



**SOLVAY**

asking more from chemistry®

# Welcome & Introduction to Safety Rules

Heanor

September 18, 2018

# COMPOSITE MATERIALS



**Carmelo Lo Faro**

*Composite Materials, President*

# COMPOSITE MATERIALS

## “AT A GLANCE”

### COMPOSITE MATERIALS



€ 1.04 bn

Net sales 2017



~ 2,800

Headcount



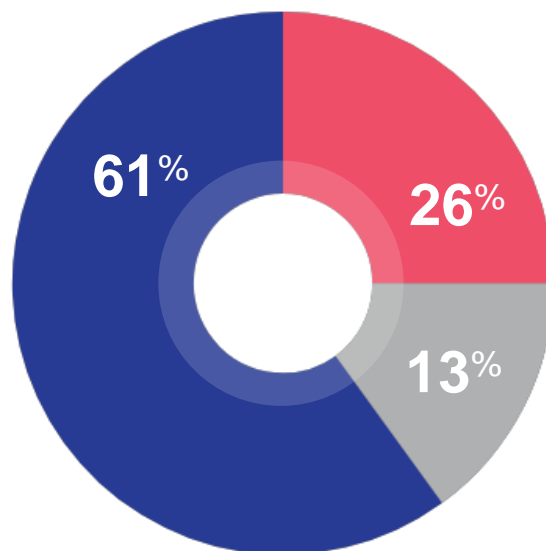
19

Industrial sites



#### Civil aircraft

Large commercial transport  
Business jets  
Regional jets  
Rotorcraft



#### Military and space

Fighter jets  
Transports  
Rotorcraft  
Unmanned vehicles  
Launch vehicles



#### Industrial

High-performance cars / Motorsport  
Oil and gas  
Wind energy

% of 2017 Net Sales

# COMPOSITE MATERIALS GLOBAL FOOTPRINT



# TO GROW FURTHER, COMPOSITES MUST DELIVER MORE VALUE

Beyond lightweighting,  
composites bring additional benefits:

- Aerodynamics
- Fatigue life
- Corrosion resistance
- Design freedom
- Part integration
- Function integration
- Increased passenger comfort



**CHALLENGES  
FOR THE FUTURE**

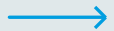
**MANUFACTURING  
TECHNOLOGIES**

**JOINING**

**SIMULATION**



# HOW ARE COMPOSITE MATERIALS AND PARTS MADE

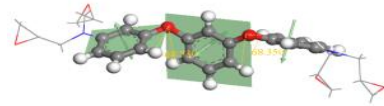


Carbon Fiber



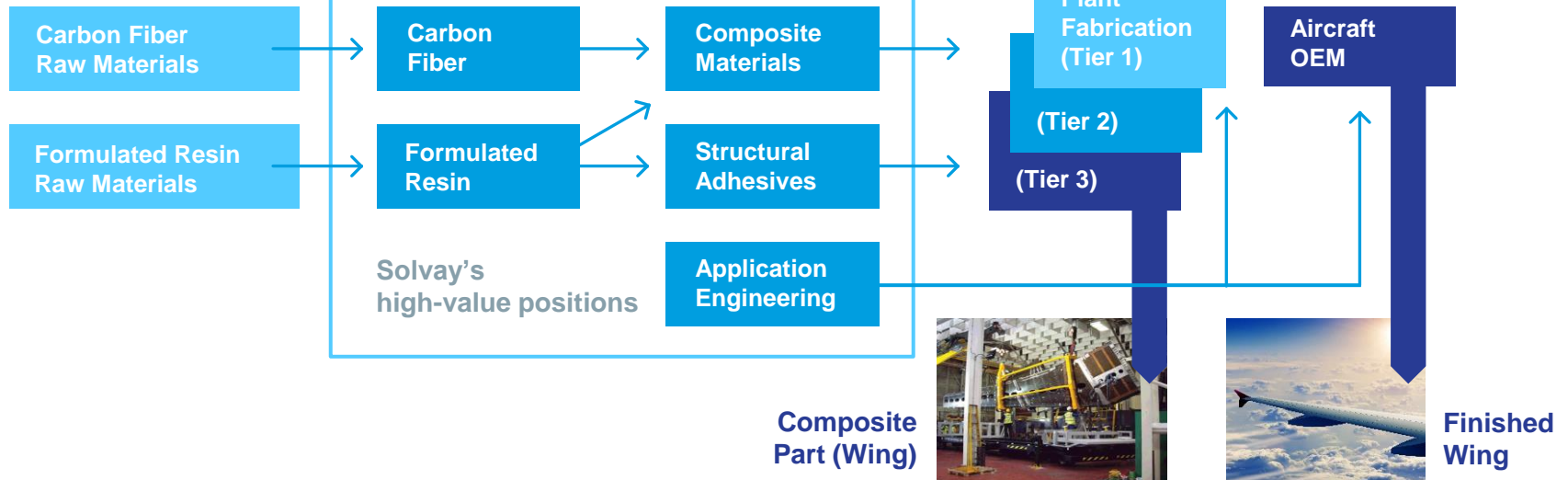
+

Formulated Resin



=

Composite Material



# AIRCRAFT FUNDAMENTALS

## SUPPORT HIGHER GROWTH IN COMPOSITES



**4.5%**

Growth in  
passenger traffic

**>8,000**

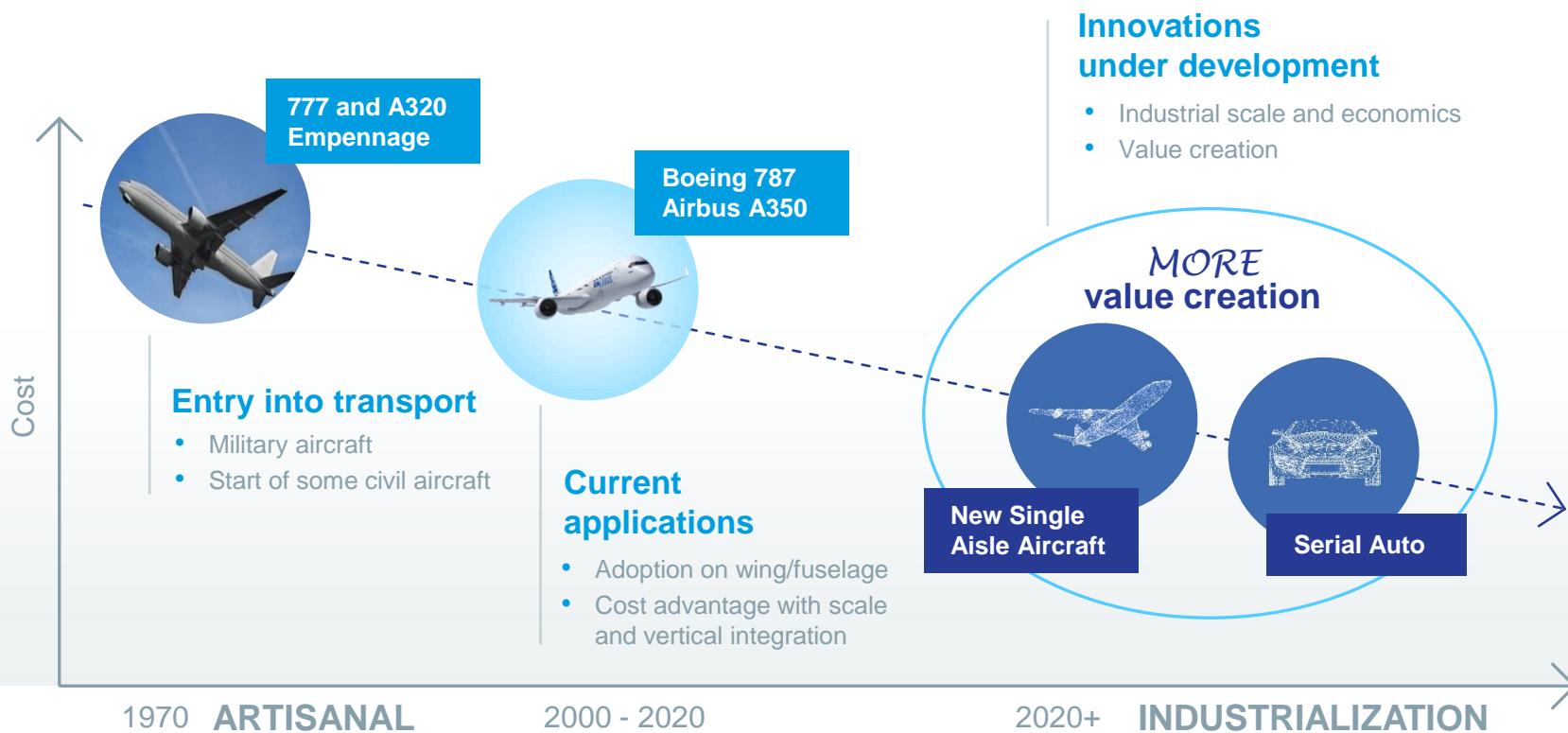
Record high  
order backlog

**50%**

Weight of composites  
on new aircrafts  
vs. <15% on legacy



# OUR STRATEGY: BECOME A LEADER IN THE INDUSTRIALIZATION OF COMPOSITES







# LEADERSHIP POSITION IN TECHNOLOGIES FOR THE AERO INDUSTRY

## Resin Infusion Technology Leader

### BOMBARDIER C-SERIES



**Wing:**  
High Potlife  
Resin & Non  
Crimp Fabric



**Wing:**  
toughened  
resin and dry  
tape for AFP



### IRKUT MC-21



### CMF LEAP

**Fan Blade:**  
toughened resin and  
3D woven preform



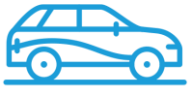
## VBO prepreg technology



**DARPA DISRUPTIVE  
MANUFACTURING WING  
(Boeing)**



**CRYOGENIC  
TANK  
(NASA & Boeing)**



# LEADING ADOPTION OF COMPOSITES IN SERIAL AUTOMOTIVE

## Press forming of thermoset composites:



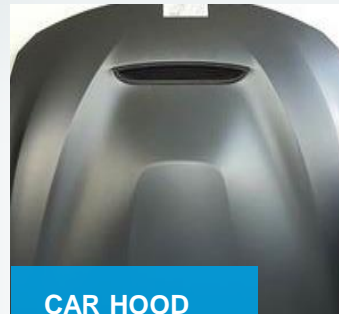
automation



faster  
cycle time



use of existing metal  
forming assets



CAR HOOD  
Prepreg  
composites



BODY IN  
BLACK  
PROTOTYPE

40% weight reduction

Process time: from 12 hours to < 5 minutes

# LAUNCH OF NEW BONDING TECHNOLOGY BENEFITS

## Reliable and certifiable primary structural bonds

- Increased structural performance
- Compatibility with all prepreg/adhesive systems

## Potential to eliminate fasteners

- Weight/costs savings

## Allows for efficient use of composites

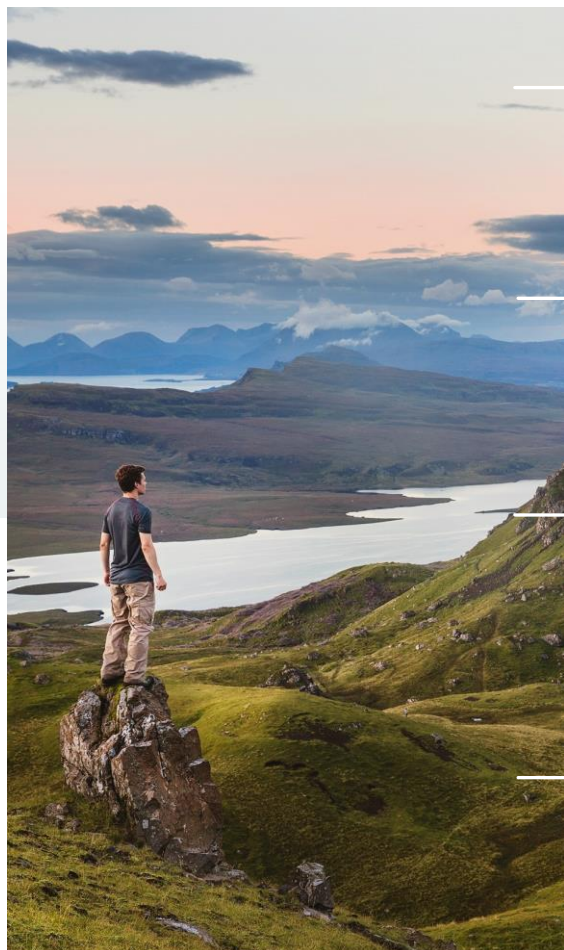
- Optimized composite design, no holes
- Complex bonded structure
- Unitized bonded structure



# KEY TAKEAWAYS



Collaborating with strategic customers to innovate with new materials for the future of mobility



→ Composites are a **young technology**

→ The history of composites has been driven by **advances in material science & automation**

→ Composites can and will **deliver more value**

→ The future of composites will be defined by the convergence of

- ✓ High rate manufacturing
- ✓ Production system enablers
- ✓ Computational capabilities

# COMPOSITE MATERIALS RESEARCH & INNOVATION



**Stephen  
Heinz,**

*Director Composite  
Product Development*

**Tim  
Wybrow,**

*Application Research  
Manager*



# A BRIEF HISTORY OF COMPOSITE NEEDS AND TECHNOLOGY

1960/70s



## Military and Space

**Extended mission envelope**

Enable unique performance  
Durability improvement

Carbon fibers  
Material processes

1980/2000s



## Civil Aircraft

**Fuel burn reduction**  
Cost efficient weight saving  
Improved aerodynamics

Toughness  
Volume ramp up

2000s



## Automotive

**Design for manufacturing**  
Rapid consolidation, part integration

Property optimization  
Industrialization

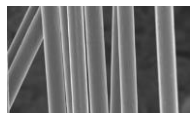
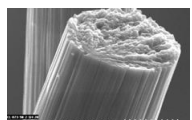
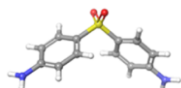
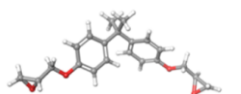
**Value proposition of structural composites rapidly evolved with market needs**



# COMPOSITE MATERIALS RESEARCH & INNOVATION

Multidisciplinary  
& Multi-scale

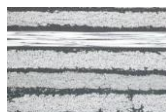
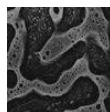
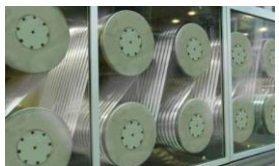
'Atoms to Airplanes'



Formulation Chemistry

Polymer Science

Fiber Science



Interfacial Properties

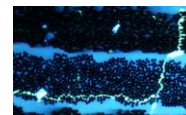
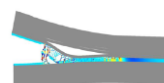
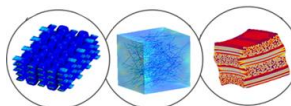
Composite Toughening

Product Architecture

Processing Science

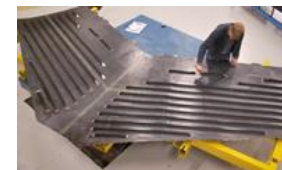
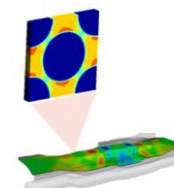
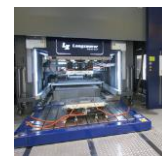
Product Forms

Recycled Products



Fracture and Failure  
Analysis

Manufacturing R&D



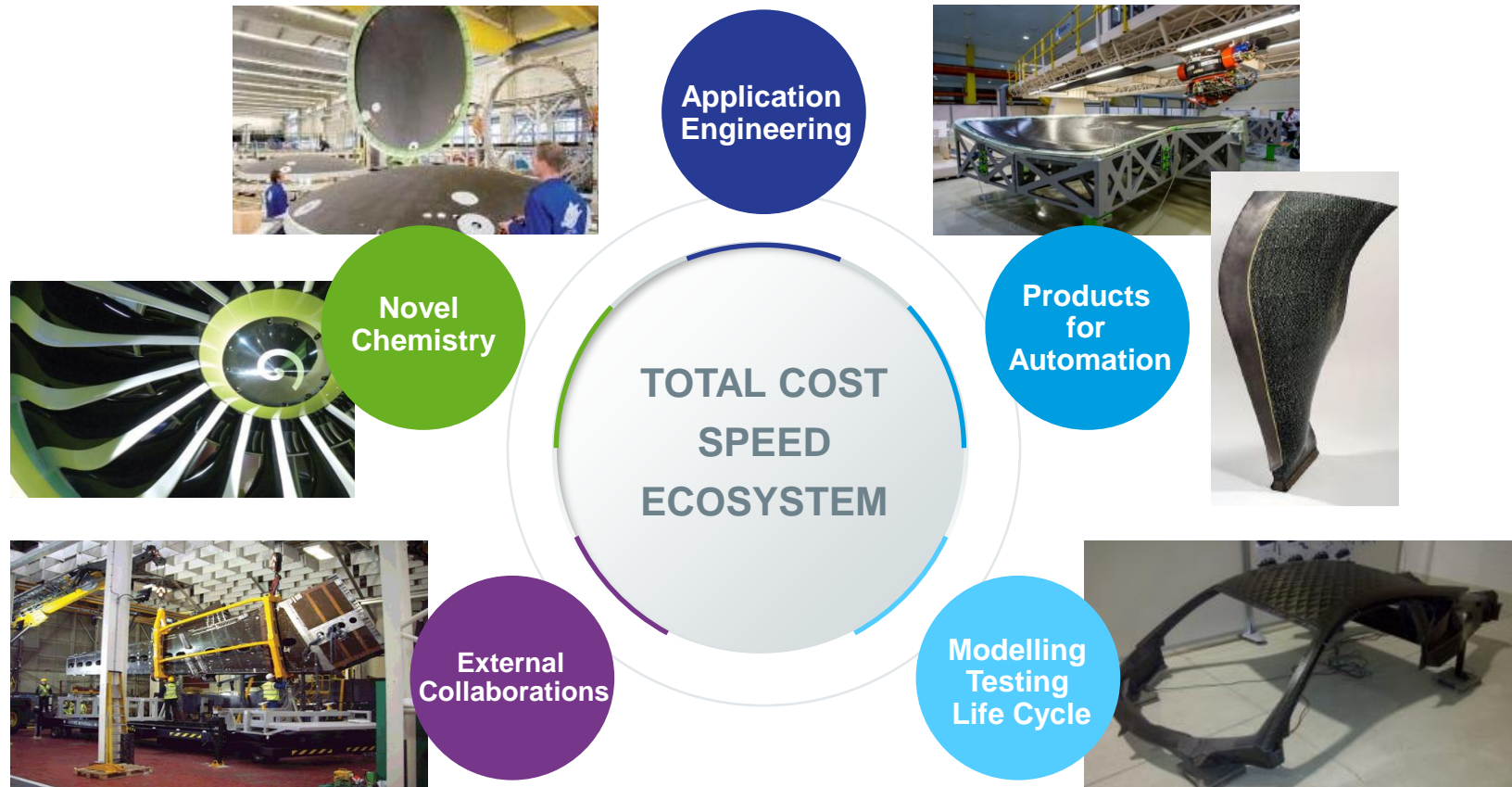
Structures

Application Engineering



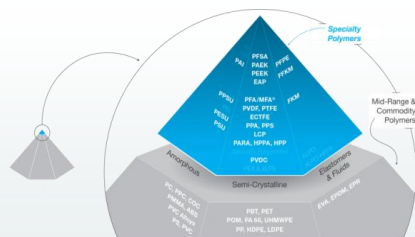
'Molecules to Vehicles'

# HOW DO WE ANTICIPATE AND DEVELOP SOLUTIONS

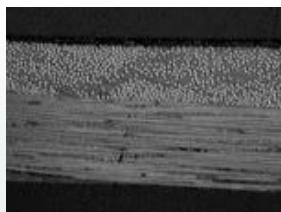


**More than a material supplier we are a technology integrator**

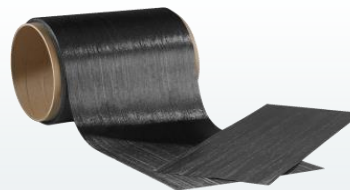
# UNIQUE POSITION TO CAPTURE OPPORTUNITIES IN THERMOPLASTIC COMPOSITES



Broad portfolio of  
specialty polymers



Fiber/Resin  
interface



TP prepreg  
manufacturing



Application  
Engineering

## Opportunities in thermoplastic composites



### Aerospace

- Supports more cost-effective fabrication
- Enables higher build rates



### Automotive

- Design freedom
- More efficient part assembly
- Outstanding crash & safety performance
- Improved recyclability

# HEANOR SITE



**Jonathan Norris**

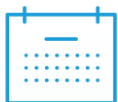
*Heanor Site Manager  
Solvay Composite Materials*



# HEANOR OVERVIEW



# HEANOR SITE OVERVIEW



**1981**

Site opening



**150**

Headcount



**€ 65M pa.**

Industrial sites



**2 R&I facilities**

new product development and  
application development



## Core site activities and products – 'Prepreg' manufacture

- Resin Mixing and Film Coating
- Hot melt Uni-directional tape
- Hot melt Fabric

## Technical (Tech) Centre

- 60 staff
- R&I product development

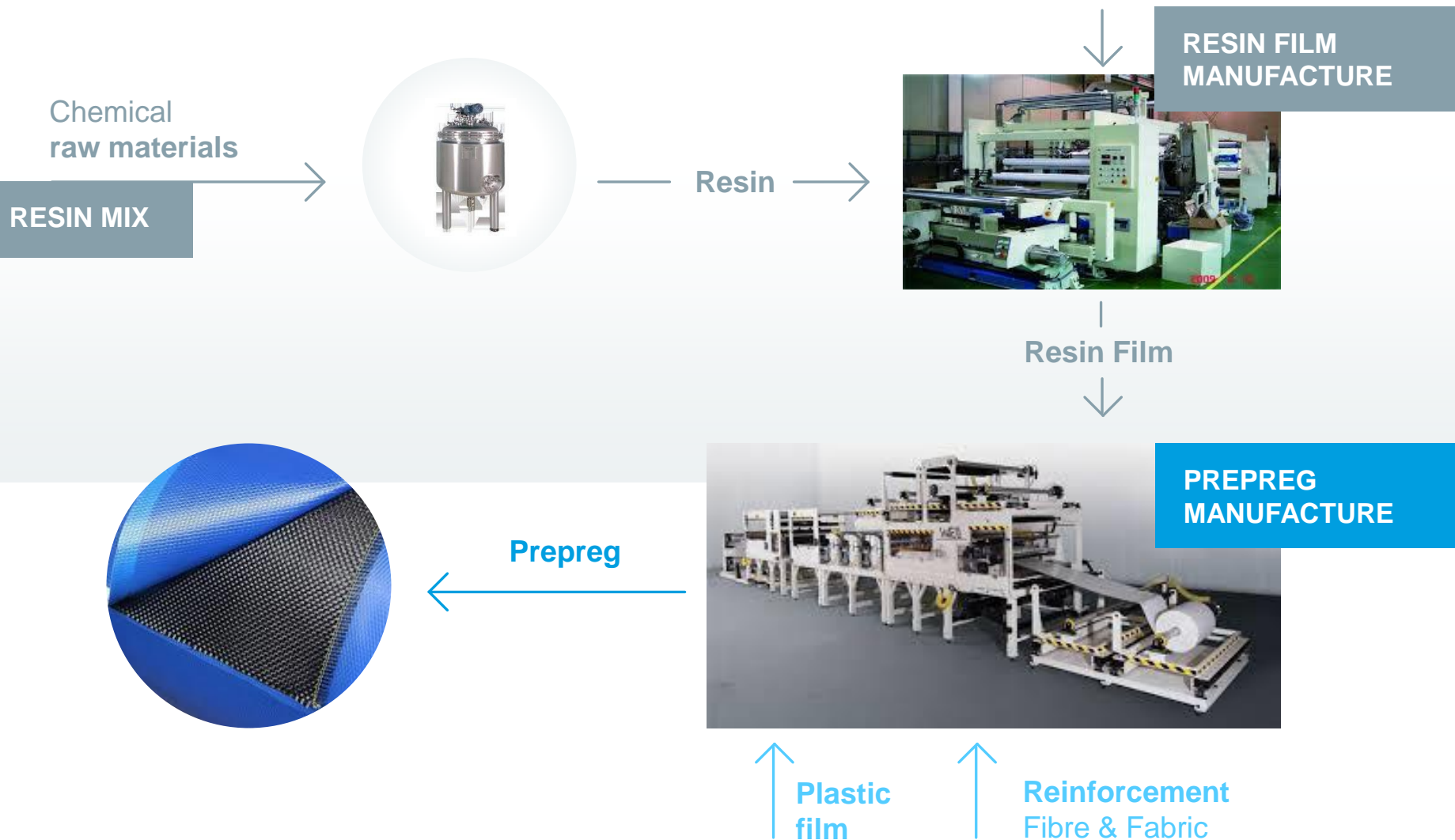
## Application (App) Centre

- 10 staff
- Development of technology to automate composite part manufacture





# PREPREG MANUFACTURING



# HEANOR KEY PRODUCTS AND CUSTOMERS

- ‘Hot Melt’ products manufactured
- **Main products** – MTM49-3 and MTM57, MTM710-1.
- **Main customers;** Supercar manufacturers, Formula 1, Defence, Rail, Aerospace, Growing Serial Automotive.

**Ferrari F150** “*LaFerrari*”

**Mercedes F1 Team**

**Porsche GT2RS**



**Close customer links, flexible and responsive**

# RELATION WITH STAKEHOLDERS



We sponsor  
**Derbyshire Fire  
and Rescue Service**

- Sponsoring a national competitive event
- Providing specialist materials for training



We held an event in July for employees and their families, **including the opportunity to visit the site and see where family members work.**



We sponsor a local **Under12 football team, providing Solvay logo kit and trophies**



We support a local charity – **“Ben’s Den”, which provides free holiday accommodation for families who have a child suffering from cancer**

[www.solvay.com](http://www.solvay.com)



**SOLVAY**

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