

Confederation of Indian Industry



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- Knowledge Partner -



WHITE PAPER

Surface Coatings are process materials which need equipment, application tools, curing mechanism, instruments etc. for application and ETP to handle chemicals & paint wastages. So the challenge to innovations and new technologies in Surface Coatings are multi-dimensional.

Coatings entail both functional and aesthetic requirements, therefore there is an ever increasing demand for new technology from various stakeholders – be it designers, manufacturers, customers and importantly –environmentalists.

There is a strong call for Green Technologies which require a collaborative approach by all stakeholders in Coating Process.





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Economic Indicators - India

• India growth story intact post economic reforms.

Economic growth of above 7 % as expected for next few years makes India the fastest-growing G20 economy. The accelerated pace of structural reforms post 2014, the move towards a rule-based policy framework coupled with low commodity prices paint a rosy future prospect for India. Govt.'s concerted efforts to improve the Ease Of Doing Business have boosted foreign investment. India jumped from ranking of 134 to 100 in World Bank 2017 report. India's challenges however remain largely of high corporate income tax rates, a slow land acquisition process, high nonperforming loans of banks, much needed labour reforms and infrastructure bottlenecks.

The healthy foreign exchange reserves, the current account and fiscal deficit under control, a strong rupee, improved tax collections post GST boosting revenue, a leak-proof and targeted delivery mechanism for financial participation and a proactive government all promise a sustained growth story for India.







· Government's commitment to doubling farmers' income by 2022, providing five crore low-cost housing units, electrification of all villages, electricity to every house, bullet trains, a corruption-free business ecosystem, self-employment, rural roads, regional low-cost air connectivity, and two lakh km of optical fiber connectivity, all point to inclusive and business-friendly vision to propel India into next orbit of development.



possibly be a \$5 Trillion economy by 2025

PWC Report - India 2025



COATING INDUSTRY- OVERVIEW





Coating Industry - Overview

In 2016. the global paints and coatings market grew to a value of \$ 149.2 billion. The global paints and coatings market has been growing at a healthy pace in recent years, with the compound annual growth rate (CAGR) standing at a strong 5.5% between 2012 and 2016. Indian Coating Industry is estimated to be \$ 9.2 billion in 2016 with a CAGR of 12-14% in past few years.



GLOBAL PAINT COMPANIES - 2016 Turnover in \$billions





Coating Industry - Overview

- Asia Pacific is the largest regional market in the world and accounting for more than 55% of global market value.
- Indian Paint Industry is estimated to be \$ 9.2 Billion having 65 % in organised sector, 70% in Decorative segment and 30% in Industrial sales segment growing at CAGR 12-14% in recent years. Future growth is expected to be 1.5 to 2 times of GDP growth in next few years.
- Indian paint consumption is estimated to be about 2.5 Kgs per annum per capita against 4 Kgs in South East Asia & 22 Kgs In developed countries.
- Paints demand largely depend on growth in Housing, Infrastructure and Industrial segments. Rise of automotive sector will propel Industrial paints demand in India.



SEGMENTS - FOCUS ON AUTOMOTIVE









Focus on Automotive Industry

Automotive Industry is the growth engine of Indian economy and has been growing well with all global majors having set up their production base in India. India is poised to emerge as the 4th biggest automotive market after China, US and Europe.

Around 31% of global sale of small cars are of those manufactured in India as per Auto News report in 2015. Besides cars, India has also emerged as the largest manufacturing hub of:

- 1. Diesel and Petrol engines of small capacity
- 2. Commuter Two Wheelers and Three Wheelers
- 3. Low powered Tractors
- 4. Engine & transmission related auto components etc.

Indian automotive industry is estimated to grow to 40 million vehicles by 2021-22 while auto component industry is expected to grow exponentially 4-5 times of its present level.







Automotive Mission Plan 2026 prepared by Government Of India and the Indian Automotive Industry envisages a vision to make automotive industry as the engine of the "Make In India" programme to contribute over 12% in GDP over the next decade.

Govt. focus is on infrastructure growth by developing world class roads and to provide safe, comfortable and efficient mobility to people. Automotive Mission Plan aims to minimise the negative externalities from use of automobiles like air pollution. It aims to propel the country towards an ambitious target of 40% electric vehicles by 2030.



COATINGS TECHNOLOGY-ROAD MAP





Technology footprints

- The new coating technologies include waterborne (thermosetting emulsion, colloidal dispersion, water-soluble) coatings, high-solids coatings, two-component systems, powder coatings, and radiationcurable coatings.
- Automotive OEMs are also adopting efficient technologies to comply with various regional emission norms in developed economies. Increasing vehicle production and growing demands have driven the growth of the global automotive paints market. However, fluctuating raw material prices and low-adoption rates of eco-friendly coatings in developing markets have restrained the usage of high solid paints & waterborne coatings. India being a tropical country, cost of using waterborne coatings is high as these require strict temperature/humidity control during usage.
- Rising global ecology concerns, however, will force developing economies to adopt cleaner and greener coating technologies in near future owing to stricter emission norms. Focus will also shift to conservation of energy and water saving coating technologies.
- Manufacturers of paints are striving to offer cost-efficient solutions without compromising on the performance of the paints through their R&D. For this purpose, Tier-1 suppliers and OEMs are partnering to develop new technologies to save development costs and offer efficient technologies in the paints market.





MODERN TRENDS IN AUTOMOTIVE COATINGS

MODERN TRENDS IN AUTOMOTIVE COATINGS



* Kansai Nerolac Paints





Automotive Paints – Technology Map - INDIA

Pre Treatment	Technology	Partially implemented	Future	
Zinc Phosphate Type	STANDARD	Low. Temp. Liquid Activation Chemical		
Conversion Technology (Nano)	Zirconium, Silone based	Nano for OEM Parts	Nano for OEM Multi Metal 🍙	
Zinc Phosphate Treatment Process (Conventional) Degreasing Water Rinsing Surface Conditioning Phosphate Water Rinsing DIW Rinsing E-Coating				

Conservation of resources in pre-treatment

In order to provide bodies in white and metallic car parts with effective corrosion protection and ideal paint adhesion, they are given conventional zinc phosphating during pre-treatment. However, phosphating processes which involve the use of heavy metals are being replaced to an ever greater extent by nano-ceramic processes.







1. Pre Treatment

Phosphatability of Liquid Surface Conditioner

Crystal morphology of phosphate coating on various substrates

Substrate	CRS	Galvannealed Steel Sheet	CRS (Box-section)	Aluminium A6061	High tensile strength steel	
Conventional Powder conditioner	×1.500 10					
New Liquid Conditioner	×11.500 10/		X1.500 10µm	×11.500 19/		
Finer crystals Lower coating weight Less chemical consumption Finer crystalsHigher coverage Higher coating performances						
Pre Treatment Activation Stage		New		Convent	ional	
Product name		Liquid Type Surface Conditioning Chemical		Powder 1 Condition	Type Surface hing Chemical	
Particle type	e :	Zinc type		Titanium	Titanium type	
Product stat	oility	Good		Good	Good	
Bath stabilit	у	Excellent		Limited	Limited	
Regular dum	np-off	No need		1- 2 week	1- 2 weeks	
Coating weig	ght control	Possible		Limited	Limited	
Phosphatab	ility	Improved				
Sludge gene	eration	Can be reduced by 10 %		2- 3 g/m ²	2- 3 g/m ²	
Treatment ti	me	Can be reduced to 60 sec		120 sec	120 sec	
Treatment te	emperature	Can be reduced to 30 C		40- 50 C	40- 50 C	

* Nihon Parkerizing





2. Pre Treatment

Conversion Coating (Nano Technology in Pre Treatment)

Zinc Phosphate

COATING CHARACTERISTICS



Conversion Coating









Automotive Paints - Technology Map - INDIA

E-COAT	Technology	Partially implemented	Future
CED	Standard Lead Free		
CED	High Throw Power	DBTO FREE	Phosphate Free Coating System Tin Free CED
CED	LOW RA (3C1B)	Super High Throw Power	Super Low bake & Water Saving
ACED	Acrylic CED		







CED PROCESS IN FUTURE









Automotive Paints – Technology Map - INDIA

Paint (Body)	Present	Partially implemented	Future
	Medium Solid SB		
Intermediate Coats		High Solid SB [●]	
		Water Borne	
Basecoats	3C-2B SB Conventional	Water Borne 🔍	
(Polyester CAB/TSA) / Compact	3C -2B SB Medium Solid	3C-2B SB [●] High Solids	
Systems	3C- 1B SB Medium Solid	3C - 1B SB ● High Solid (>55%)	3C1B ● Water Borne
		B1/B2 system 📍	
Clear Coats	TSA Based Conventional		
	Mar Resistant TSA Modified	2K CLEAR	Acid Resistant Clear
		High Solid Mar Resistant (Silane Modified)	Powder Slurry
Solid	Monocoat SB		
Topcoats	COB medium Solid	COB HS (>55%)	
		Water Borne 📍	

- * 3C1B 3 COAT 1 BAKE
- * 3C2B- 3 COAT 2 BAKE
- * SB SOLVENT BORNE
- * COB CLEAR ON BASE COAT
- * 2K 2 COMPONENT TYPE
- * HS HIGH SOLID
- * 1K SINGLE COMPONENT TYPE





Development Concept for 3-Wet-Coat System Solvent Borne



Total DFT is less in 3 Wet system as compared to current 3c 2b system

* Kansai Nerolac Paints





Development Concept for 3-Wet-Coat System Solvent Borne



[3 Wet-coat system] Using Solvent-based coatings



[3 Wet Waterborne Base coat system]







Automotive Paints – Technology Map - INDIA

Paint (Bumper)	Present	Partially implemented	Future
BUMPER PRIMER	Solvent Borne	Water Borne	Primer less Conductive Primer
BUMPER B/C 1K	Solvent Borne	Water Borne	
2K CLEAR	Solvent Borne		







Automotive Paints – Technology Map - INDIA

Niche Technologies			
Category	Technology	Applications in Automotive	
Powder Coatings	Epoxy, Polyester	Auto Parts	
Heat Resistant	Interior Coat		
Paints	Exterior Primer/ Top Coats	Motorcycle Mufflers	
Soft Feel Coatings	Primer/ Top Coats	Car Interiors - console, door handle and door trim, arm rest and glove box covers etc	
Interior Coatings for Cars		Car Interiors – plastic, leather, fabric	
Cubic Coatings		Car interiors	
UV Coatings		UV coatings (Helmet Industry)- Mirror backs	
Vacuum Metalizing	Glass Coatings	Lamp reflectors and trim applications	
Sealants & Underbody	Underbody Coatings & Sealants		
Auto	High Solid Solvent Borne	After -sales renairs	
Paints	Water Borne • Paints		

ROLE OF PROCESS PARTNERS, COLLABORATIONS







Role of Process Partners, Collaborations

Coatings are process materials for OEMs & their component suppliers. Any new technology implementation require seamless co-work and collaboration from all process stakeholders – from Raw Material suppliers to Coating manufacturers to OEMs/Tier 1/2 suppliers supported by painting equipment suppliers and OEM Engineering. Role of Government as a facilitator for induction of newer, greener technologies is also crucial.







OEM Quality Scenario

- It is easy to control the process & Quality at OEM as they have got state of art Equipment
- Standard Materials
- Control System
- Team of Professionals
- Discipline
- Robotic spray, energy efficient Plant

To achieve OEM quality level at Tier-2/3. close collaboration and CFT hand holding by OEMs, Coatings & Equipment suppliers.



CLIMATE Challenge





Global focus on VOC /CO2 reduction

- Heavy Metals Free Coatings
- HAPS Compliance-Free (hazardous air pollutants)
- Solvent Emissions Directive: VOC Reduction

At the end of 2013, the European Parliament and the Council of the European Union reached an agreement regarding two regulatory proposals that will implement mandatory 2020 CO2 emission targets for new passenger cars and light-commercial vehicles in the European Union.

The passenger car standards are 95 g/km of CO2, phasing in for 95% of vehicles in 2020 with 100% compliance in 2021. The light-commercial vehicle standards are 147 g/km of CO2 for 2020.

EU has mandated phasing out of high solvent based paints in existing plants and adopt water borne coatings in new OEM Plants to meet VOC targets since 2005. US & Japanese paint companies have introduced High Solid Coatings & Waterborne Coatings to meet these challenges.

COATING INDUSTRY-Skills & Jobs





Coating Industry- Skills and Jobs

There are only a handful of Institutes which have specialised courses on Paint and Plastics Technology – Harcourt Butler Technical University (Formerly HBTI) Kanpur, the oldest institute and UDCT, Mumbai. There is a dearth of Technical Institutes which specialise in Coating Technology courses. Industry needs large number of paint technologists due to increasing demand from automotive companies,



paint companies, chemical companies, housing, infrastructure industry and others segments.

Coating Industry, OEMs and Government should consider forging alliances to establish large number of Institutes for coating technology and skill development for coating processes. Creation of large number of skilled jobs will be the obvious outcome of this collaboration.

It is noteworthy that many OEMs have started training and skill development for their workers and tier 2 and tier 3 suppliers to upgrade their systems and processes but coating related training centres are very few.

FUTURE - COLOURFUL THROUGH TECHNOLOGY







Future Technology Trends – Automotive Industry

• Vehicle Light-weighting

Major shift in vehicle design to meet global fuel economy standards

Product Development Strategy

- Light-weight materials
 - Metallic Approach Advanced High Strength Steel, Aluminium, Magnesium
 - Plastics & Composites
 Carbon Fibre & Glass Fibre (CRPF/GRPF)
- Advanced Power trains
- Aerodynamic Designs
- Fuel Economy improves 6~8% by reducing vehicle mass by 10%



* Bayspring Solutions LLC





Future Technology Trends – Automotive Industry

Additive Manufacturing- 3D Printing

- SL-Stereolithography
 - Most used AM technology
 - Digital data-3D solid object
 - Layered resin cured with UV laser
 - Novel photo-curable composite resins, UV light sources and equipment
 - Speed, part size and cost reduction will advance the process





K. Ren; "Stereolithography: Three Decades of UV Technology Innovation" UV EB Technology, 2015, Quarter 1, Vol. 1, No. 1 12 (8)

* Bayspring Solutions LLC





Future Technology Trends – Automotive Industry

- New Paint Shop initiatives to support light-weighting
 - Reduction in Paint Cure Temperature
 - Chemistry Shift $1K/2K \sim 80^{\circ}c$
 - UV EB Cure Liquid & Powder
- New Joining Techniques Sealing/Adhesive Bonding/Galvanic Corrosion Protection
- Alternative Topcoat Strategies
 - Coil Coating
 - Pre-painted Plastic Parts
 - In Mould Colour parts



Carbon E7 law enforcement vehicle - Carbon Motors is investigating a technique called film insert molding (FIM).



The new CTS uses 387 feet of structural adhesive as a bonding agent that holds together and stiffens load-bearing parts and components.



Coil coated pre-primed substrates in automotive production

* Bayspring Solutions LLC





 Multi-coat Super Metallic (Liquid Silver) paints on cars – many global automotive companies have set up Customised Paint Shops to cater to customers wanting super finishes



*Kansai Nerolac







Future :

- Starch-based completely biodegradable polymer materials for paints and plastics.
- Vegetable oils (VO) constitute the single, largest, easily available, low cost, non-toxic, nondepletable, biodegradable family yielding materials that are capable of competing with fossil fuel derived petro-based products.



- Self Cleaning and Self Healing Paints many global automotive OEMs are working on developing these type of paints jointly with Paint Companies.
- India needs multi station large paint repair 3S Body Shops as India has high vehicle accident rate (over 30%).
- Network of Car Wash units across cities and highways needed to protect paints from dirt and bird droppings.
- While the trend for paint in recent years has been a shift toward low and no-VOC, some coatings companies overseas have raised the bar by producing vegan paints based on ancient natural recipes.





aSource Consulting works closely with automotive suppliers to provide marketing solutions.

Asource, founded by Virendra Gupta, a paint industry veteran, have been working in automotive field for many years and successfully supported many companies build business after gaining source approvals from global OEMs.Asourcealso help OEMs in new vendor development. Our key strengths are strong customer relationships at strategic levels at major OEMs and forming business strategy.

Services:

• Source Approvals from Automotive OEMs

We support for source approvals by providing liaison services to OEM suppliers to gain vendor approval & product approval from auto OEMs in Europe, USA, India & Japan.

- Supplier Plant audits & compliances.
- Project Consulting

We undertake project consulting for new projects in automotive segment for suppliers wanting to set up new units in India and Africa.

• Business Development

We support Automotive Suppliers & Other Industrial materials manufacturers in business development in specific segments by providing Sales & Marketing support.





Protect System GmbH, Germany are our associates in Europe with whom we work jointly to support Indian Automotive Suppliers who may be requiring source approvals from automotive OEMs located in Europe. We liaise with consultants in Japan and USA to provide support to our clients. We work for many companies in India and abroad.

www.asourceconsulting.in





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Confederation of Indian Industry

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering industry, Government, and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, playing a proactive role in India's development process. Founded in 1895, India's premier business association has over 8,500 members, from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 200,000 enterprises from around 250 national and regional sectoral industry bodies.

CII charts change by working closely with Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness and business opportunities for industry through a range of specialized services and strategic global linkages. It also provides a platform for consensus-building and networking on key issues.

Extending its agenda beyond business, CII assists industry to identify and execute corporate citizenship programmes. Partnerships with civil society organizations carry forward corporate initiatives for integrated and inclusive development across diverse domains including affirmative action, healthcare, education, livelihood, diversity management, skill development, empowerment of women, and water, to name a few.

As a developmental institution working towards India's overall growth with a special focus on India@75 in 2022, the CII theme for 2017-18, **India@75: Inclusive. Ahead. Responsible** emphasizes Industry's role in partnering Government to accelerate India's growth and development. The focus will be on key enablers such as job creation; skill development and training; affirmative action; women parity; new models of development; sustainability; corporate social responsibility, governance and transparency.

With 67 offices, including 9 Centres of Excellence, in India, and 11 overseas offices in Australia, Bahrain, China, Egypt, France, Germany, Iran, Singapore, South Africa, UK, and USA, as well as institutional partnerships with 344 counterpart organizations in 129 countries, CII serves as a reference point for Indian industry and the international business community.

Confederation of Indian Industry

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