

# Plastics Compounding: Potential Development for the Middle East Market

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# Contents

## *Global Compounding Business Overview*

### *Global PP Compound Demand*

### *PP Compound Demand/Supply*

### *Key Players & their Distributions*

## *Compounding Fundamentals*

### *PP Compound in Automotives/Appliances*

### *Compounding Business Development in Middle East*

# Global Compounding Business Overview



# Polyolefins Compounding: Industry Profile

## ▶ Size of Polyolefin Compounding Business

Global Revenue	\$ 15 Billion
Global Demand	11 Million tons ( 55% PP, 45% PE)
Global Growth Forecast	4.5 – 5.0 %
GCC Estimated Demand	185 KTA

## ▶ Nature of Business

- Fragmented due to low entry barriers
- Encourages new entrants, especially in regional markets
- More than 50 % market share is controlled by top 15 compounders

# Why Compounded Plastics ?

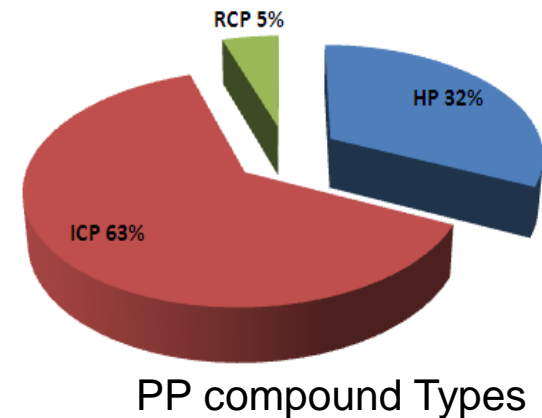
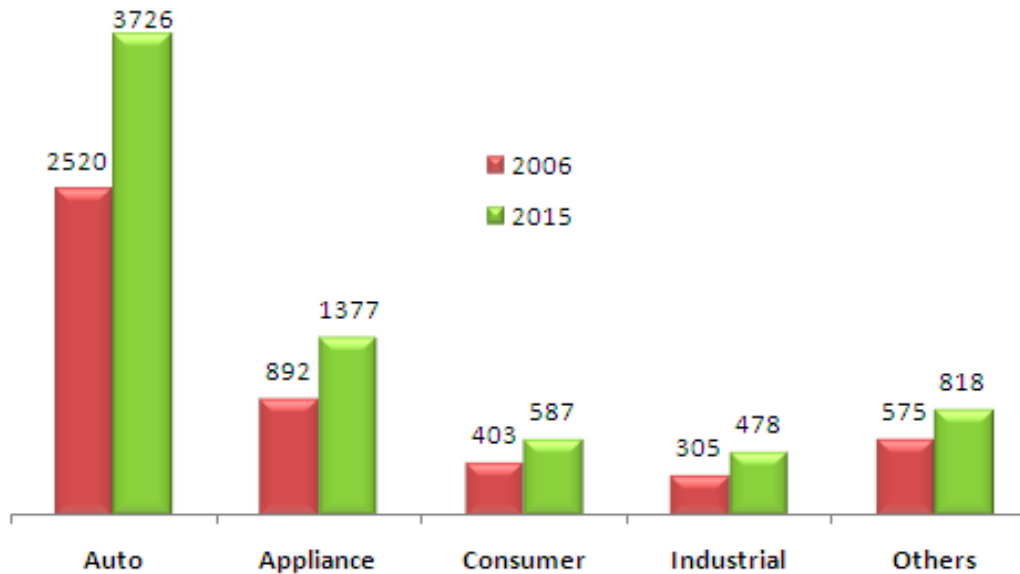
## Compounded Plastics to enhance features like

- ▶ Mechanical/Physical and Thermal Properties
- ▶ Opticals (color/visuals)
- ▶ Functional properties
- ▶ Reduced cost

## Ingredients play key role to enhanced compound properties

- ▶ Fibers to increase strength and stiffness
- ▶ Plasticizers for flexibility
- ▶ Lubricity of molded parts
- ▶ Antioxidants for high temperature stability
- ▶ UV stabilizers for resistance to sunlight
- ▶ Fillers for economy
- ▶ Flame retardants and smoke suppressants
- ▶ Conductive fibers for electrical properties
- ▶ Color concentrates for colored plastic
- ▶ Polymer alloys & blends for performance plastics

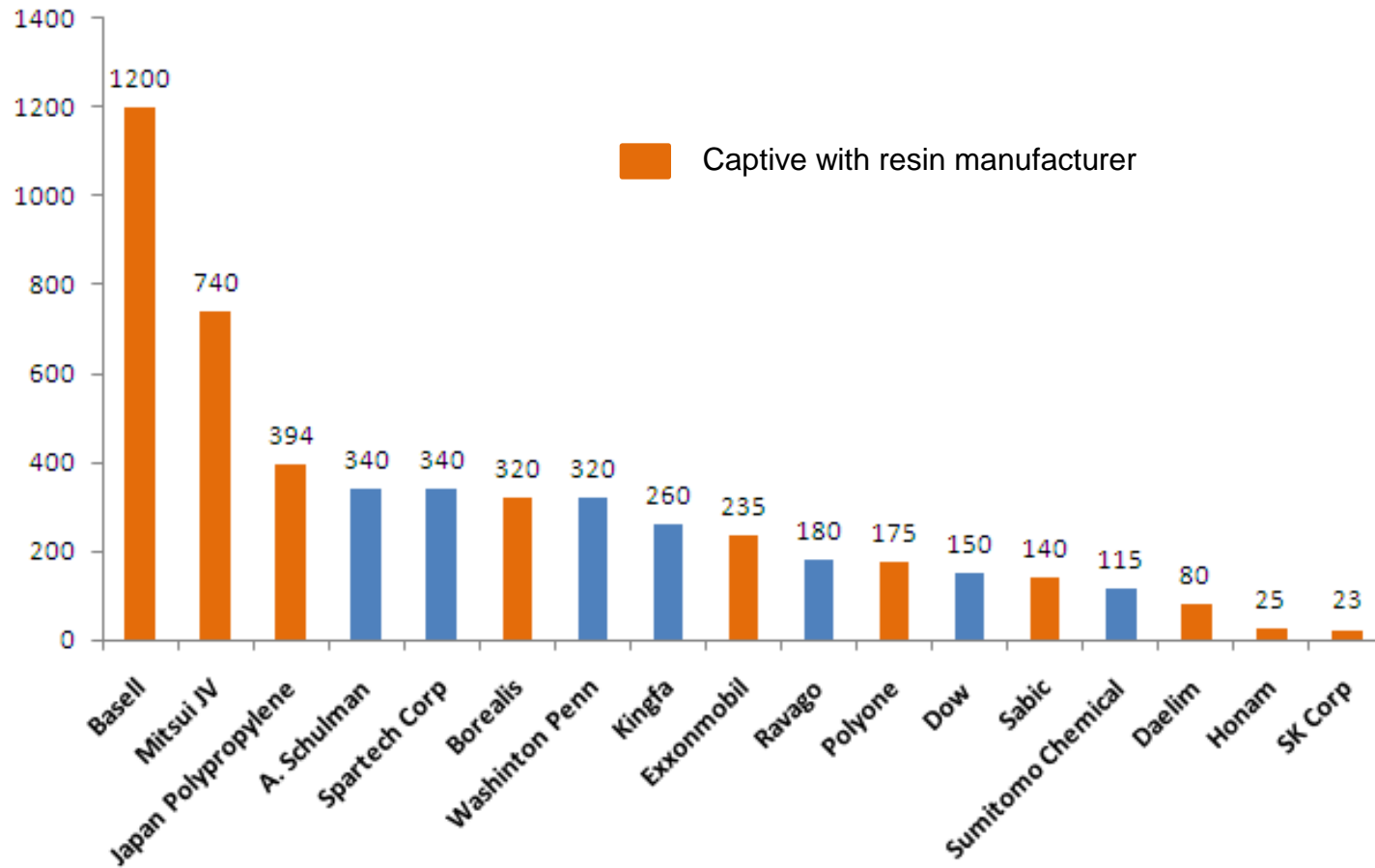
# Global Demand of PP Compounds: Sectors



- ▶ Total PP Compound Demand in 2006: 4.7 MMTA,
- ▶ Expected demand in 2015 : 7 MMTA
- ▶ Automotive largest sector with 55% followed by appliances sector with 19%
- ▶ Strong demands in automotive attributed to increasing and ongoing substitution

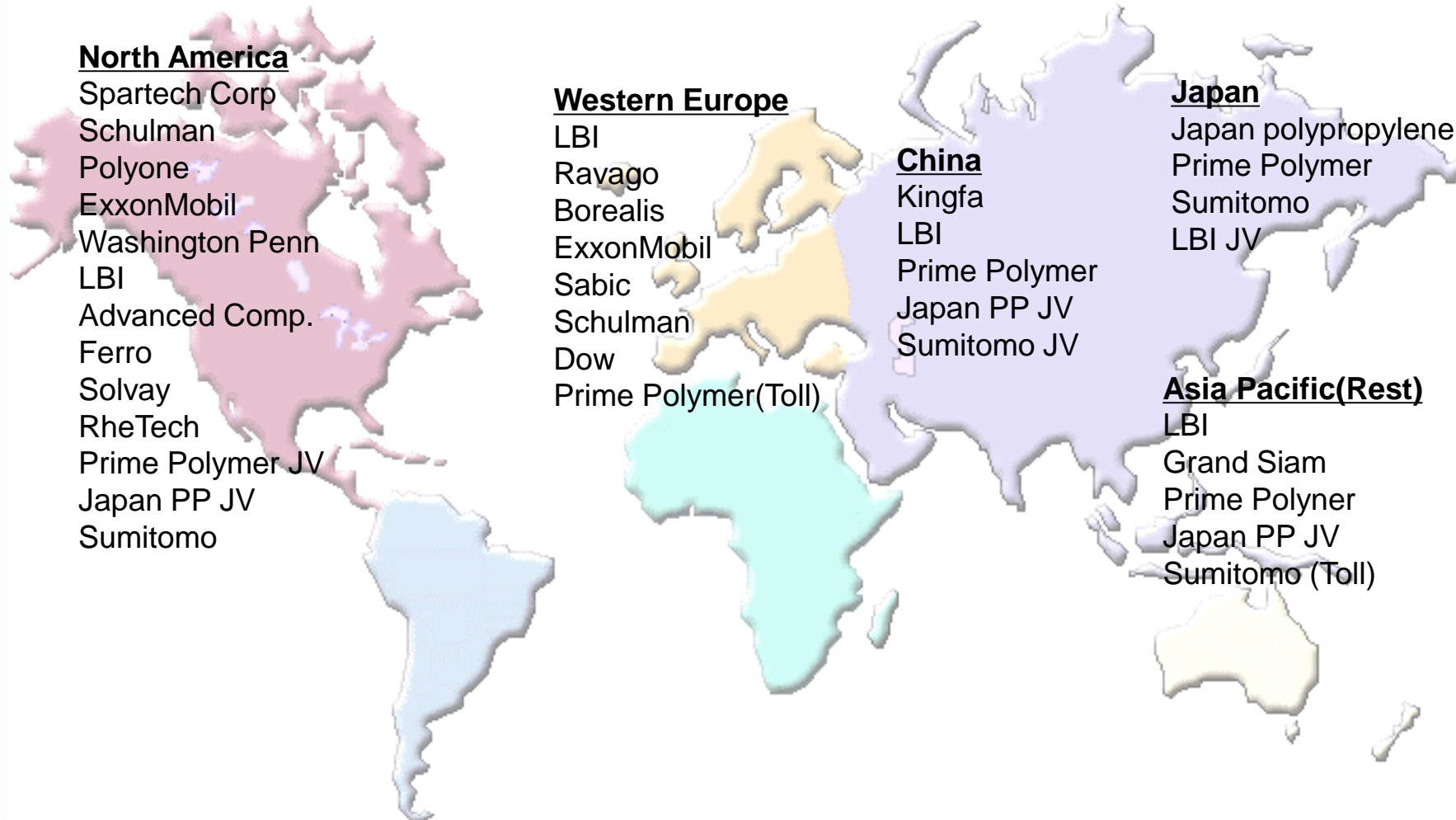
**Total Global Demand Growth - AAGR 4.4% ..**

# PP Compounds: Major Global Producers



**Total Global Capacity: 5.5 MMTA**

# Global PP Compound Producers spread



**LBI got global presence in PP Compounding**



# Major Trends In Polyolefin Compounding

- ▶ **From Integrated to Independent..**
  - Traditionally integrated to polymer production, transitioning to independent
  - Cost structure/pressures in compounding different than polymer production
  - Customer base quite fragmented and technical specifications intense for polymer producers
- ▶ **Rapid Consolidation & Globalization in Compounding Industry..**
  - Big compounders are getting bigger – Polyone, Schulman and King Fa are getting bigger while ICO and other regional players are being consumed
  - Globalization seems to be key for serving global customers of compounding base in Auto and Packaging industry
  - Regional players thrive by partnering with global or other regional counterparts
- ▶ **Technology and Innovation Key to Success..**
  - Innovation in materials used such as nano-composite and other reinforcing agents provide unique properties akin to metals and engineered plastics
  - Intensive research and technology improvement in compounding equipment and techniques

**Provides Industry Continued Growth Options..**

# Compounding Fundamentals



**How**  
**Why**  
**Where**

# Plastic Compounding....

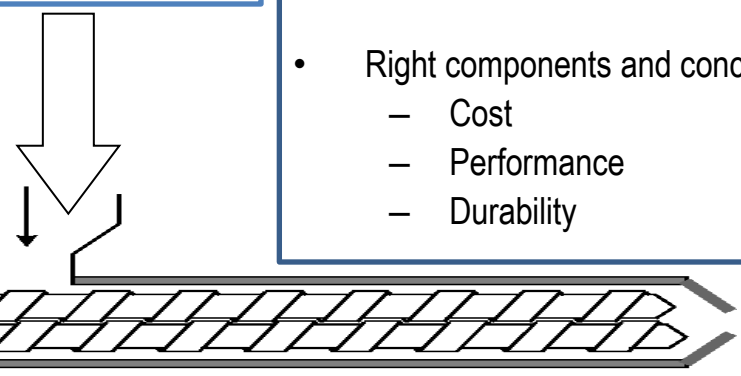
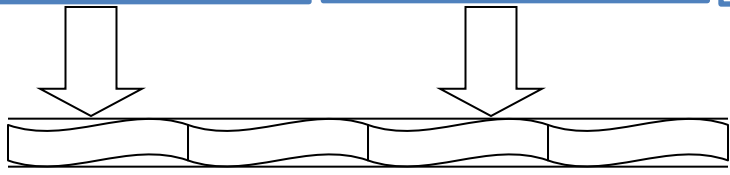
Compounding is the process of incorporating additives, modifiers into Polymer for achieving uniformity on a scale appropriate to the quality of the articles subsequently made from the compound.

- Polymers**
- PP
    - Homo Polymer
    - Block Copolymer
  - PE
  - Elastomer

- Additives**
- Process Aid
  - Heat Stabilizer
  - UV stabilizer
  - Special Additives
  - Colourants

- Fillers**
- Calcite
  - Talc
  - Glass Fiber
  - Others

- Essential for Compounding**
- Proper mixing & blending techniques/process
    - Uniformity
    - Homogeneity
    - Dispersion
  - Right components and concentrations
    - Cost
    - Performance
    - Durability



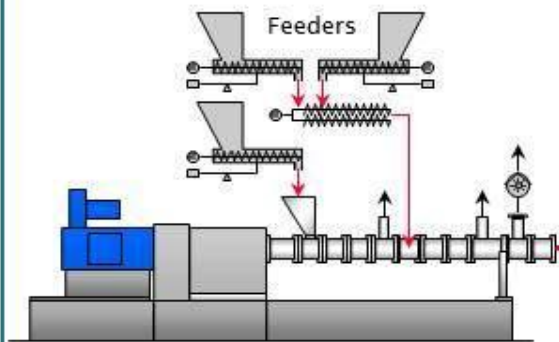
- Special Modification**
- Warpage and An-isotropic Shrinkage
  - Sink Marks
  - Visibility of Weld Lines
  - Scratch Resistance
  - Paintability

**Compound**



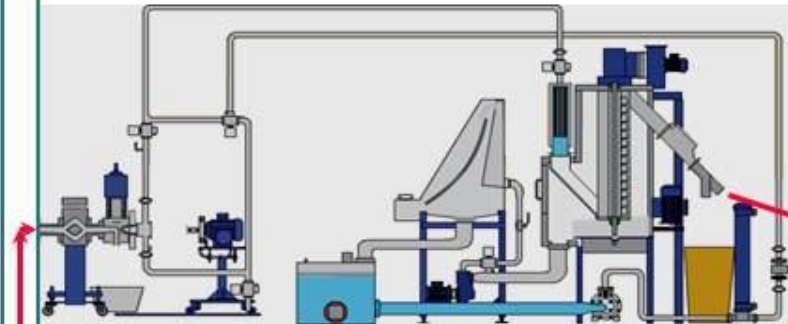
# Compounding Operation

- Polymers
- Additives
- Reinforcement/Fillers

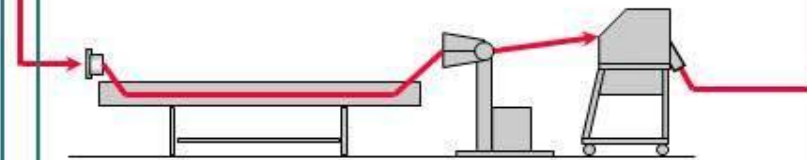


## Extrusion

- Polymers, additives and fillers are melt mixed in twin screw extruder to give homogenous compound.

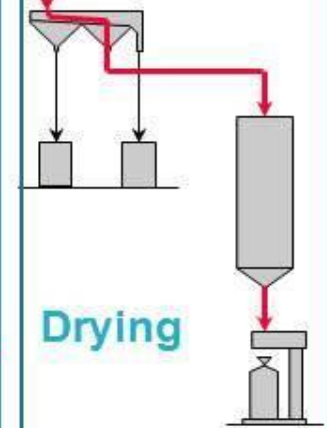


## Underwater pelletizing system



## Strand pelletizing

- Compound is extruded in form of strands, cut into pellets.



## Drying

## Packaging

- Pellets are dried and packed.

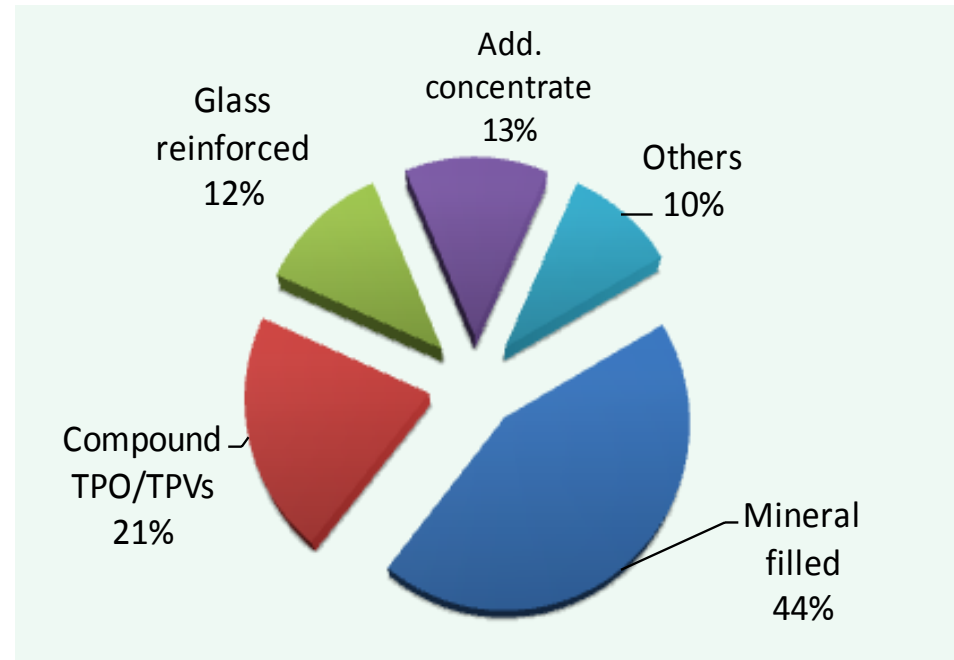
# Where is used Compounded Plastics

## Industries Served:

- ▶ Construction
- ▶ Auto
- ▶ Wire and Cable
- ▶ Durables
- ▶ Consumer Products
- ▶ Industrial Applications
- ▶ Aerospace
- ▶ Electrical & Electronics
- ▶ Health Care

## Replacing:

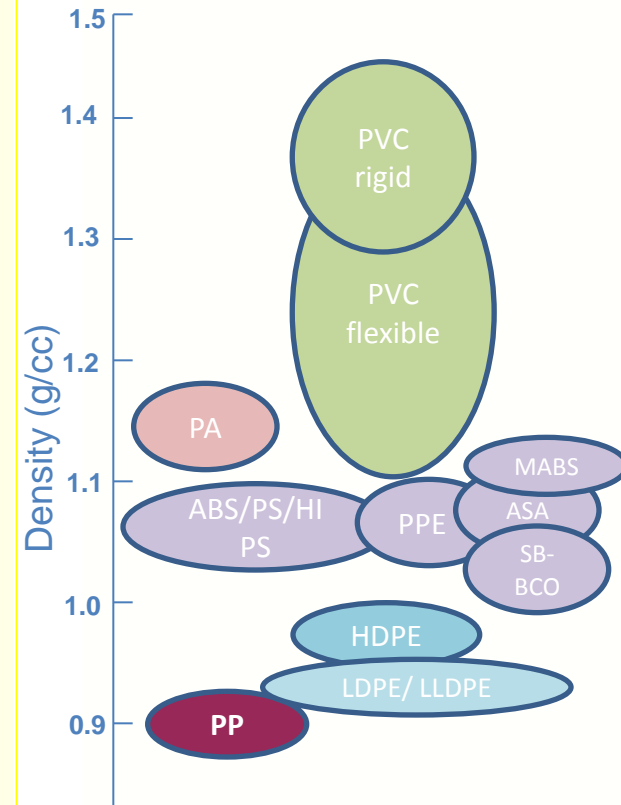
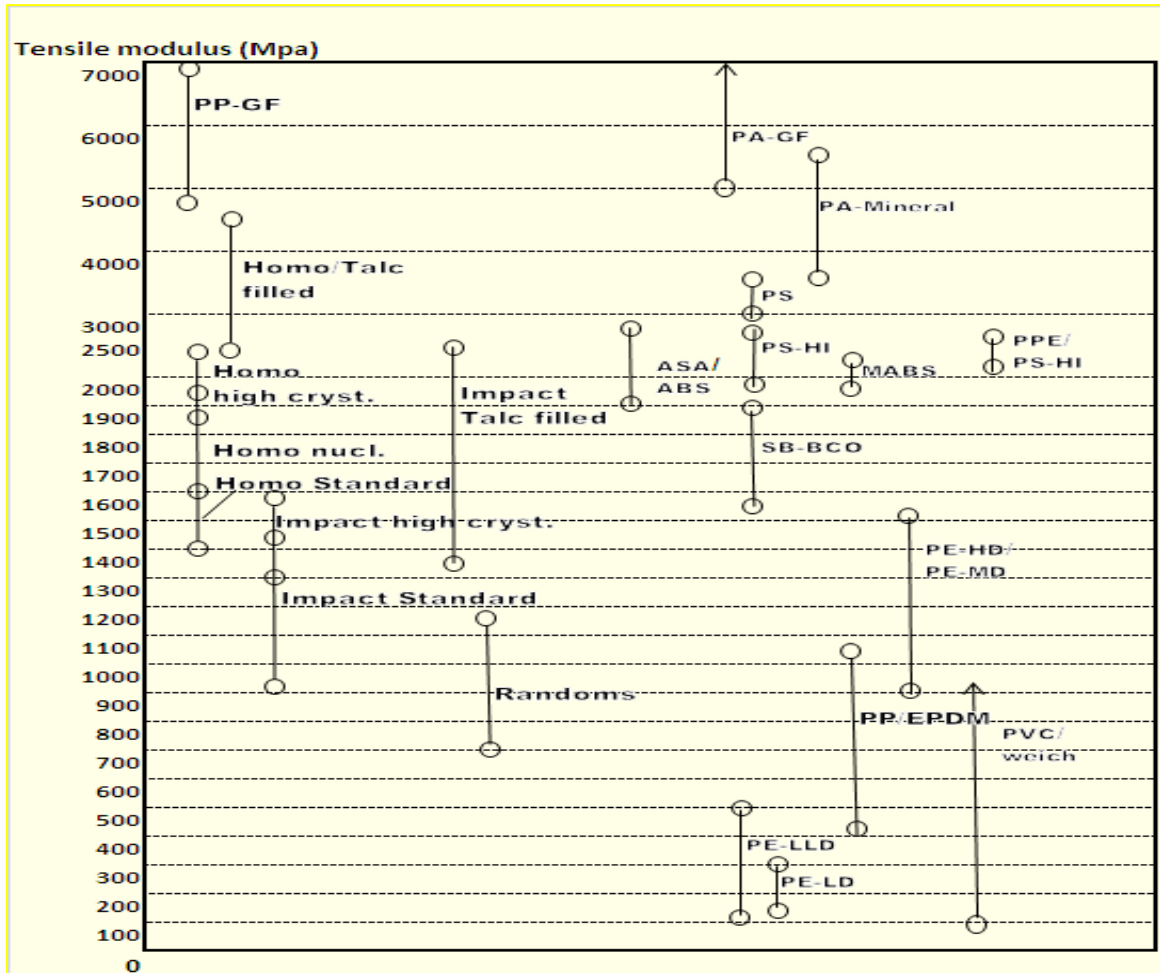
- ▶ Metals
- ▶ Wood
- ▶ Natural Rubber
- ▶ Expensive Engineered Plastics



Mineral Filled PP compounds dominate the market...

**Focusing on novel compounding & blending techniques...**

## PP Product categories/stiffness vs. other Polymers



**PP Compounds meet entire properties demand.  
Neat PP has lowest density.**

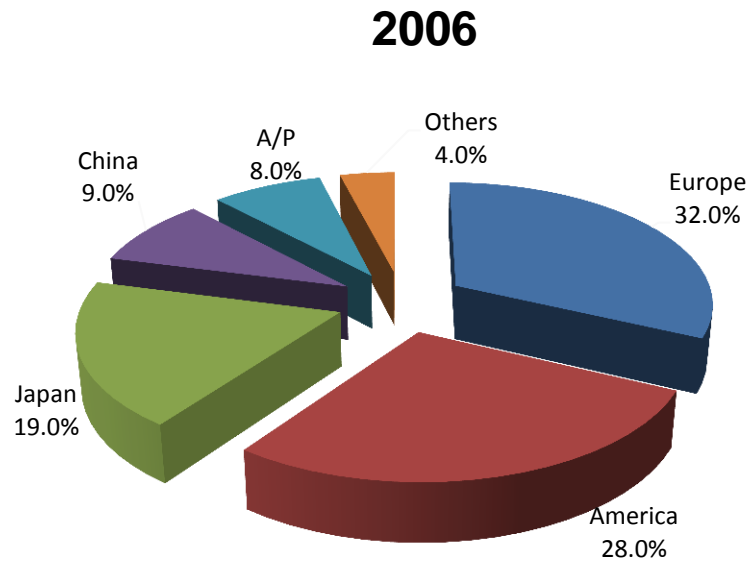
## Automotive: A success story for PP

- ▶ 12% of PP total consumption is used in cars (Europe)
- ▶ 30 to 40% of all plastics is PP
- ▶ More than 60 kg of PP used in modern car nowadays
- ▶ PP compounds got the highest growth rates in emerging countries

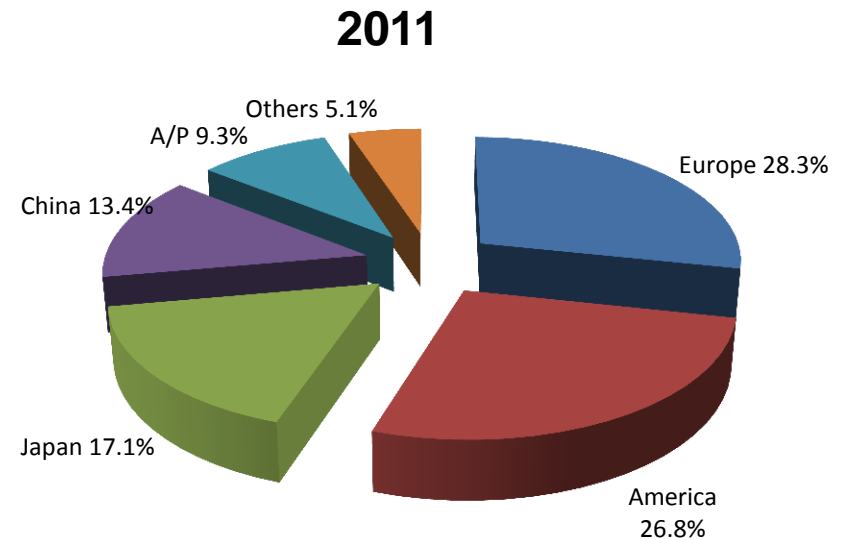
Model	Car Maker	PP (kg/car)	% of total plastics
Citroen C4	PSA	90.2	56
Aygo	Toyota	47	52
Auris	Toyota	71	51
Yaris	Toyota	64	47
Fiat 500	Fiat	60	49
Opel Corsa	GM	65	44
Mondeo	Ford	72	41
Mercedes C-class	Daimler-Benz	72	34

**PP Compounds volume in Automotive application is highest**

## PP Consumption in Automotive : By Region



Total Consumption : 3454 KT



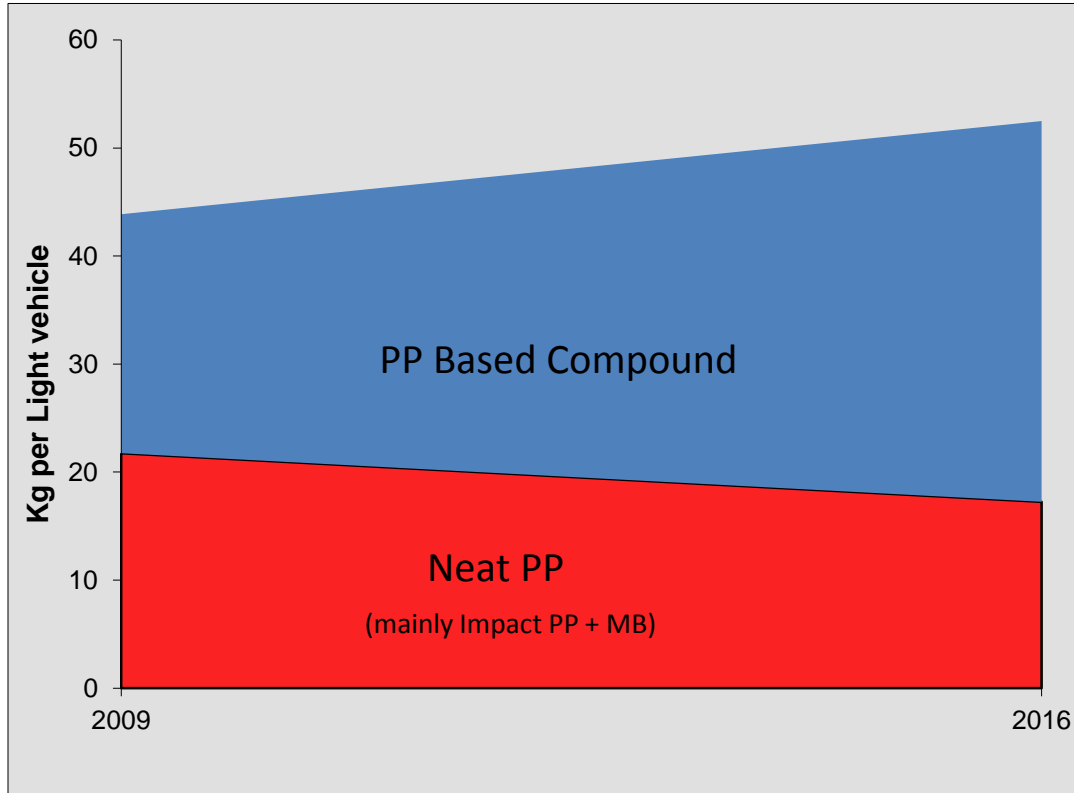
Total Consumption : 4394 KT

PP in automotive as Compounded and net polymer

**China & Asia Pacific Demand grow to 23% in 2011**



# PP Compound usage in Light Vehicles



- ▶ PP compound incorporation in light vehicle are increasing by replacing Neat PP.

PP compounds usage in light vehicles increase and neat PP usage decreases....

# Automotive Industry Trends & Developments

## Vehicles



## Materials

- ▶ Low Cost Small Car
- ▶ Green Vehicles - Adoption of Alternate Fuel  
CNG, LPG, Bio-fuel, solar etc
- ▶ MUV/SUV becoming second family vehicle
- ▶ Mandatory Fuel Efficiency Regulations
- ▶ Enhanced Safety features
- ▶ Emphasis on Aesthetics & Comfort
- ▶ Increasing Plastics penetration per car

- ▶ High Flow, High Impact-Stiffness  
balance
- ▶ Soft touch, Odourfree materials  
for steering wheel, handles etc
- ▶ Metallic Finish & Good  
Paintability
- ▶ Low-Density Dashboard &  
Interior Trim
- ▶ PP LFRT in Front End Module  
Carrier

**Automotive Industry on growth track**

# Advantages of Plastics in Automotive Case Study

**“36% of emissions are due to weight.  
 20% weight saving ~ 10-12g/km of CO<sub>2</sub> less emission**

**ONE WEAPON  
 IN THE ARMOURY**

**VEHICLE  
 WEIGHT REDUCTION**

**PLASTICS PLAYS  
 KEY ROLE**

- ▶ 100 Kg of Plastics reduces weight of car by 200 –300 Kg
- ▶ Modern car saves 0.5 liter of fuel on every 100 km of travel
- ▶ Every light car saves 750 liters of fuel in it’ s life time
- ▶ Lesser the fuel consumption, lesser is the CO<sub>2</sub> emission
- ▶ EC aimed to reduce average fleet CO<sub>2</sub> emissions for new passenger cars from today’ s level of 160g/km to 130g/km by 2012, a reduction of 19%



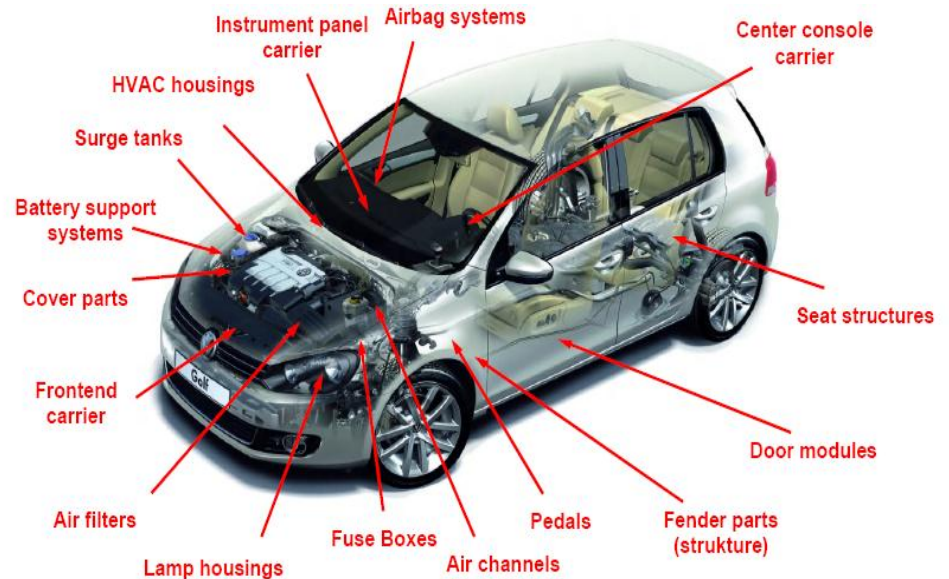
Fuel	Kg of CO <sub>2</sub> emission/ It
Petrol/ Gasoline	2.3
Diesel	2.7

**.... Contribute to Fuel saving & reduce CO<sub>2</sub> emissions**

# Polypropylene Compound in Automotives- Interior

## Key Requirements

- ▶ Good Scratch resistance
- ▶ Low emission
- ▶ Low smell
- ▶ Medium to high impact
- ▶ Good dimensional stability
- ▶ High Flow
- ▶ Low gloss
- ▶ Sound dampening
- ▶ Stain resistance to auto-fluids, grease, soap solutions.



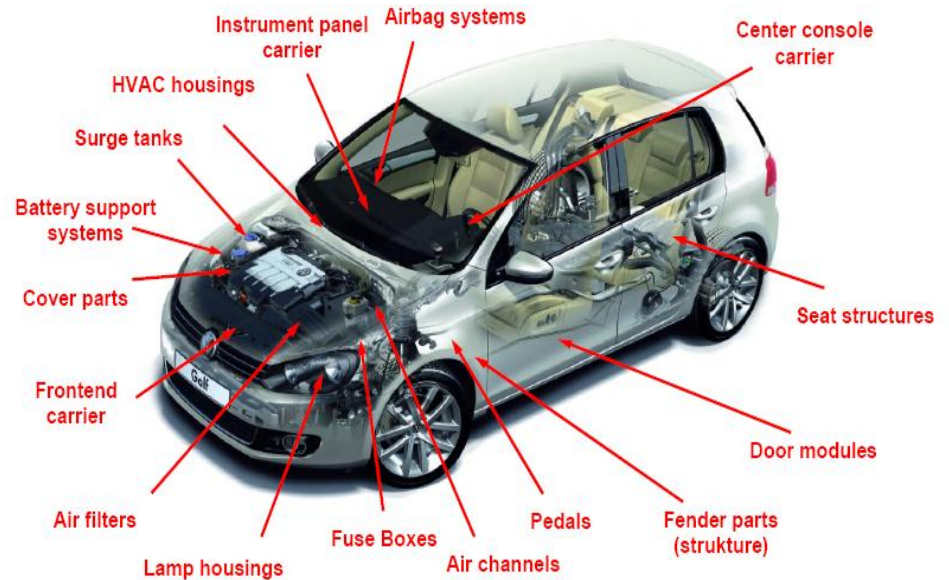
## Interior Applications

- ▶ Dashboards
- ▶ Dashboard carriers
- ▶ Pillar claddings
- ▶ Door pockets
- ▶ Door panels
- ▶ Consoles
- ▶ Chairs

# Polypropylene Compound in Automotives- - Exterior

## Key requirements

- ▶ Good flow
- ▶ Good processability
- ▶ No surface defects
- ▶ Good paintability
- ▶ Good dimensional stability
- ▶ Excellent UV resistance
- ▶ High low temperature impact



## Applications

- ▶ Bumper
- ▶ Bumper spoilers
- ▶ Lateral sidings
- ▶ Rocker panel
- ▶ Body panel
- ▶ Wheel arch liners

# Polypropylene Compound in Automotives- Under Hood

## Key requirements

- ▶ Good balance of stiffness and impact properties
- ▶ High impact properties at low temperature
- ▶ High HDT
- ▶ Low shrinkage
- ▶ Light material
- ▶ Low emission and odor
- ▶ Scratch resistance
- ▶ Low vibration
- ▶ Easy to paint
- ▶ Good processability



## Applications

- ▶ HVAC – Heating Ventilation Air conditioning
- ▶ Batteries
- ▶ Battery covers
- ▶ Electronic housings
- ▶ Air ducts
- ▶ Splash shields
- ▶ Pressure Vessels
- ▶ Reservoirs
- ▶ Engine Covers

# Polypropylene Compound in Automotives- Under Hood

## Key requirements

- ▶ Good impact stiffness balance
- ▶ High impact properties at low temperature
- ▶ Excellent Aesthetics
- ▶ Low moisture Absorption
- ▶ Excellent Chemical Resistance
- ▶ Good electrical properties
- ▶ Excellent Processability



## Household Appliance

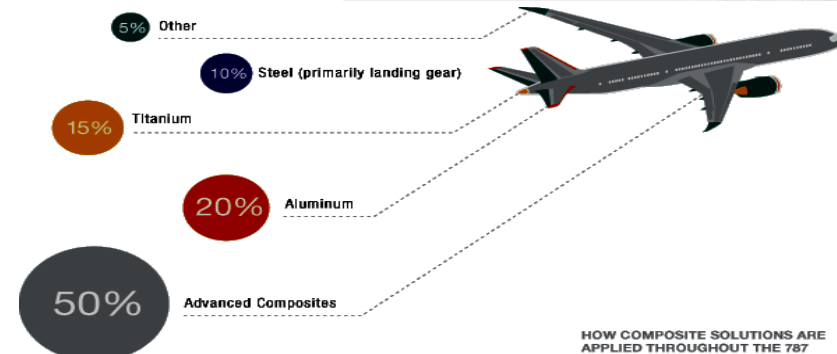
- ▶ Washing machine tub, refrigerator trays and shelves, housings for cooker hoods, Dish washer drum.

## Electrical/Electronic Appliances

- ▶ Plates for electrical switches, engine cover plates, electrical condenser housings.

# Compounded Products in Real Life:

- ▶ Automotive Exterior-replacing metals
  - Provides safer, lighter and more economical alternative
- ▶ Multi layer Barrier Packaging replacing glass and metals
  - Weight Reduction and better barrier properties- plastic container weighs a fraction of metal or glass coffee jars in the picture here
- ▶ Aircraft Exteriors & Wind Mill Turbines replacing Aluminum alloys
  - Weight Reduction/Fuel Efficiency
- ▶ Siding and Roofing materials in home construction replacing wood and metals
  - Better Durability , Insulation, Energy Saving & Weathering properties



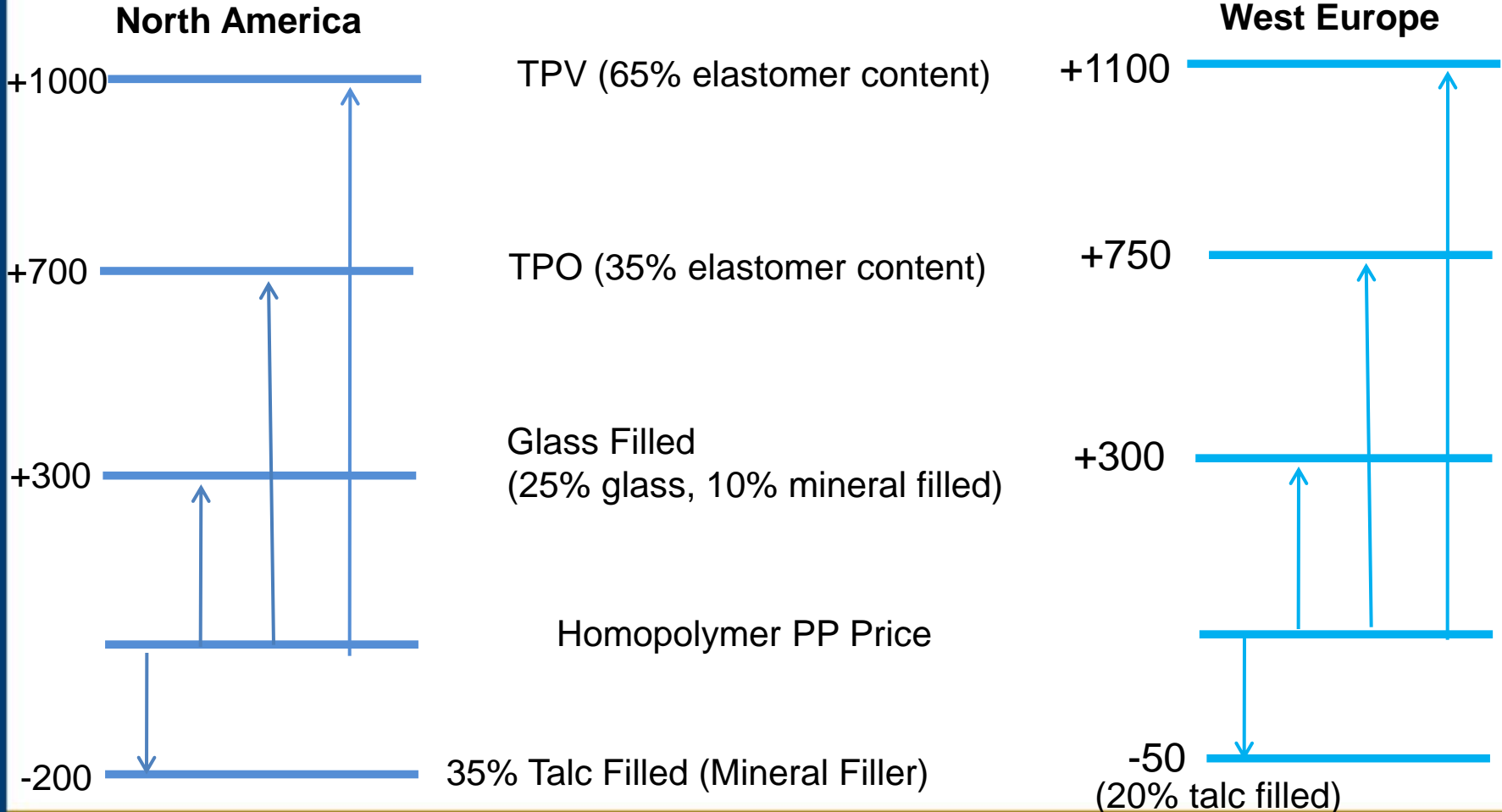
HOW COMPOSITE SOLUTIONS ARE APPLIED THROUGHOUT THE 787



**Compounds has potential to replace many more.....**



# PP Compound: Price difference (relative to HomoPP, \$/MT)



**TPV costly due to small volume product.....**  
**20% Mineral Filled PP most common in Europe.....**

# Compounding Business Development in Middle East



## Automotive Industry in GCC: Potential Driver

GCC Auto industry in 2010: \$ 17 Bn

GCC Auto industry in 2014: \$ 21.5 Bn

Estimated Annual growth : 10%

Low fuel cost, high per capita income and growing population are driving rapid development of automotive market in GCC.

- ▶ Government Incentives
  - Favourable tax environment with no personal, corporate, value added or withholding tax
  - Large no of free trade zone
- ▶ Sound Macro-economy
  - High per capita GDP, high standard of Living, relatively low inflation
- ▶ Excellent Infrastructure and logistic support systems
- ▶ Strategic Location
  - Easy access to huge market like MENA, India, South East Asia and CIS countries.
- ▶ Base for raw materials like Plastic, Aluminium & Glass
- ▶ As a result of climatic conditions and a rugged terrain, there is a vibrant and growing market for accessories and spare parts

**Automotive Industry in GCC growing 10% Annually**

# Major Automotive Industry in GCC: Potential Driver

## UAE:

- ▶ Ashok Leyland Motors' s automotive plant in UAE started with a assembling capacity of 2000 units buses & trucks annually.
- ▶ Swedish automaker Scania' s JAFZA plant assembles 1400 units vehicles per year in UAE.
- ▶ Volgren & Praktiko have announced establishment of vehicles assembling unit in UAE.
- ▶ JEFZA set up at Dubai is to house companies dealing in vehicles and related service and spare parts
- ▶ Dubai autozone is free zone to attract foreign direct investment, a SEZ to cater GCC market.

## KSA:

- ▶ Mercedes Group, Volvo Group & Man have assembling unit in KSA.
- ▶ Isuzu Motor to establish new automotive assembly plant in 2012 with initial capacity of 600 units trucks per year and will expand to 25,000 units per annum in future.
- ▶ In KSA, Gulf Automobile Manufacturing Company will start the plant in a \$100 million agreement with the Saudi Authority for Industrial Cities and Technological Regions. In 1st phase, the factory will have a capacity of 15,000 cars. In 2nd phase, at Sudair, capacity will grow to 300,000 cars.
- ▶ The Saudi Clusters Program was initiated by the Government of Saudi Arabia to develop and to provide support to automotive industries in vehicle assembly, components manufacturing etc.

## Bahrain:

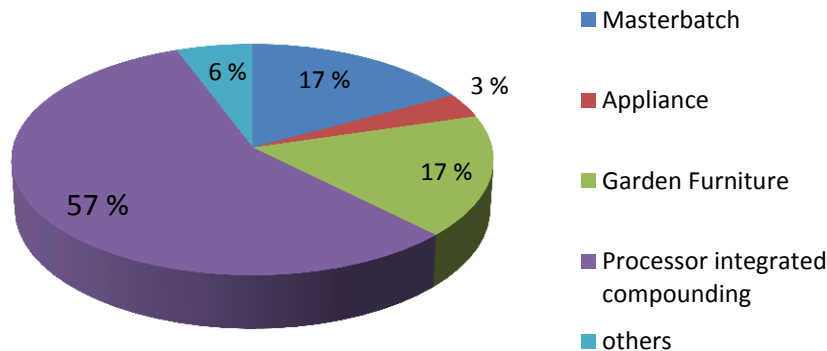
- ▶ Vanguard's vehicle assembly unit in Bahrain.

**Inevitable Growth in Plastic compounding and Processing Industry in GCC**

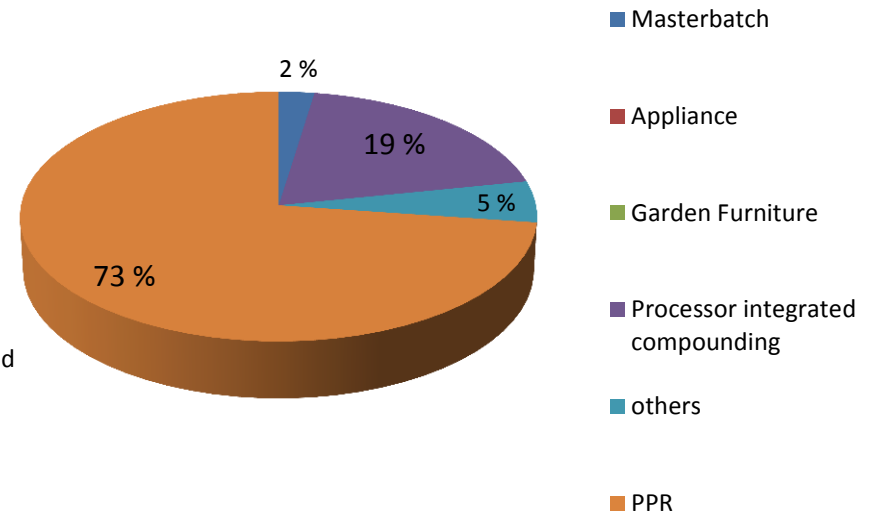
# PP Compounds in GCC & ME

**GCC Market Size = 9 kta**

**ME Market Size = 21 kta**



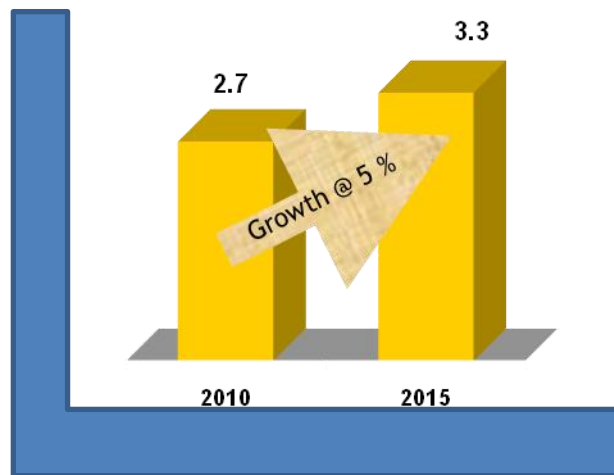
**GCC Region**



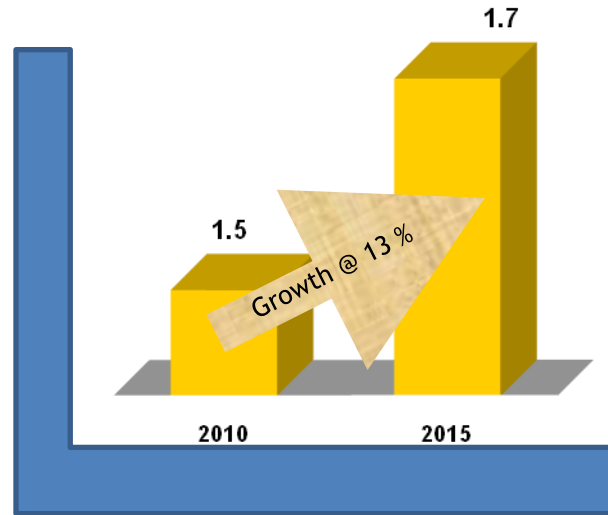
**ME Region**

## Automotive Scenario in Middle East

ME Vehicles Sales Trend (Million)



ME Vehicles Production Trend (Million)



- ▶ By 2015, Middle East vehicle sales will be led by Iran, KSA, UAE, Kuwait and Qatar.
- ▶ Middle East automotive production will be led by Iran & Egypt.
- ▶ Vehicles demands enhances the scope for more Polyolefin compound production in ME. Also enhances demand for spare parts.

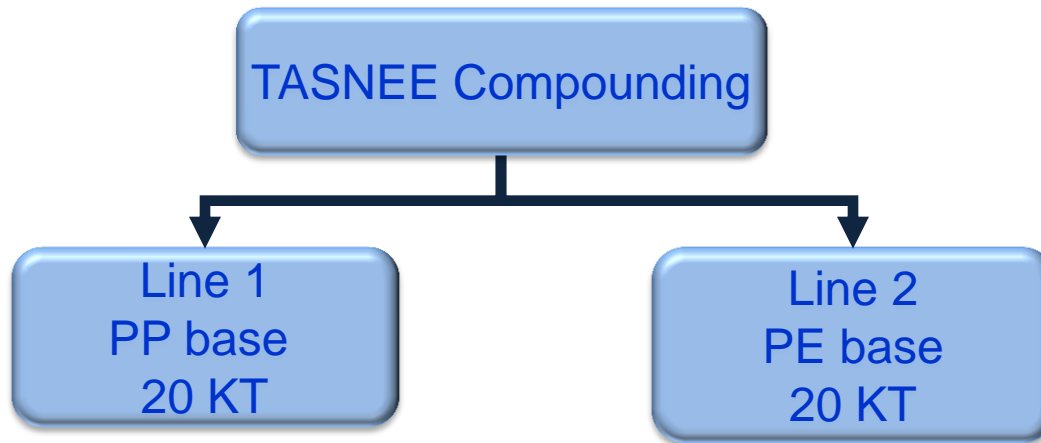
**Automotive Sales Ramping up in Middle East.....**

## TASNEE' s Strengths in Compounding: Integrated Regional Player in Polyolefins

- ▶ Integrated competitive raw materials
  - PP & PE compounded products
  - Complements Conversion Park concept
- ▶ Sufficient Regional Market Size
  - ME & GCC growing demand base
- ▶ Synergy with existing business & world class R&D TPRC
  - Low overheads and cost structure for operations and innovation
- ▶ Broadens product portfolio and offering to customers
- ▶ Products designed mainly for automotive and electrical appliances – these are tailor made products
- ▶ TASNEE Compounding is completely back integrated

**Access to proprietary compounding technology and products from  
LBI enhance TASNEE' s strength in Compounding**

## TASNEE Compounding facility



- PP Filled with Talc
  - 20%
  - 40%
- PP Filled with CaCO<sub>3</sub>
- PP Filled with Glass Fibers
  - Different loading levels
  - Short and long fibers
  - Treated and non treated

- PE colored for pipe use
  - Blue for drinking water
  - Y/O for gas distribution



TASNEE التمنية

*Thank you*



رؤية واضحة وآفاق واسعة  
Clear Vision & Expanding Horizons