers in universities developing advanced battery technology for vehicles, energy storage and energy conversion.

"These are all things the State of Michigan and its universities are seeking. There are Israeli companies that are developing the infrastructure for electric vehicles, such as Better Place and ETV, that are developing new engines for the electric vehicle world," says Perry.

For example, Israel's ETV Motors recently raised $12 million to fuel its engine, described by USA Today as "a jet engine for a Toyota Prius."

So far, the Michigan-Israel group has connected with Prof. Doron Aurbach from Bar Ilan University's Department of Chemistry, a leader in the battery storage field, who also collaborates with key players at other Israeli universities, including Tel Aviv University (which developed the battery storage company Enstorage) and the Technion - Israel Institute of Technology.

"Couples" form after speed dating exercise

The Michigan Israel Bridge has developed two forums over the last couple of years that have led to some concrete business exchanges.

One exchange led to a partnership with a Michigan organization called Automation Alley, which connected Michigan businesses - OEM and Tier 1, 2 and 3 suppliers - to Israeli companies.

It was accomplished "speed dating style," says Perry, who is not at liberty to divulge the partnerships forged until the companies themselves announce details. "Customers sales were made, as were new customer acquisitions and a couple of strategic alliances between Michigan and Israeli companies," he says. "We are helping them to further develop their business.

"Even though they have been selling to Detroit, historically [Israeli companies] have a hard time getting their foot in the door. Many of these companies have for years been trying to get to the right business development people even if they have local reps. We've helped open doors for some companies who weren't able to open them before."

A jumpstart from military and telecom tech

Some of Israel's automotive technology comes from the military and telecom industries and includes Raval, a company based in the Negev Desert near Sde Boker. Raval supplies fuel tank systems for cars to prevent fuel reflux.

Another Israeli company working with America is Mivrag from the Galilee region, which supplies cold-formed metal parts to Tier 1 and Tier 2 companies including GM, VW, Delphi and Opel. There is also Tadir-Gan that provides precision-molded aluminum parts.

Perry mentions some Israeli companies that have been less-successful at entering the US market, companies like Microheat's HotShot technology that went up in flames. The company developed a windshield wiper technology that was to prevent wiper fluid from freezing. A technical problem in GM cars caused a fire and led to a lawsuit, forcing the company to file for bankruptcy in 2008.

While he concedes that, "It's no secret that Michigan has its problems, too," Perry adds that, "A very large percentage of Israeli companies make a lot of hoopla and then fizzle out when they reach the US market. With that said, I am happy to discuss the good and the bad, and the future."

And that's because, according to Perry, "Michigan is not going down easily in this changing world. It is trying to chart a new course." So with a little innovation, and perhaps a little help from Israel, America's automotive state should show marked signs of improving. ■

The Future of the Car

By David Pogue, New York Times


Shai Agassi

Since it was established as a formal company in 2007 by Israeli founder and CEO Shai Agassi, Better Place has outgrown its status as a vision, or a project (indeed, it has dropped all reference to its early-day "Project Better Place" moniker) to being a global company worth US$1.25bn. It now has the backing not only of the Renault-Nissan alliance as its first strategic partner, but also support from countless national and regional government bodies worldwide for its business model, and most recently a US$350m investment by a consortium led by HSBC and Morgan Stanley.

The Better Place business model calls for networks of battery switching stations as a key element of an electric vehicle (EV) infrastructure. By offering the battery switching option, Better Place and its automotive partners intend to remove the element of range anxiety from a consumer's decision-making process when considering opting for an electric vehicle.

To succeed, Better Place requires partnerships with major vehicle manufacturers to ensure that vehicles are compatible with its technology. The company's switching stations, for example, are designed for removable batteries mounted beneath the vehicle. The batteries themselves are owned not by the vehicle manufacturer or the driver, but by Better Place. Drivers will pay not for electricity but for driving distances, in a similar fashion to mobile phone tariffs. Better Place is establishing commercial links to suppliers of renewable energy, such as wind power, for the electricity used in its switching stations, to ensure that its business model is as environmentally friendly as possible.

On 24 January 2010, Better Place announced that a consortium of investors, led by HSBC, had invested US$350m, boosting the value of the clean-tech company to US$1.25bn. HSBC led the Series B equity financing round with a US$125m investment. Other companies involved in the investment were Morgan Stanley Investment Management and Lazard Asset Management. Under the

agreement, HSBC acquired a 10% stake in Better Place plus a seat on the board of directors.

As mentioned above, Better Place's current major partnership is with the Renault-Nissan Alliance. The company is actively seeking to establish similar partnerships with other vehicle manufacturers.

In this interview with David Pogue of the New York Times, Shai Agassi, answers a whole range of questions on the viability of this revolutionary project.

NYT: Explain how this is different from all the failed electric car programs that have come before.

SA: Most of the car efforts were done from within the car, and assuming that there is no infrastructure change at all. It's as if people were trying to build cars, but skipping over the gas station.

We started from the infrastructure. We came up with an electric car that would have two features that nobody had before. 1) The battery is removable. So if you wanted to go a long distance, you could switch your battery instead of waiting for it to charge for a very long time.

And 2) It was cheaper than gasoline car, not more expensive. Because you didn't buy the battery. You paid just for the miles and for the car.

NYT: So what will you guys make? What will you do?

SA: We sell miles, the way that AT&T sells you minutes. They buy bandwidth and they translate into minutes. We buy batteries and clean electronswe only buy electrons that come from renewable sourcesand we translate that into miles.

NYT: What are we talking about here? What's the infrastructure you're building?

SA: We have two pieces of infrastructure. 1) Charge spots. And they will be everywhere, like parking meters, only instead of taking money from you when you park, they give you electrons. And they will be at home, they'll be at work, they'll be at downtown and retail centers. As if you have a magic contract with Chevron or Exxon that every time you stop your car and go away, they fill it up.

Now, that gives us the ability to drive most of our drives, sort of a 100-mile radius. And that's most of the drives we do. But we also take care of the exceptional drive. You want to go from Boston to New York. And so on the way, we have what we call switch stations: lanes inside gas stations. You go into the switch station, your depleted battery comes out, a full battery comes in, and you keep driving. It takes you about two, three minutesless than filling with gasolineand you can keep on going.

NYT: But it sounds like you're talking about a parallel universe, where there are hundreds of thousands of charging spots and switch stations. There aren't any.

SA: Well, that's what we're building. If you think of our first location in Israel, we will have about a quarter of a million charge spots before the first car shows up. Just like you wouldn't buy a cell phone on a network that wasn't built yet. You have to first build the network. And then let the cars come in.

And so we put a massive investment in big infrastructure projects: Green jobs. A new electric infrastructure for cars.

NYT: And has nobody said, "By the way, this is crazy?"

SA: Oh about nine out of ten people say it's crazy. But the other ones are actually saying "Where can I put my money?"

We raised $200 million in a seed round, the largest seed round of any startup in history. We raised a $135 million a week ago in Denmark to put the same network in Denmark. We're raising $700 million in Australia to build this network on the biggest island you

can find. So this is actually getting a lot of support and a lot of funding.

NYT: Which governments are actually signing up?

SA: Israel was first. Denmark signed up next. Denmark is the host of the next climate change conference, and the prime minister really backed this up: They put a huge tax on gasoline cars, 180 percent tax, and zero tax on electric vehicles.

Australia signed up after.

Then we went to the U.S. Gavin Newsom, mayor of San Francisco, coordinated an effort of all the mayors in the Bay area to create the next transportation island, the San Francisco Bay area. Even though it's not an island.

Governor Lingle of Hawaii was really the driving force behind getting us to Hawaii. And then the Premier of Ontario announced about a month ago that we're gonna go to Ontario. And Ontario, most people don't know, is the capital of cars in North America. They make more cars than Michigan these days.

And there's a lot of interest beyond these first six networks that we've announced. We're talking about 25 countries around the world, and various different governors and mayors in the U.S.

NYT: Hawaii's an island. Australia's a big island. Why islands?

SA: Contained islands are easier to work with, because you have sort of an ecosystem of cars that don't go in and out.

NYT: Now so far, these electric cars that are coming to market: Tesla, $100,000. Volt, $40,000. How much will one of these cars cost?

SA: If you take the battery component out of our car which is what we do; we don't let you buy the battery, we buy the battery then our cars are on par with gasoline cars. So an SUV will cost roughly the same as an equivalent gas SUV, roughly in the $20,000 range. A sedan will cost roughly the same range. About $20,000.

What we also do is, if you're committing to driving a long distance for example, if you're committing to 20,000 miles a year we give you a discount. And a discount can be sometimes $50 a month, sometimes $100 a month, towards the car. In other words, we pay for your financing of the car. And so you get a car that's actually cheaper than its gasoline equivalent, depending on how many miles you commit. You can go all the way down and in the case of people who drive a lot, like taxis all the way down to zero.

NYT: Free car? If you sign up for the maximum minutes plan?

SA: This is Oprah for everybody. Right? It's, "You all got a free car!"

NYT: Now, you don't strike me as a guy with a lot of car experience. Why is everybody buying into this vision that you, a software guy, are bringing them?

SA: Well, I'm more of an integration guy. So if you think about it, even though I was at SAP, SAP is about understanding the art of technology, the software part, but also understanding the processes of business. And if you look at what I did in the past, I managed teams who brought about a 100 products a year. We had labs in 25 countries around the world. Very, very complex solutions that drove the largest companies on earth, including car companies. What I bring in is that understanding of complexity of both the technology and the economy.

When you look at the problem mobility with a fresh set of eyes, sometimes you find solutions that the guys who are sort of locked in the inertia of day-to-day business have missed.

NYT: What do you think about hybrid cars?

SA: Well, the most successful hybrid car in the world, Prius, is roughly around 1 or 2 million cars. Out of about 750 million cars. In other words, we're having 0.0 percent effect on oil consumption.

During those 12 years, we added 200 million gas cars. We're moving really slowly if we're gonna go to hybrid! What you need to do is you go to zero: zero emissions, zero oil. And you have to scale it to infinity, if we really want to make a difference.

NYT: I hear a lot that the battery technology just is not here for electric cars. It has to work in the Arizona summer. It has to work in Fairbanks, Alaska. Short battery life, lethal to throw into the junkyard when it's done. Have you thought about this stuff?

SA: Yeah, so let's demystify batteries for a second. As a consumable, the batteries we're getting today are roughly in the range of about $.06 to $.08 a mile.

If you try and find gasoline, in the U.S. you're roughly at about $.10 to $.12 a mile. So the first thing is it's cheap. Second thing is, the batteries we're using are not lead-acid batteries. They're lithium iron phosphate. All within the 35 most common elements in nature. So they're not dangerous to the environment.

Three: They're consumed for a very, very long time. These batteries will last multiple generations. 20, 25 years.

The fourth element is that there's always a better battery around the corner. Now in the past, that was a negative thing. Because you were afraid to buy a car and get stuck with a car that has a battery that's an older generation. And then not be able to sell it. It was a very, very negative thing.

What we've done by decoupling the car and the battery is, we took away that fear. You may buy a car with generation 1 battery today, and then three years, five years, ten years from now, you may get a different battery that's designed with backwards compatibility into your car, but gives you longer range.

NYT: How will it work for a subscriber? Specifically?

SA: Most of what we've done is try to make it convenient. We don't want you to pass a credit card when you charge the car. We don't want you to pay every time you switch the battery. We looked at it from the angle of convenience.

And so we're probably gonna see three different pricing models. In some places, you'll see it sort of as pay-as-you-go, very much like a gas tank. I mean, if you think about it, a gas tank is sort of the prepaid phone-card model of cars. You come, you buy 400 miles, you drive 'em. You buy another 400 miles.

So they'll be something like that in the base package. There'll be a fixed number of miles, plus a surcharge if you go more than that 1,500 miles a month or something in that range. And then there'll be the all-you-can-drive model. You pay one-time fee, you and your family can drive as much as you want on that car.

And we like those guys the most. Because effectively, what they do is they take the drivers who consume the most oil, and spew out the most pollution and CO2 emissions, off the road first. 'Cause if you come and tell people there's a flat fee, then the guys who drive the most, the extremes of the extremes, think you're crazy, and they're the first ones who come in and jump. So it's a self-selection process of the guys who we want to get off the road first.

NYT: Oh. And do you have any idea how much that might cost?

SA: It depends on the price of gasoline in the market that we're coming in, because we're replacing gasoline miles. So if you're in a country where gasoline is at $7, $8 a gallon, which is what Europe is right now, the cost of a mile is much higher. If you're in the Bay Area or in Hawaii, you're paying a lot less per mile. So we need to be competitive with the price of gasoline in the location. That's why Europe has a significant advantage over the U.S. in getting these kinds of solutions in place.

NYT: Your critics have had their potshots. What are the realistic obstacles?

SA: This is a massive integration project. And everything needs to happen roughly at the same time. In other words, the cars need to show up at the same time as batteries need to produce in scale. At the same time as the infrastructure's in the ground. All of that needs to be synchronized with beautiful software that runs

inside the car. And then back-end software.

And then all this has to happen at a scale that is scary, to a certain degree. We need to be at 100,000 cars in 2011. About 100 million cars by 2016 to 2020. A thousand-times growth in production capacity and in installation capacity. There's never been a project of this magnitude in history.

NYT: No.

SA: But if we don't get a hundred million cars, by the end of the next decade, [the world will have] a billion gasoline cars on the road and we're done. We don't know how to produce enough oil for a billion cars. So humanity needs to switch before we run out of natural resources: air and oil.

NYT: But aren't you just shifting all the energy producing pollution from the individual tailpipes to the power plants?

SA: Well, we have committed to only buying clean electrons. So we've made a decision that if we put a car on the road, we put a renewable source on the grid at the same time.

NYT: Aren't the gas and oil industries going to want to squash you? They'll have lobbyists and PR…

SA: So, something fascinating happened over the last 12 months. The price of oil fluctuated up and down, from a $100 to $150 to $50 a barrel.

And it drove everybody in the industry crazy. We know what to do with oil: We drill, baby, drill. Right? But at $50, we can't drill. It's so expensive to drill, that the price of the oil doesn't pay for the cost of drilling. The fluctuation is worse to the car companies and the oil companies than any stable price, high or low. And so what all these car and oil companies are asking for right now is some sort of a stabilizer.

They need a company that would give an alternative that would be fixed in price. And they want it to be stabilized roughly around $75 to $100 a barrel. That's what they tell us. "$75 to $100 a barrel allows us to find marginal oil." And so they're actually liking us now. They want us to succeed because we're viewed as a sort of a stabilizing buoy.

NYT: But you're also viewed as someone who's trying to end the oil industry.

SA: Well, they don't think it's gonna happen that fast.

NYT: It seems like you're the gatekeeper of all this. You could become Bill Gates. You could become the guy who changed it all and became fantastically wealthy and successful. Have you crunched the numbers at all, and said, like, "Yeah, I'm glad I quit SAP"?

SA: First of all, I'm already glad I

quit SAP. Not because SAP isn't a fantastic companyI love SAPbut because there's a purpose in life. And that higher purpose is much more important than making money. I've been extremely blessed and successful. I sold my first start up at 30. I sold it again at 33. I made enough money in both cases that my kids don't need to worry about money.

So I've never done anything for money since that point, at age 30. But when you find a great purpose in life, you gotta pursue it. It's when your big question finds you. You can't let it go.

One of the things that we've done that is very interesting, unique for a first mover, is, every government we go in to, we ask for one thing: "Make sure that you build an open, standards-based network." So that we can't lock any competitor out, and competitors can't lock us out when they show up. We want to make it so that the networks are so open, that I can roam from my network to their network and back.

We believe that if we align all the vectors together, we'll get adoption much faster. We had to opt for either speed or greed, and we picked speed.

NYT: So speaking of these networks. When I plug into one, how does it know who I am?

SA: We have a protocol that goes between the car and the charge spot that says, "I'm car number 41, I'm seeing charge spot number 72." And the charge spot says to the central computer, "I'm charge spot 72, I'm seeing car 41." And the central computer says, "Okay, relax, I know you're there. And I'll tell you when you can start taking power."

And it tells them to take power when the utility, the supplier of electrons, says "I got power for you, for that many cars." Utilities tell us every three seconds how many cars can charge. And based on that, we moderate. The cars that need it the most importantly right now. So we sort the priority of the cars, based on how much they've got and how far they can go, and what's the probability the driver will show up again. If you came into work, and you're usually ten hours at work, you won't charge immediately in the morning. If you just came home, it's 5:00 and you don't leave, usually, you won't get charged.

But right as you park your car, you can press a button that says, "I need juice now." We put you in the top of the line.

So there's a lot of software, very simple. Mostly it's one click. But we do a lot of management behind the scenes.

NYT: Do I need to install a charging spot in my garage?

SA: Yes. It's about $250 to $300.

NYT: So I can't just use a regular power cord?

SA: You could, but what we're trying to do is make it so that when you plug in, YOU don't pay for the electricity. WE pay for the electricity; you only pay for the miles.

NYT: What's the best hope of when we'll start to see these cars in America?

SA: Our stated goal is that mid-2011, we'll be in mass consumption. And the fist sites are Israel, Denmark and Hawaii. The second half of 2010, we'll be running a massive test: tens of thousands, hundred thousand spots in Israel. And right after that in Denmark. Testing our software, testing our hardware, testing the switching, the entire network.

We've just installed the first charge spots in the U.S., in about 50 parking lots, tested the equipment for installation. In a couple months, we're installing the first switch station in Japan.

It's about 2 and a half years of testing, from now till the mass release.

NYT: Wow, that's really fast.

SA: For a transformation of this magnitude, it's immensely fast. Yes.

NYT: By the way, how do you stop teenagers from just walking by and unplugging everybody?

SA: Oh, it's a secret. And they shouldn't try it. No, you can't just plug it out. You need your keychain.

NYT: Oh, so the outlet locks onto to the socket?

SA: It has a mechanism in there to avoid vandalism.

NYT: Oh. You've thought of everything.

SA: No. But we've thought of some of the things! ■

Connecting Global Wealth Creators

India's only bilateral trade magazine publishing house

- Outsourced Publishing
- Community Magazine
- K.P.O.
- International Business Advisory
- Online Publishing
- Events

To know more about our services: connect@newmediacomm.com

NEW MEDIA

www.newmediacomm.com

New Media House, 1 Akbar Villa, Near Old State Bank,
Marol-Maroshi Road, Andheri (E), Mumbai 400059. India.
Tel: +91-22-2925 0690, Fax: +91-22-2925 5279

How Will the Automotive Industry Accommodate Electric Cars?

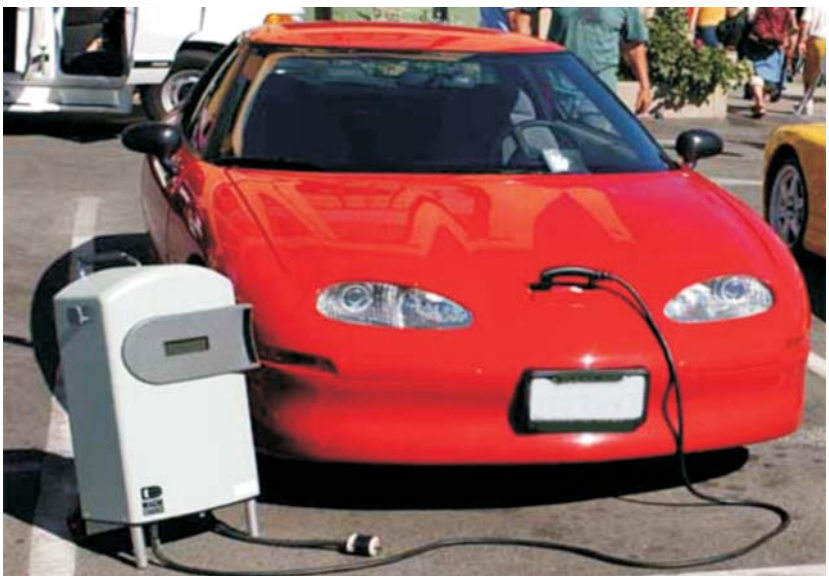
There is an inevitable change in the auto industry: Electric cars. The McKinsey Quarterly's latest report examines how three main industries, battery producers, automakers, and utility providers will need to change in order to accommodate the transition to electric cars.

Electric vehicles are still an emerging technology. It's too early for anyone to gauge how the industry will evolve and what the rate of adoption will be. Also no one is really sure yet how much such a vehicle will cost to produce. However electric vehicles could probably enter the mainstream market if around 10% of all the cars that were on the road were plug in vehicles.

This figure means that there may be around six to eight million electric cars on the road by 2020 which will change the entire automobile sector entirely. According to the MQ report there will be both challenges and opportunities especially in terms of issues like high cost, a lack of infrastructure, and the need for better technology.

In the new world where many vehicles will be running on electrons rather than hydrocarbons, it will be up to automakers to reinvent their businesses in order to survive. New auto companies that enter the industry will face barriers like brand equity, customer management, manufacturing scale, and capital.

Utilities Global Industry Guide



But electric vehicles will open up new opportunities for incumbent automakers. These new cars will help automakers meet the strict emissions regulations as well as to avoid fines. Also the low-end torque that these new electric motors have means that these cars can accelerate much quicker and smoother than other cars, making them desirable to consumers. Automakers should also closely examine the relationship they will need to build with battery makers as they will play a vital role in how technology standards are implemented.

Apart from electric cars, there will also be policies used to improve the efficiency as well as to reduce the amount of carbon emissions that pose a serious problem to utilities since their revenues and their profits come under pressure as private homes and businesses will demand more efficiency. There will also be government investments in new standards and policies in United States, China and Europe.

The electric vehicles should create new sources of revenue for utilities. Let's take say for instance that within the next 10 years 20 percent cars on the road run on electricity. Their electric drives will need recharging, which could make up to 2% of the total demand for electricity. ■

Innovation Drives Israeli Automotive Industry

Israeli companies have for decades manufactured a diverse range of the most sophisticated components and assemblies for the world's automotive industry. Local firms supply the major global vehicle manufacturers as well as aerospace corporations and more recently the railway industry and are world leaders in developing innovative automotive technologies.

Israeli companies combine traditional engineering precision with advanced design and the latest technologies and those manufacturers active in the automotive sector come from many industries including plastics, rubber, metal, and electronics. Many defense manufacturers have successfully adapted and applied their technologies to the civilian automotive industry.

The most outstanding example of Israeli innovation in this area is ICL Metallurgy, a joint venture between Israel Chemicals (65%) and Volkswagen (35%) to transform the concentrated magnesium in the Dead Sea into high-quality metal magnesium alloys for use in the manufacture of vehicles. ICL Metallurgy has sales of more than $100 million per year. The lightest of all commercially available alloys, magnesium is used for support beams on dashboards and steering columns, interior brackets, valve cam covers, and more.

Other products in this sector include aircraft parts, car parts and accessories, marine equipment, railway and bus assembly, towing and tipping equipment etc. Companies producing parts for the aerospace industry include Blades Technology, which makes aircraft propellers and blades, and Carmel Forge, owned by Pratt and Whitney, produces disks, rings and cases for aircraft engines. Techjet Aerofoils Ltd. is a world leader in the development and manufacture of compressor aerofoils and is owned jointly by Blades and UK manufacturer Rolls Royce. Ashot Ashkelon manufactures gears and transmission systems for the aerospace industry as well as off-road and heavy vehicles.

TAT Group Ltd. designs, develops, manufactures and markets aerospace products and systems including heat management systems, cooling systems, heat sinks, heat exchangers, cold plates and related products. In the marine transport sector, Israel Shipyards Ltd. (ISL) is one of the largest privately owned shipbuilding and repair facilities in the Eastern Mediterranean.

Haargaz's transportation plant builds and refurbishes buses using the chassis of leading vehicle manufacturers such as Mercedes, MAN, Volvo and Scania. These buses include low city buses, inter-city buses and luxury tour buses. Haargaz also makes armor plated buses for the enhanced security. Another Israeli company, which manufactures security accessories for vehicles is Oran Palmach Zova, which produces safety, high quality laminated windshields and tempered sidelights.

Deutsch Dagan is a supplier to OEM automotive manufacturers in the USA and Europe using the most up-to-date CNC machining centers and lathes, single spindle, multi-spindle and Swiss type automatic screw machines. Migan designs and manufactures automotive and aircraft parts including Reusable and rigid hose fittings for low, medium and high pressure, air and hand operated pumps, valves and connectors for special purposes and fuel management systems. MAG is a supplier of integrative mechanical and electro-mechanical assemblies for the automotive industry and Englander produces precision stamped metal parts, tools and dyes for automotive applications. Matar Casting manufactures aluminum and magnesium gravity castings and low pressure casting, including in-house machining and automotive assembly, while Nordia springs

produces springs for vehicle manufacturers and Ortal Diecasting is engaged in zinc and magnesium diecasting.

Alex Original manufactures air-conditioning for cars, minibuses and special applications including refrigeration systems and electric doors for vans and minibuses. Polyrit produces flexible and rigid polyurethane products for vehicles and Raviv specializes in thermoplastic-based components and modules as well as precision injection molding, insert molding and vertical molding for automotive applications. Siron Microtech is able to manufacture parts made to customer's drawings on automatic turning screw machines CAM and CNC controlled.

Among other things Israeli companies design, develop, manufacture and market cables and exhaust systems, radiators, batteries for trucks and buses, precision stamped metal parts, fuel and air filters, electronic components, security systems, and more. For example Tadir-Gan (Precision Products) Ltd., produces high-quality precision metal parts. The company has been awarded General Motors Supplier of the Year for its superior performance in quality, service, technology, and price. Tadir-Gan also supplies Opel, Peugeot, Man, Ford, and Citroen.

A growing number of Israeli high-tech companies are entering the marketplace as more and more advanced developments direct the way in which OEMs design, develop, and manufacture vehicles. Israeli companies are focusing on telematics, driver safety systems, and tracking technologies. Innovative Israeli developments are contributing to safer, more efficient transport by such means as reducing traffic accidents and increasing energy efficiency.

MobileEye Vision Technologies has developed a complete range of vision applications for driver assistance and for safety related applications. MobileEye and Denso Corporation, a Japanese-based manufacturer of auto parts and electronic systems, have formed a strategic cooperation agreement to develop advanced driver assistance systems combining MobilEye's video processing technology with other sensory systems.

Tecnomatix Technologies develops automobile manufacturing software. The company has a network of subsidiary offices in over 20 countries with more than a dozen distributors around the world. Customers include Audi, BMW, DaimlerChrysler, Ford, General Motors, Hyundai, and many more.

In recent years with the development of Israel's railway network more and more local companies have been successfully manufacturing railways parts. One such example is Paltechnica, which produces high quality ergonomic seats for train carriages working with Bombadier, Adtranz and Alstrom. Paltechnica recent signed a contract to supply Siemens with 6,750 seats. ■

GM looks to Israel for hi-tech car solutions

By Ron Friedman, Jerusalem Post

General Motors held the first of what is planned to become an annual conference on automotive innovation in Herzliya, Israel. The June 16 conference, "Cognitive Cars: Driving the Future," featured lectures by GM staff from the United States and local Israeli research partners, and a showcase of experimental vehicles.

GM's vice president of global research and development, Alan Taub, spoke in the keynote address about the auto industry's development and the company's vision for the future of automobiles.

"The first line in the mission of the new General Motors is 'to lead the industry in advanced technology.' If you consider all the challenges that are going on today, that really is a major initiative.

"We are reinventing every part of the vehicle. In order to accomplish that, the research laboratories lead the front end of that innovation process," he said.

GM opened its Israel center two years ago (one of eight worldwide). "We are proud that this is the first true scientific research laboratory for automotive OAMs [Operations, Administration and Maintenance] in the country," noted Taub.

"The key is that we need to hire your best and brightest. Both the people that you educated and then sent around the world, so that they'll return to Israel, and the students that you're creating today."

Taub said GM's goal "is to tap all the technology, intelligence and knowledge that exists in Israel as we try to satisfy our mission of making the world's best vehicles."

Taub spoke about the evolution of the automotive industry, the challenges encountered and the ways GM faced them from the introduction of safety features and reducing tailpipe emissions to developing electric vehicles that will one day drive autonomously.

After the first autonomous feature, the antilock braking system (ABS), was introduced in the 1970s, Taub said, automotive companies and drivers began to understand computers could do certain tasks better than humans.

"That was the beginning of a march toward vehicles that not only will be stable but will not crash. If you look at the vehicles around the world today, you are beginning to see the march first toward warning, and in some cases intervention," he said.

"The fact is, we are learning how to point the vehicle in the direction the person's trying to go and using sensors to determine what's


Alan Taub

around. We are on the march toward vehicles that first of all won't crash and at the same time will drive themselves. They use the exact same technology."

Visitors to the conference got a glimpse of that future in the form of "The Boss." Named after GM's first research and development chief, Charles "Boss" Kettering, the Boss is an experimental self-driving vehicle featuring dozens of sensors and other electronic devices mounted on the body of a Chevrolet Tahoe.

The Boss is able to drive, park and negotiate intersections all without the aid of human intervention. A joint design of GM and Carnegie Mellon University, it proved its abilities when it beat out 10 other robotic vehicles to win the 2007 U.S. Defense Department's urban challenge.

One goal of GM's Israeli Advanced Technology Center is to take the experimental features on the Boss and adapt them for standard vehicles at affordable prices.

"It costs between $250,000 and $500,000 to produce a single vehicle like the Boss. The real technological challenge is to take systems that cost that much and reduce them to $25,000," said Gil Golan, GM's Israel site director.

"Every sensor on that car costs $3,200. The next generation of sensors costs $70. But that still doesn't solve our problem. We need a sensor that costs $7 or $8.

"The trick is to leapfrog the technology. We are currently part of an ongoing global initiative by GM and its partners to make the technology more reliable, more doable and more affordable."

Golan said the Israeli team was joining the effort on two main fronts: active safety systems and human-machine interface. "Israel has an incredible amount of human talent in the fields we require and also has a very conducive high-tech environment," Golan said. "Being here, we enjoy the benefit of working with some of the world class leaders, both in academia and in industry." On the other hand, he continued, "we have invested a lot of money here in Israel and introduced the local market to a sector that had not been in existence here before. The fact that GM opened a facility here exposes local researchers and industry people to a huge industry with lots of resources."

Representing the Israeli government at the conference was Eli Opper, chief scientist of the Ministry of Industry Trade and


Eli Opper

Labor. Opper said the three pillars of his office's work are bridging the gap between industry and academia, strengthening international relationships and focusing on preferred sectors. The GM site in Israel answered all three of the principles, Opper said, adding that he hoped partnerships like it would one day lead to technological breakthroughs that are as yet unimaginable. ■

Israeli Auto Sector Inspires Indian Auto Component Firms

Mr. Jayant Davar, President, ACMA

The Automotive Component Manufacturers' Association of India (ACMA) organised a 15-member CEOs delegation that toured Israel during July 10-14 this year. The visit was organized in co-operation with the Embassy of Israel in New Delhi, the Consulate General of Israel in Mumbai, the Embassy of India in Israel and the Israel Export and International Cooperation Institute. The delegation team included:

The broad objectives of the visit were:

- To understand the Automotive and Auto component industry of Israel.
- To understand the R&D capabilities of Israel and to explore the possibilities of integrating these technologies in the Indian auto sector.
- Visit to R&D facilities/ institutes to have a first hand knowledge on innovation/new product development.
- To understand the process of innovation through Government initiatives / Incubation facilities.
- Visit and interact with Defence production facilities

The following are the highlights of the visit:

1. Meeting with H.E. Mr. Navtej Sarna

The delegation called on H.E. Mr. Navtej Sarna, Indian Ambassador to Israel. Mr. Sarna briefed the delegation on the outstanding relationship the two countries enjoy in trade, defense cooperation and other strategic sectors. Contrary to the common perception, Israel is a peaceful country with very high focus on innovation led industries. The country spends 4.7% of its GDP on R&D. The current trade volume with India is around US $ 4 bln of which 45% is in diamonds alone. Other areas of cooperation include science and technology, IT, defense, counter intelligence, home land security.

Name	Designation	Company Name
Mr. Jayant Davar, Mission Leader	President, ACMA & Vice Chairman & Managing Director	Sandhar Technologies Ltd.
Mr. Deep Kapuria	Past President & Chairman, Globalization Committee, ACMA & CMD	Hi-Tech Gears Ltd.
Mr. Raghu Mody	Past President & Chairman - Golden Jubilee Celebrations, ACMA & Chairman	Hindustan Composites Ltd.
Mr. Beni Daga	Managing Director	Baynee Industries
Mr. Jagdish Singh	Chaiman & Managing Director	Guru Nanak Auto Enterprises Ltd.
Mr. T M Lalani	Chaiman & Managing Director	Indication Instruments Ltd.
Mr. Vijay Pusalkar	Chairman & Managing Director	Indo Schottle Auto Parts Pvt. Ltd.
Mr. S Ganesh	Chaiman & Managing Director	Liners India Ltd.
Mr. Nitesh Jain	Joint Managing Director	Madhusudan Auto Ltd.
Mr. Pratap S Mungi	Managing Director	Mungi Brothers
Mr. Snehasis Ghosal	Head (R&D)	Rico Auto Industries Ltd.
Mr Rajeev Paal Gupta	Executive Vice President (Operations & NPD)	Subros Ltd.
Mr. Muralidharan Kalyanasundaram	Vice President Business Development	Sundram Fasteners Ltd.
Mr. Arvind Goel	President & Head B.G.B	Tata Autocomp Systems Ltd.
Mr. Vinnie Mehta	Executive Director	ACMA

Mr. Sarna also stressed on the need for the auto-component industry to move up the value chain and asserted that Israel, with its strong focus on aerospace and defense, offered significant avenues for mutual cooperation.

With a strong democratic system, freedom of press, robust judiciary akin to India, the Israeli industry could be an ideal partner for the Indian automotive sector.

2. Presentation of Israel's automotive industry by Mr. Uri Pachter

The delegation called on Mr. Uri Pachter, Director, Automotive Industries, IEICI. Mr. Pachter made a detailed presentation on the automotive industry in Israel and possible avenues of cooperation. Israel has currently no manufacturing of finished vehicles and a very miniscule presence of auto-component manufacturers. However, there exist a significant number of R&D companies as well as start-ups focusing on technology for the auto sector.

The country currently has an installed base of around 3.5 mln cars for a population of 7.5 mln people, thus making it one of the highest car penetration countries in the world. The country has several FTAs and bilateral trade agreements with countries such as the US, EU, etc. for the automotive sector. There are no customs tariffs or NTBs on the import of finished vehicles; however, the local taxation is significantly steep 90% on cars.

While all cars in Israel are imported, there are none from India. The same holds for auto-components for the aftermarket. India could explore the opportunities to either collaborating with R&D houses and start-ups for technology infusion into their companies / products as well as explore supplying components for the aftermarket.

3. Seminar on Indian Automotive Industries and Exhibition of Israeli Auto Components Products/ Technology Suppliers

Mr. Jayant Davar made a detailed presentation on the auto-component industry in the country. He stressed on the need for collaboration between the Indian and Israeli automotive industry as this could result in an ideal symbiotic relationship. Indian companies would be able to access the cutting edge Israeli technologies while the Israeli industry would get access to the Indian automotive industry, one of the world's fastest growing.

A mini exhibition of the Israeli automotive industry was organised by the IEICI for the benefit of the ACMA delegation. On display were the latest products and technologies that Israeli industry had to offer to the Indian auto market. These include navigation tools, safety systems and technologies, microwave technology and testing equipments, diagnostic technologies, fuel management systems, etc.

4. Better Place Centre

In order to optimize energy consumption, minimize the usage of fossil fuel and address environmental concerns, the Better Place Centre with support of the Israeli Government and venture capitalist is setting up an infrastructure for Electrical Vehicles (EVs). These EVs are being developed in cooperation with Renault-Nissan. The services are expected to be rolled out by the end of the current calendar year, 2010.

Under the project re-chargeable high capacity lithium-ion batteries have been developed which can run over 80 miles on a single charge. An extensive grid with an investment of US $ 200 mln is being created to allow easy access to consumers for charging batteries and replacing them. The entire system will work on a service model wherein the consumers will pay only for the ownership of the car, while the battery and the battery charging/changing infrastructure will be owned by the service provider.

4. Meeting with Mr. Sharon Kedmi

The delegation made a courtesy call on Mr. Sharon Kedmi, Director General, Ministry of Trade & Labor. Mr. Jayant Davar briefed the DG on the Indian automotive electronics industry and the objectives of the business delegation. Mr. Kedmi assured all support and cooperation of the Israeli government in fostering better business ties between the Indian and Israeli automotive industries.

6. Tadir - Gan Group

Tadir-Gan holds the 2001 and 2002 Supplier of the Year awards from General Motors, given for quality, service, technology and price. Tadir-Gan, with over 30

years of experience in aluminium, zinc and magnesium high-pressure die casting and machining, is located on a 12,000 sq.m. green field site, close to Israel's main seaport.

7. Technion - Israel Institute Of Technology

In operation since 1924, the Technion is the oldest university in Israel. Since its founding, the institute has educated three generations of men and women who have played a key role in laying the country's infrastructure and establishing its crucial defense and high-tech industries. In the new millennium, Technion's role at the forefront of the global network of science and technology has never been more vital.

The university offers degrees in science and engineering, and related fields such as architecture, medicine, industrial management and education in an intellectually invigorating environment. Great emphasis is also placed on its humanities and social science programs, the incorporation of which take on ever-increasing importance in today's multi-faceted workplace. But Technion's goals go beyond providing a well rounded technical education. At the institute, scientific instruction is interwoven with professional ethics, producing leaders sensitive to social and environmental issues.

The dissemination of knowledge doesn't end in the classroom. The Technion actively publishes its discoveries in journals and popular manuscripts, and aims to spark scientific and technological interest among youth through popular lectures and programs. Technion laboratories and incubators are also dedicated to enhancing the country's economy by offering novel solutions, research facilities, and world-class expertise.

8. Plasan Armored Vehicles

Plasan armor protection manufacturers has accumulated over 15 years of technical know how and practical experience in the development of technically advanced armor protection kits for armor tracked, armor cars and wheeled vehicles. Plasan also provide armor protection solutions for aircraft and naval armor systems. Plasan armor protection utilizes a "Total systems approach" when planning the armor requirements for a particular platform. The current turnover of the company is US $ 1 bln.

Plasan armor protection solutions engineering concept, considers all aspects of the platforms' survivability requirements and then engineers a solution that will incorporate the most cost effective materials solution for the specific threats. Plasan is a preferred armor supplier for the Israeli Defense Forces and an approved armor protection supplier to Ministries of Defense around the world. The focus of its core business is the development, manufacture and assembly of Add-On Armor Kits

[APK's] for lightweight military tactical tracked [APC's] and wheeled armor vehicles [APC/Trucks], fixed and rotary wing aircraft, naval platforms and civilian armor vehicles.

Way Forward/ Recommendations

a) ACMA in collaboration with Technion should consider launching a programme on new product development and innovation. This would involve training key industry personnel under a "train the trainer" programme for inculcating a culture of innovation in their respective companies. ACMA needs to continue the dialogue with Technion for finer details of the engagement to be worked out.

b) ACMA members should explore:

- Business alliances with Israeli defense- automotive facilities for manufacture and supply to the strategic sector in India.
- Opportunities in Electrical Vehicles and Battery Management Infrastructure.
- Sourcing auto-electronics/ sensors from Israel
- Opportunities to fund auto-technology start-ups in Israel.
- Opportunities in light metal HPDC (High Pressure Die Casting), eg. Magnesium.
- Water management and other environment management technologies. ■

Indian Auto Sector on Fast Drive

Only three decades back, Indian car buyers had just two models to choose from. Both were local reproductions of European models that had disappeared from the western markets soon after World War II. Irrespective of market demand, manufacturing capacity was restricted through government licenses, and buyers had to wait several months after paying cash up front to get delivery. Imports were discouraged through very high duties, which remain high even now, and foreign-made cars were prized possessions of only the most affluent.

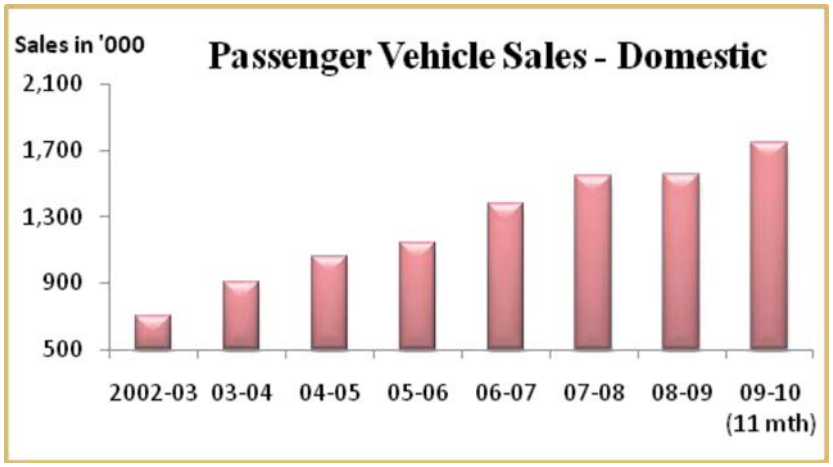
The introduction of a tiny hatchback in 1983 by Maruti 2 Suzuki, jointly promoted by the Indian government and Japanese small car manufacturer Suzuki, was in many ways a defining moment in the development of the Indian automobile industry. Though very small, the Maruti 800, as it was called, was modern and much more reliable than its competitors. After a relatively slow start, the car endeared itself to the growing Indian middle class and remained the best seller for the next two decades. Until recently, it was the most inexpensively produced car in the world, and today remains popular in the semi-urban and rural markets of India.

More significantly, Maruti Suzuki introduced more efficient manufacturing practices and developed a number of local component suppliers. This industrial eco-system with vastly improved capabilities eased the entry of several foreign car manufacturers, after industrial licensing was abandoned in the 1990s. The growth of component suppliers also enabled select domestic automobile firms, with no prior experience in car manufacturing, to add passenger vehicles to their product range. Though several foreign manufacturers have struggled to expand their foothold, the growing purchasing power of the middle class continues to attract new entrants to the Indian passenger car market.

This story essentially repeated itself in other segments of the Indian automobile market, including commercial vehicles and motorcycles. These segments too have evolved from duopolistic inertia to vigorous competition. In place of outdated products, buyers now have a surfeit of

Fast Facts

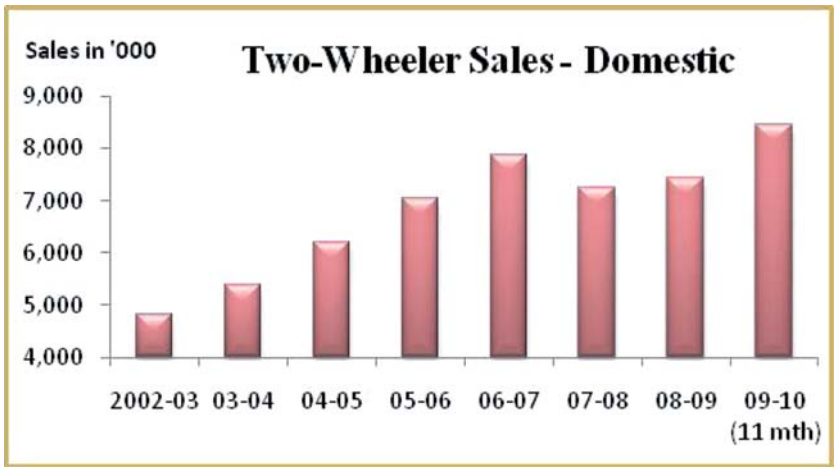
- India is the second fastest growing automobile market in the world after China.
- Over 2 million passenger vehicles were produced from April 2009 to Feb 2010, representing growth of nearly 25%.
- India is emerging as a major production base for small cars, with output expected to reach 3 million units by 2016. The country is building a reputation in designing and manufacturing low cost cars.
- Production of trucks and buses increased more than 35% between April 2009 and Feb 2010. An expanding highway network and overall economic growth is pushing up demand.
- India is the second largest market for motorcycles worldwide. Output of nearly 10 million units was registered during April 2009 Feb 2010, marking growth of nearly 25%.
- The auto parts industry is also scaling up, as global car manufacturers are increasing their component sourcing from India, due to cost and engineering competencies.
- Competition is set to intensify as more global firms enter the market.



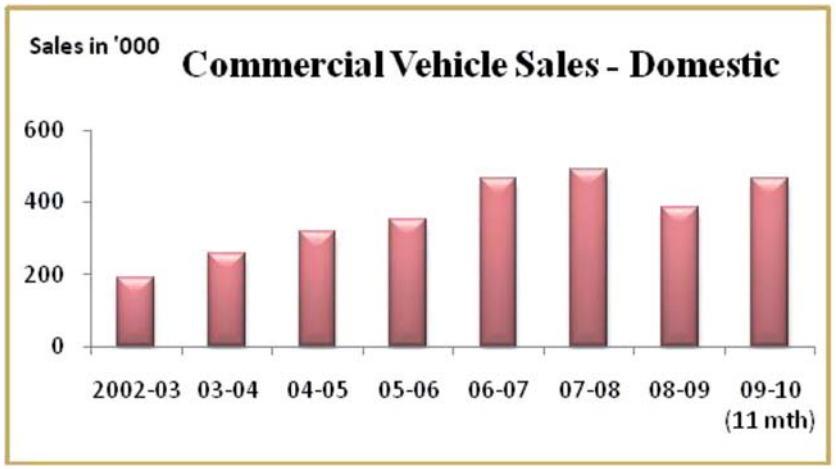
vehicle models to choose from. The trigger for change has typically been the introduction of foreign technology and competition. However, instead of being overwhelmed, the domestic manufacturers have emerged as market leaders, adapting well through alliances with foreign firms for technology.

Yet, withdrawing restrictive industrial licensing and allowing the entry of foreign firms would not have ensured sustained growth for the Indian automobile industry. For demand growth to endure, the government would also have to enable the development of the country's road network and reduce traffic congestion in its cities.

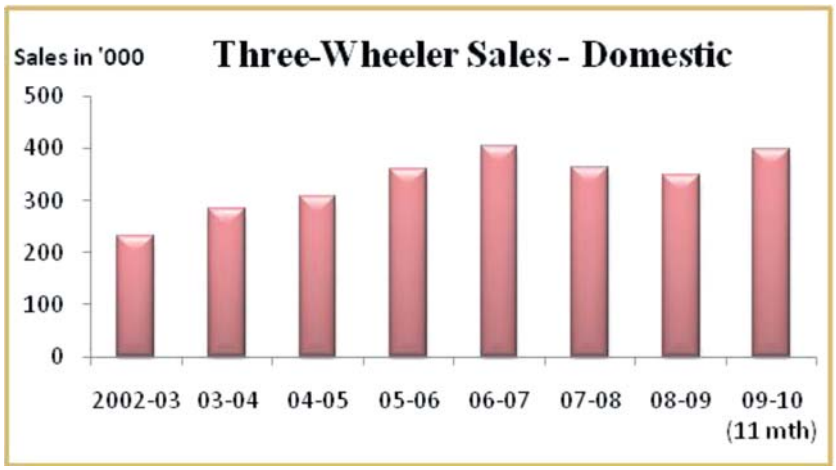
Considering the poor state of Indian 3 roads even in the 1990s, this was an arduous task that required large capital investments.



The National Highway Development Program launched in 2000 is similar in concept, though smaller in scale, to the National Highway System in the U.S. The first leg of the project linked the four big Indian cities of Delhi, Kolkata, Chennai, and Mumbai with a four-lane highway, dubbed the Golden Quadrilateral. The subsequent phases of the program developed the North-South and East-West highway corridors and access roads to major seaports. Since its launch, more than 20,000 miles of highways have been upgraded or are currently being developed under the program. Over the next decade, the government is planning to upgrade another 20,000 miles of highways apart from building more than 10,000 miles of expressways. Most of these projects are being implemented through private sector participation, with the government absorbing part of the costs for segments where toll collections are unlikely to make the project commercially viable.



Most Indian cities have grown without even basic planning of the road network and other infrastructure. As the number of car owners started rising, roads in



most cities became clogged and pollution levels increased. Widening of inner-city roads and construction of elevated roads over busy intersections and level crossings have helped the cities to absorb the significant increase in vehicle population over the last decade. The federal government provides a large part of the financing for such projects, under programs like the National Urban Renewal Mission.

Market Segments

Passenger Vehicles: Middle-class dreams fuel sales growth

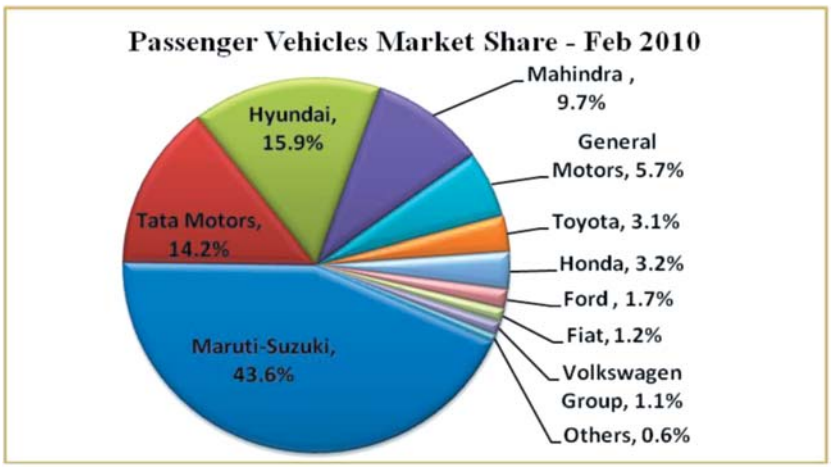
Like most other markets, much of the excitement in India is in the passenger vehicle segment. Robust growth in middle class income levels and easier credit availability have sustained demand growth for passenger cars. Most major global manufacturers are already present in the country, while some of the domestic manufacturers are entering overseas markets. 4

Despite increased competition, Maruti Suzuki, which is now majority owned by Suzuki Motor Corp, remains the market leader in India with a share of nearly 44%. Its strength lies in its wide range of small car models, which form the bulk of the Indian car market. Maruti Suzuki also has the largest dealer network and its annual manufacturing capacity is close to 1 million vehicles.

Korean firm Hyundai and domestic major Tata Motors have been in a tight race for the second and third places for a while now. Hyundai is now marginally ahead with a market share of nearly 16% as compared to over 14% for Tata Motors. Small hatchbacks dominate Hyundai's model lineup and the firm has built up a strong brand reputation over the last several years. Tata Motors has a wider product range, from SUV's to the world's cheapest car, the Nano. Tata products are positioned as value-for-money and run predominantly on diesel, which is nearly a third less expensive than gasoline in India because of government subsidies. The firm also jointly owns an assembly line with European carmaker Fiat and markets Fiat cars in India.

Mahindra & Mahindra, another large local manufacturer, derives the bulk of its sales from the SUV segment where it is the market leader. The firm has partnered with European manufacturer Renault to assemble and market a passenger car, but the venture has not performed well.

Several global manufacturers have struggled in India, though they have been present in the market for more than a decade. General Motors has seen a revival over the last year, after the firm launched low-priced hatchbacks under the Chevrolet brand. GM also sells small sedans and SUV's, but volumes remain very low. The firm sold half of its Indian operations to Chinese automaker SAIC Group last year, and the joint venture is planning to introduce utility vehicles, besides



passenger cars. Ford has been more successful in the small sedan segment in India, with the company recently launching a competitively priced small hatchback from its assembly line and engine plant near Chennai, in south India. 5

Though their product offerings in the Indian market are limited, Japanese manufacturers Toyota and Honda enjoy leadership in their segments. Honda is a clear leader in the mid-sized sedan category, while Toyota sells the most minivans. In a bid to expand their market share, both firms are expected to launch small hatchbacks and sedans shortly.

Among European manufacturers, Skoda Auto, the Czech subsidiary of Volkswagen, has built a relatively good position in the mid-sized sedan market. Volkswagen itself has been a recent entrant in the Indian market and has expanded its product range by launching a small hatchback. Fiat's record in India has been patchy and it now relies on the Tata Motors dealer network to sell its products. While its venture with Mahindra has not been successful, French automaker Renault has opened a large assembly line, jointly owned by its Japanese associate Nissan. The Renault-Nissan alliance is expected to launch several models in the near future, with Nissan focusing more on the small car segment.

Luxury passenger cars have seen excellent demand growth, especially in recent years. However, the luxury segment now accounts for less than a percent of the total passenger vehicle market. Mercedes Benz and BMW have almost identical market shares while Audi has made rapid gains over the last year. All three manufacturers assemble cars in India from imported kits, which attract high import taxes, and hence product prices are higher than other markets. Jaguar and Land Rover, now owned by Tata Motors, are gradually expanding their dealerships in the country.

Commercial Vehicles: Rapid economic growth boosts demand

The volume of goods to be moved across the country and the demand for commercial vehicles to transport the goods are directly related to the pace of overall economic growth. When the country has a high population density and personal car ownership is low, demand for passenger transport

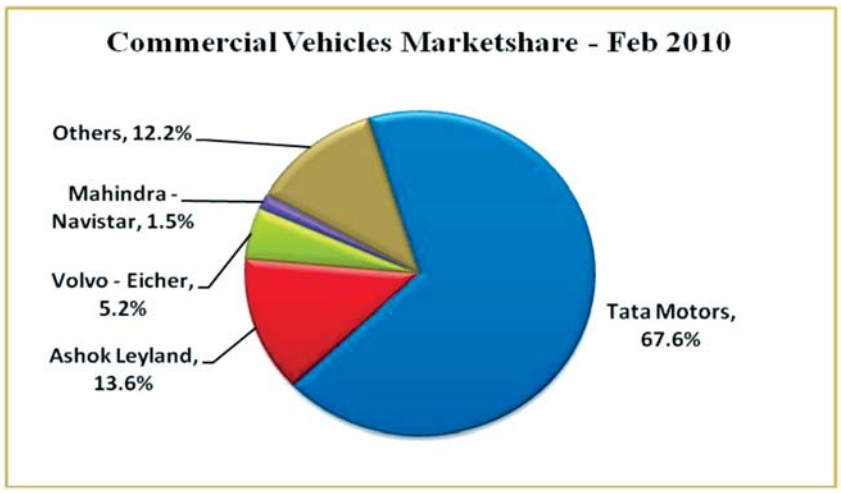
will also rise faster when the economic growth accelerates. In recent years, as the country emerged as the second fastest growing economy in the world, India has seen a substantial increase in demand for trucks, buses, and other commercial vehicles.

Though India has one of the most extensive railway networks in the world, the bulk of the commercial goods movement is by road. The rebuilding of the country's main highways under the National Highway Development Program

Leading Indian Automobile Firms

Firm	Products	Foreign Partner	Market Capitalization (in $ Billions)	Stock Listing
Maruti Suzuki	Passenger Vehicles	Suzuki Motor	9.2	Mumbai
Tata Motors	Passenger and Commercial Vehicles	Fiat	7.4	Mumbai, New York
Mahindra & Mahindra	Passenger and Commercial Vehicles, Tractors, Two-wheelers	Navistar for Commercial Vehicles; Renault for passenger cars	6.1	Mumbai, London
Hero Honda	Two - Wheelers	Honda Motor	7.7	Mumbai
Bajaj Auto	Two and Three - Wheelers	Renault-Nissan for planned small car	5.7	Mumbai, London (Holding Firm)

Market capitalization data based on full capitalization as on February 26, 2010



has made road transport easier and more efficient. Unlike in the past when only single axle trucks were suitable for narrow Indian roads, the new highways can easily accommodate large multi-axle tractor-trailers. Another factor that pushed up demand for trucks is the substantial increase in construction of buildings and infrastructure.

To ease traffic congestion in cities, the bus transit systems have been improved and upgraded across the country. The federal government continues to finance the introduction of modern buses, comfortable enough to encourage commuters to switch from personal vehicles in cities. Increased migration of workers to the cities and industrial zones has also pushed up demand for long distance bus services. As the smaller towns and villages get connected to the highway system and more migrants move out of the villages, demand for commercial transport services will only increase in the future.

For decades, Tata Motors has dominated the commercial vehicles segment and currently controls two-thirds of the market. The firm has the broadest dealer network and the widest product range of all manufacturers, from small goods carriers to large tractor-trailers. Tata Motors has also expanded its overseas presence over the last decade, mostly through acquisitions and joint ventures. The firm currently has a truck manufacturing facility in South Korea and owns a major portion of a bus and coach manufacturer in Spain. Tata Motors is the majority partner in a venture with Brazilian firm Marcopolo to build buses in India. In Thailand, the firm has joined hands with a local company to assemble and market pickup trucks.

Ashok Leyland is a distant second in the segment with a nearly 14% market share of all commercial vehicle sales, including small goods carriers. The firm's large trucks and buses are popular, but it has had limited success in smaller capacity truck models. Ashok Leyland is a market leader in buses and a leading vehicle supplier to the Indian armed forces. The company has recently tied up with Nissan for manufacturing light commercial vehicles and engines.

In the 1990s, several Japanese manufacturers entered the Indian market with light commercial vehicles but had limited success. Among more recent entrants, Volvo has gained market share in the large truck and bus segment and acquired half of a domestic manufacturer of small trucks. German manufacturer MAN owns half of a joint venture with local firm Force Motors, which manufactures a range of commercial vehicles. American manufacturer Navistar has a joint venture with Mahindra & Mahindra and has recently launched large trucks in India.

Two-wheelers: Rural markets offer further growth opportunity

Like most developing markets, two-wheelers, such as motorcycles and motor scooters, are the most popular mode of personal transport in India. Two-wheelers are more affordable than low cost cars and even used cars. They are also cheaper to run and easier than cars to maneuver and park on narrow roads. Since the average road speeds in India are low, the lower passenger safety of two-wheelers when compared to cars does not inhibit buyers. These factors have made India the second largest two-wheeler market in the world with annual sales of over 10 million units. The increasing income levels in semi-urban and rural areas of the country offers further growth potential for two-wheeler manufacturers.

Hero Honda is the undisputed market leader in the Indian two-wheeler market, with a market share of more than 40%. The firm

is particularly strong in the entry-level motorcycle category and its products are positioned as the most fuel-efficient. Honda Motor of Japan holds a 26% stake in the firm and provides product technology.

Bajaj Auto is the second largest Indian two-wheeler manufacturer, with a dominant position in higher priced motorcycles. The firm once had a near monopolistic control of the motor scooter market, but gradually withdrew from the segment as consumers switched to motorcycles. Bajaj Auto is also the market leader in three-wheelers, which are popular as taxis in India. TVS Motor is the third major player in the two-wheeler market.

Honda Motor of Japan also has a wholly owned subsidiary in India, for manufacturing motorcycles and motor scooters. It is the market leader in motor scooters and the fourth largest in motorcycles. Honda is followed by fellow Japanese manufacturers Suzuki and Yamaha in the motorcycle segment. Harley Davidson is a recent entrant in the premium motorcycle market where volumes are very low.

Automobile Components: Attractive source for global auto firms

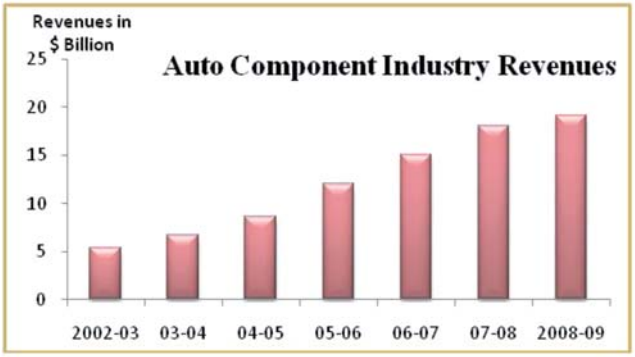
The Indian automobile component industry and allied businesses are among the select success stories in the country's manufacturing sector, but their achievements are not yet widely acknowledged. The leading Indian component manufacturers have gradually built their design, engineering, and manufacturing competencies over the last couple of decades. The impressive growth of the domestic automobile market has allowed them to scale up their operations. Several of them now export to major global car manufacturers and the leading firms are establishing manufacturing operations in overseas markets.

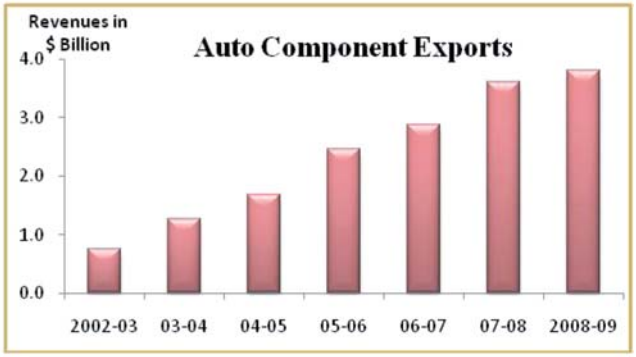
Though major carmakers bring along their key suppliers when they enter new markets, local component manufacturers are enlisted as suppliers of smaller parts. As the carmakers become more confident in the capabilities of the local parts suppliers, they begin sourcing components from local suppliers even for their global operations. Several global automobile makers have been present in India for several years now and they have been sourcing parts from the network of local suppliers for other markets. Leading global manufacturers including Volkswagen and Fiat have announced their plans to increase component sourcing from India.

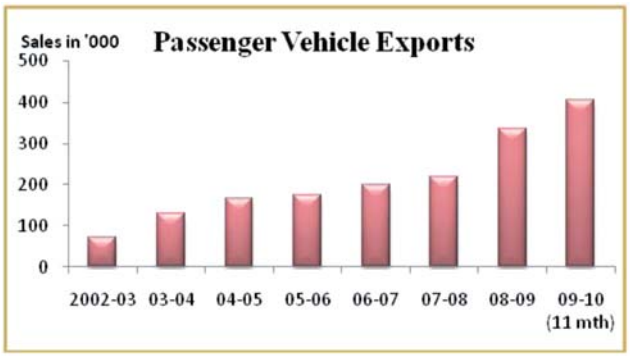
Outlook: Export potential adds to domestic demand flourish

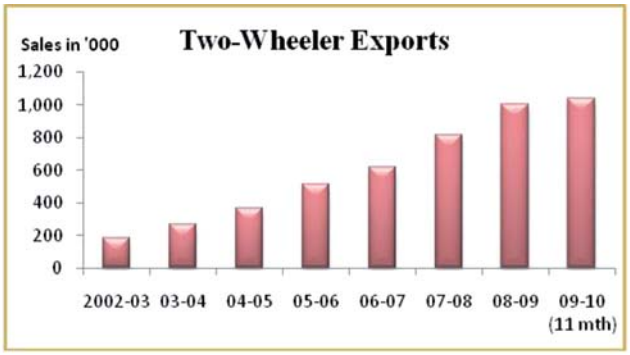
Even after the spectacular growth in recent years, the Indian automobile market still has considerable room to grow. Passenger car ownership in India is still very low even when compared to other emerging markets. Despite domestic sales of over 10 million units annually, even two-wheeler ownership is below 100 per 1,000 of the population. It is likely that the continued rise in average income levels will sustain demand for personal vehicles while overall economic growth will support the demand for commercial vehicles.

Besides the domestic prospects, India also has the opportunity to emerge as a global manufacturing base for select product segments. The big domestic market potential will allow carmakers to build large assembly lines, with sufficient economies of scale. Design, development, and production costs in India are lower than the developed markets. The country is also building a reputation in frugal engineering, or building low-cost products under tight









budgets. Together with the growing maturity of domestic auto component suppliers, these factors are making an attractive automobile manufacturing location for the global markets.

In recent years, India has emerged as a leading center for the manufacture of small cars. Hyundai, the biggest exporter from the country, now ships more than 250,000 cars annually from India. Apart from shipments to its parent Suzuki, Maruti Suzuki also manufactures small cars for Nissan, which sells them in Europe. Nissan will also export small cars from its new Indian assembly line. Tata Motors exports its passenger vehicles to Asian and African markets, and is planning to launch electric vehicles in Europe this year. The firm is also planning to launch an electric version of its low-cost car Nano in Europe and the U.S. Mahindra & Mahindra is preparing to introduce its pickup trucks and small SUV models in the U.S. market. Bajaj Auto is designing a low-cost car for the Nissan-Renault alliance, which will market the product globally. Nissan-Renault may also join domestic commercial vehicle manufacturer Ashok Leyland in another small car project.

While the potential is impressive, there are challenges that could pull down future growth of the Indian automobile industry. Since the demand surge for automobiles in recent years is directly linked to overall economic growth and rising personal incomes, industry growth will slow if the economy weakens. Also, any delay in the further development of the highway network could slow down domestic demand growth. It is possible that the government will favor mass transport systems for the large cities, which may restrict the demand for personal vehicles. Most Indian cities will have a combination of metro rail networks and dedicated road corridors for buses and it is possible that a good number of commuters will opt for public transport. It is also likely that intense competition will erode the profitability of manufacturers, especially in the passenger vehicles segment.

Despite these challenges, the long-term outlook for the automobile industry in India remains bright. In most countries, the automobile industry historically has been one of the sectors leading the economic growth and development. Available indicators suggest that it will be no different in India, which is likely to remain one of the fastest growing economies in the world.

Sources:

Thomas White International.

For automobile sales and export data: Society of Indian Automobile Manufacturers (SIAM)

For auto component revenue and export data: The Automotive Component Manufacturers Association of India (ACMA) ■

A2Z Group.

A powerhouse of 360 degree solutions and success.




A leader in diverse business verticals, the A2Z Group has evinced unprecedented growth. A2Z is much sought after Engineering, Procurement and Construction (EPC) company among the public and private sector clients. It has gained an enviable reputation of executing complex project within extremely challenging time frames to the satisfactions of exacting and highly demanding clients. A2Z consistently delivers 360 degree solutions to all its clients with international parameters.

Founded in 2002, it has grown today into an admirable and versatile business group with Approx 1200 crores (FY 10 E) turnover. A2Z has established sound leadership in an exciting portfolio of opportunities viz. Power Transmission and Distribution EPC, Solid Waste Management, Biomass Power Generation, Facilities Management & IT Application-Power Sector etc. The company received accolade in form of E&Y conferring Start-up of the Year Award to Mr Amit Mittal (Founder-MD)

Mr Amit Mittal (Founder-MD)

A2Z Maintainence & Engineering Services

- ISO 9001-2000 certified by MOODY
- Leader in Building Primary and Secondary Power Distribution Network on EPC basis.
- Concept to commissioning of Power Transmission line Project upto 765 kV and substation of upto 400 kV.
- One-stop-shop for complete Engineering Maintenance/ Asset Management & Utility Infrastructure Services the Power Generator Transmission & Distribution Enterprises Electrical.

A2Z Infrastructure

- JCB-CII Award for Excellence in Waste Management Year 2010
- Early entrant in IRRF mode MSW Management Company.
- Operating a large 1500 TPD MSW Project in India at Kanpur on an integrated mode
- Portfolio of approx 5000 TPD across various municipalities/urban local bodies
- Strong experience in PPP model
- Deploying unique technologies for operational efficiency
- Integrated waste management entails collection of waste, transportation of waste, processing of waste, disposal of waste & converting waste into energy.

A2Z Infra-Services

- Unique approach as Integrated Facilities Management Organization.
- Professionally managed with almost 800 technical people on roll out of the total approx12000 employees.
- Pan India Presence.
- Focus on energy savings and green solutions.

Corporate Office: Plot No. 44, Sector - 32, Institutional Area, Gurgaon - 122001, Haryana. Tel : 91-124-4517600, 4776100 Fax: 91-124-4380014. Email: info@a2zemail.com

Bank's Major Initiatives

- Export Credits
- Finance for Export-oriented Units
- Overseas Investment Finance
- Lines of Credit
- SME & Agri Finance
- Support for Grassroot Enterprises
- Export Services

Products and Services

- Export Marketing
- Pre-shipment
- Post-shipment
- Investment Abroad
- Advisory Services
- Import Finance
- Export Product Development
- Export Production

EXIM Bank

Owned fully by the Government of India, the Bank was established by an Act of Parliament in September 1981 and commenced operations in March 1982. Exim Bank is an apex financial institution catering to diverse needs of exporters and importers, and facilitating two-way investment flows.

EXIM Bank's catalytic role

Ever since its inception, the Bank has been actively involved in catalysing India's international trade and giving it an enduring identity in the global market, through its pioneering initiatives to serve its constituents all over the world.

Awards

EXIM Bank has undertaken a multitude of promotional activities through innovative projects that have been highly acknowledged by its clientele and stakeholders.

- 'Trade Development Award' by the Association of Development Financing Institutions in Asia & the Pacific (ADFIAP) in 2010 in recognition of Bank's "Lines of Credit Programme."

Our evolving vision for your dream

To develop commercially viable relationships with a target set of externally oriented companies by offering them a comprehensive range of products and services, aimed at enhancing their internationalisation efforts.

Our goal for your future

At EXIM Bank we aspire to promote the country's international trade by providing comprehensive assistance to exporters and importers globally. The future will witness a plethora of products and services for the Rural Grassroot and SME sector, as EXIM Bank will take rural products to the international market.

EXIM Bank is dedicated to encouraging globalisation efforts of Indian enterprises across all sections of the economy. • Rated by Moody's (Baa3), JCRA (BBB+), S&P (BBB-) and Fitch (BBB-) • 28 years of continuous profits and dividends • Resources raised in International Debt Capital Markets through Loans/Bonds/FRNs/Samurai Bonds

EXIM BANK

EXPORT-IMPORT BANK OF INDIA

Head Office : Floor 21, Centre One Building, World Trade Centre Complex, Cuffe Parade, Mumbai 400 005.
Phone : 022 - 2217 2600 • Fax : 022 - 2218 2572 • E-mail : cag@eximbankindia.in
Offices - India : Ahmedabad, Bangalore, Chandigarh, Chennai, Guwahati, Hyderabad, Kolkata, Mumbai, New Delhi, Pune
Overseas : Washington D.C., London, Singapore, Dubai, Durban (South Africa), Dakar (Senegal).
Website : www.eximbankindia.in