



# Research Internship Guidance

## Apollo Tyres Ltd.,





## Leading Global Tyre Company

- o Presence across India, Europe & other growing economies of Asia
- o Delivered above industry growth of 18% as the company posted a consolidated revenue of USD 2.48 billion in FY2019

## Manufacturing Across 2 Continents

- o Manufacturing presence in Asia & Europe

## Mix of Global & Regional Brands



## Extensive Distribution Network

- o ~6,200 retail dealers in India
- o ~3,550 dealer outlets in Europe

## Leading Tyre Manufacturer in India, Balanced Product Portfolio

- o Became the first tyre company in India to introduce a range of fuel-efficient tyres in FY2019 highlighting the role played by R&D team in creating first-to-market products
- o Maintained leadership position in the CV tyre segment and built on the dominant position in the overall TBR market
- o Launched Apollo Alpha—'India's first zero degree steel-belted motorcycle radial tyre'

World's **14<sup>th</sup>** largest Tire Manufacturer

Apollo Tyres is the **Largest** Indian Tire Manufacturer by turnover (consolidated)

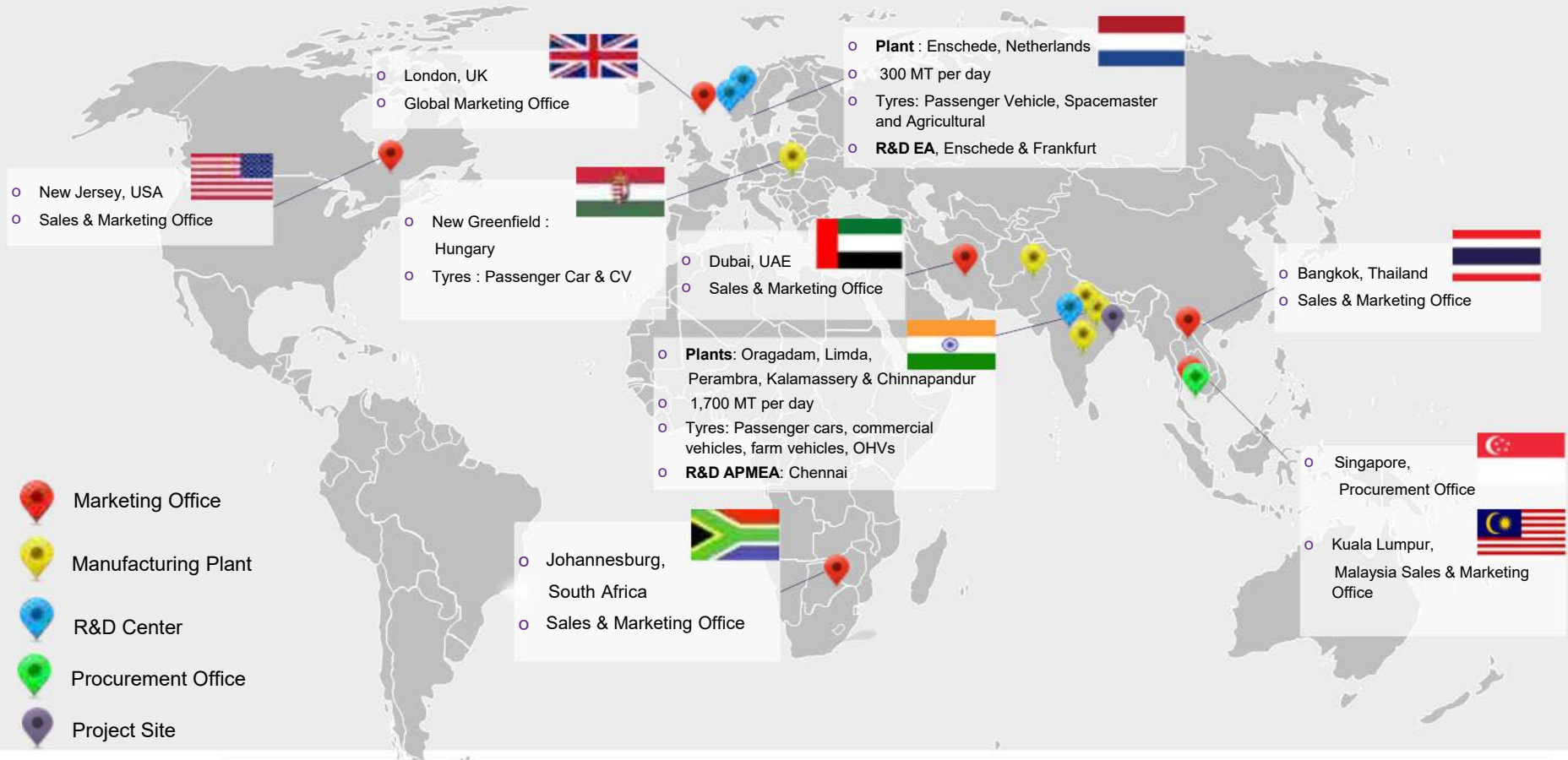
No1 in OEM supply 6Mn tyre per annum



# Apollo at a Glance



Sales To More Than 100 Countries Worldwide



Global presence in line with the company's vision of being a significant global player

## VISION

To be a premium tyre company with a diversified and multinational presence



## VALUES

- o Customer First
- o Business Ethics
- o Care for Society
- o Empowerment
- o One Family
- o Communicate Openly

# Global R&D Key facts and figures



- Two Global R&D centres : *India (Chennai) , The Netherlands (Enschede)*
  - OEM development centre : *Germany (Raunheim)*
- 410 full time R&D Engineers & Researchers
- Full product range player
- Steady growth in R&D investment 1.81% on net Sales



# Product

# Our Products

**apollo**  
TYRES

Passenger Cars



Trucks



OHT

Farm



Two Wheelers



# Special Products



## Space Master



## Air Master



## Sensors & Systems



## ATMS (TPMS)



## RFID





# Capability

# Material



Materials Research with global partners

AsahiKASEI

BEKAERT

EVONIK INDUSTRIES

LANXESS



EASTMAN

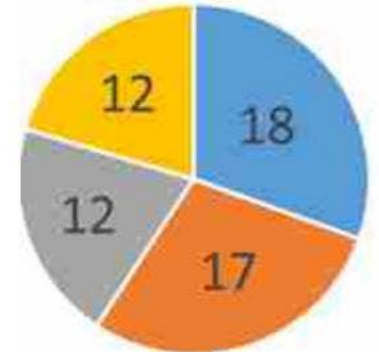
STYRON

Sustainable materials:

Aug 2012: First European tyre with Dandelion Natural rubber



Patents:



Method Vehicle Compound Design

# Design



Cavity & Tread Design

Design Automation

Product Styling

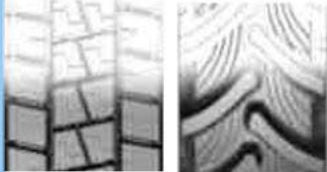
Mould Engineering

IP documentation & Value engineering

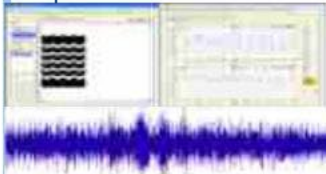
Layout Preparation



Pattern Preparation



Pattern Noise Optimization



Layout Parametrization



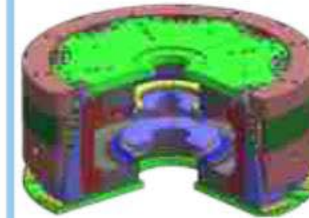
Tread pattern parameterisation



Sidewall Rendering



Mould Designing



Material Selection



Design Registration



Rapid proto type (RPT)



Capabilities : Softwares like Unigraphics, Catia, Autocad, Photoshop, Adobe illustrator/Corel draw

# Simulation



10 m  
1 m  
10 cm  
1 cm  
1 mm

**Full Vehicle Analysis**

Vehicle Modeling

Ploughing

**Tire-Terrain**

Pinch Cut

Aquaplaning

Snow Interaction\*

Wear\*

Pressure Distribution  
Carcass Deflection  
Load Variation  
F Tire

**Structural Analysis**

Footprint Pressure @ Various conditions

Rolling Resistance

1<sup>st</sup> Mode  
74.2 Hz  
Modal Analysis

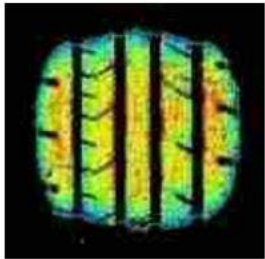
Vulcanization

\* Under Development

# Characteristic Evaluation



One of the 11 labs in EU approved for RRC testing as per ECE R117.



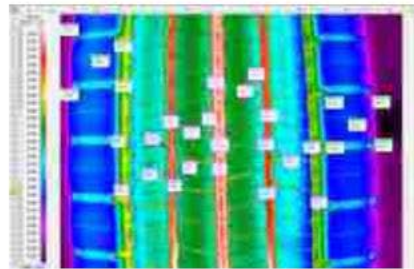
Foot print pressure distribution



Tyre Stiffness



Speed / Load Durability with Camber



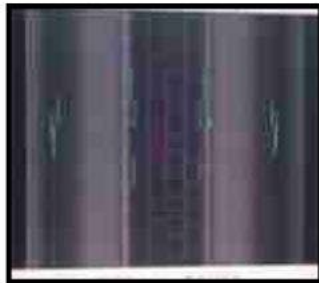
Thermography



Rolling Resistance



Shearography



X-Ray



Force Transmissibility



360 Wear Scan

# Performance Evaluation



## Dry Testing

- ✓ Dry handling
- ✓ Dry braking
- ✓ Pass-by noise measurements
- ✓ In-Cabin Noise measurement.
- ✓ Double lane change test
- ✓ Off road traction



## Winter Testing

- ✓ Snow traction
- ✓ Snow braking
- ✓ Snow handling
- ✓ Ice traction
- ✓ Ice braking
- ✓ Ice handling



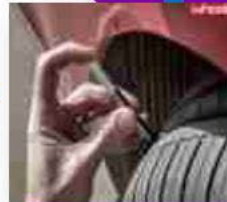
## Wet Testing

- ✓ Wet handling
- ✓ Wet Braking
- ✓ Hydroplaning longitudinal
- ✓ Hydroplaning lateral



## Field Evaluation

- ✓ Durability
- ✓ Wear Test



**NATRAX**  
(Indore, India)

**VRDE**  
(Ahmednagar, India)

**Gerotek**  
(Pretoria, South-Africa)

**Test Center Lelystad**  
(Lelystad, Netherlands)

**Nürburgring**  
(Nürburg, Germany)

**MMRT**  
(Chennai, India)

**Wabco – TVS**  
(Tamilnadu, India)

**Nardò Technical Center**  
(Nardò, Italy)

**Automotive Testing**  
(Papenburg, Germany)

**APPlus Idiada**  
(Barcelona, Spain)

**Wanaka**  
(New Zealand)

**Ivalo**  
(Finland)

# Product Certification



# University Collaboration

## Global R&D Centre – Asia





# Industry – Institute



R&D Centre is recognized as “Centre for Research” by Anna University, Chennai, India

## Collaborative research projects with premier Indian institutes

- Indian Institute of Technology - Madras, Kharagpur, Patna
- BITS - Goa



## Collaborative research projects with European and American institutes



# Internship..

Who we are looking for:

**Talented, highly motivated students of Engineering,**  
in Our Plant, Global R&D Centre in Chennai, India

- Expect you to learn a lot
- Take initiative in seeking new work
- Own your assignment and deliver in the given time frame
- Expect you to provide a somewhat fresh, new perspective



## Research Areas

- **Advanced Materials**
- **Tire Mechanics**
- **Vehicle Dynamics**
- **Sensor Technology**
- **Manufacturing**
- **Maintenance Engineering**

Graduate Engineering Interns

Duration : More than 3 months

Post Graduate Interns / Ph.d

Duration : More than 3 months



**THANK YOU**