

2017年度

デミング賞  
受賞報告講演要旨

CEAT Limited

## Chapter 1 Company Profile

### 1.1 RPG Enterprises

CEAT is one of India’s leading tyre manufacturers and the flagship company of RPG Enterprises. Founded in 1979 by Rama Prasad Goenka, the RPG Enterprises grew in size and strength with several acquisitions in the first decade of its existence, the first being CEAT Tyres of India, in 1981. In the year 2010 a few companies of RPG Enterprises, namely CESC, Spencers and Saregama India, were separated into a separate entity under the name of RP-Sanjiv Goenka Group.

RPG Enterprises, is headquartered in Mumbai and currently comprises of CEAT, KEC International, Zensar Technologies and others. With a turnover of Rs183.5Bn in FY16, a global presence in over 100 countries, a human capital of over 20,000 across geographies and a Profit After Tax (PAT) of over Rs 9.75 Bn, RPG Enterprises is one of the fastest growing business groups in India.

A brief snapshot of the Group’s financials are depicted in (Fig1 and 2).

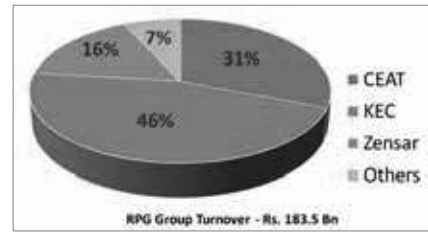


Fig 1: RPG Group FY'16 Turnover – Companywise Breakup

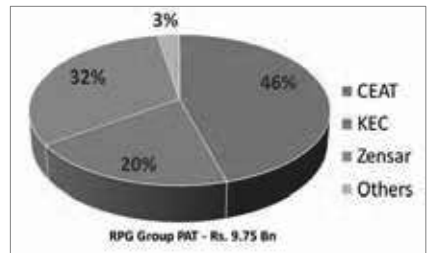


Fig 2: RPG Group FY'16 PAT – Companywise Breakup

### 1.2 CEAT Limited

CEAT ranks 4<sup>th</sup> in the Indian Tyre Industry in terms of revenue, with a consolidated turnover of over Rs. 56.8Bn, a net worth of Rs. 20.6 Bn and a market capitalisation of Rs. 48.3 Bn. An established brand, CEAT manufactures a wide range of radial and bias tyres for both commercial and passenger vehicle segments. CEAT has four in-house plants in Bhandup, Nashik, Halol and Nagpur, as well as various outsourcing units. It is one of the leading players in India’s domestic retail market.

The company has four subsidiaries namely, CEAT Sri Lanka, CEAT Bangladesh, CEAT Speciality and RADO Tyres, which are not in the scope of the Deming Application. These contribute to less than 5% to the overall CEAT turnover. Key milestones in the CEAT journey are depicted in timeline above.

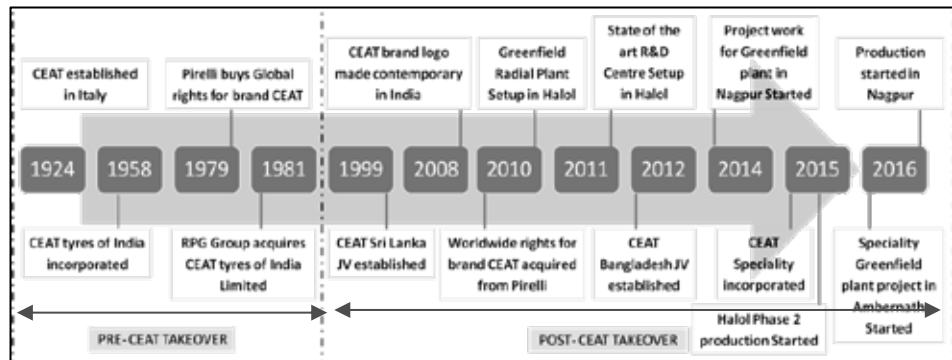


Fig 3: CEAT'S Timeline – Pre and Post CEAT Takeover by RPG Group

Driven by the purpose of “Making Mobility Safer & Smarter. Everyday.” CEAT has embarked on a journey of giving safety its rightful place, first in India and then in all the global tyre markets that CEAT would reach out to. CEAT’s products, services and communications would work towards enhancing safety on roads, by bringing to table digitisation, innovation and the latest technological trends.

### 1.3 Tyre Industry

The size of the global tyre industry is approximately Rs. 10500Bn with little less than 65% of the market share being held by top 10 companies. CEAT is ranked 29<sup>th</sup> worldwide with a market share of 0.59% in the world tyre market.

An improving economy, positive customer sentiment, pick up in auto demand and declining interest rates, have all ensured that the prospects for growth remain strong for the Rs.530 Bn Indian tyre industry in FY '18.

Between FY '11 and FY '16, the Indian tyre industry grew in value by 9.2% while CEAT grew by 9.6%.The individual shares of the top 4 players in the tyre industry are depicted in the adjacent pie chart.

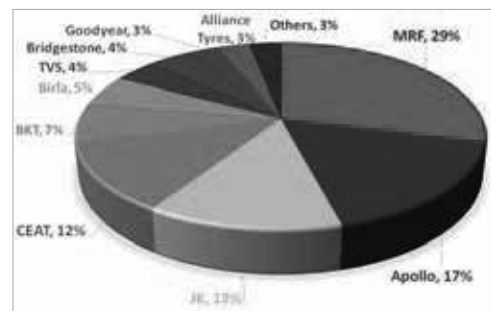


Fig 4: Indian Tyre Industry – FY '16

### 1.4 Product Portfolio

CEAT offers a wide product portfolio comprising of tyres catering to almost all user segments. While the truck/bus and light commercial vehicle segment contribute to little over 50% of the turnover, the categories which enjoy a higher market leadership are motorcycle and scooter, which also are more profitable.

Product Category	Domestic Replacement Market Share	Domestic Replacement Market Position
Truck Bus (Bias)	13.8 %	4 <sup>th</sup>
Passenger Car	9.3%	4 <sup>th</sup>
Utility Vehicles	8.0 %	4 <sup>th</sup>
Motorcycle	28.7 %	2 <sup>nd</sup>

Table 1: Replacement Market Share & Position (FY 17)

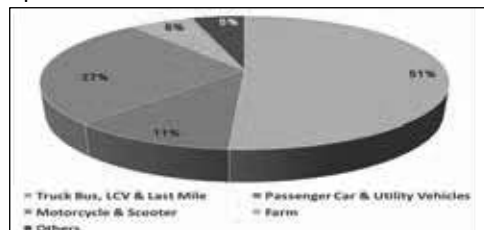


Fig 5: Sales Value – Category wise Breakup

### 1.5 Markets & Distribution Network

CEAT operates in two markets of the tyre industry, namely Domestic and Exports. The domestic market is further segregated into Original Equipment (OE) and Replacement segments. Exports comprise of international trade through the global replacement market. The domestic replacement market is reached through three channels namely, Exclusives, semi-Exclusives and Direct. Exclusives are CEAT Franchises and sell only CEAT tyres, while semi exclusives also sell competing tyre brands. CEAT sells directly to vehicle manufacturers. For exports the sales are done through distributors.

**Distribution:** The distribution network for domestic replacement market is an extensive one comprising mother warehouses, distribution centres, and Carrying and Forwarding Agents (CFAs),

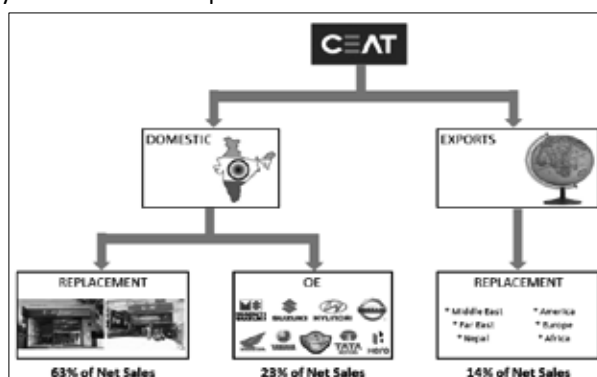


Fig 6 : CEAT Distribution Network

### 1.6 Manufacturing Footprint



Fig 7: Plant Locations

CEAT carries out manufacturing via a combination of self-owned and outsourced production units. While CEAT’s own manufacturing facilities are located in Maharashtra and Gujarat across 4 locations namely Bhandup, Nashik, Halol and Nagpur, the key outsourcing tyre units are located in Hyderabad, Halol, Kolhapur and Kochi. The manufacturing processes and technology in Bhandup and Nashik are traditional and most of the operations are carried out in manual mode. The newer plants in Halol and Nagpur are equipped with advanced manufacturing equipment and technologies. The Outsourcing units contribute close to 33% of the total sales volume for CEAT. For these units, CEAT supplies raw materials and provides technical support.

Plants	Categories Produced	MT / Day (inc. WIP)
Bhandup	Truck Bus, Farm, Motorcycle, Scooter	245
Nasik	Truck Bus, Farm	225
Halol	Truck Bus Radial, Passenger Car, Utility Vehicle	270
Outsourcing	Motorcycle, Scooter	220
Nagpur	Motorcycle, Scooter	120
<b>TOTAL MT / Day (Includes Greenfield &amp; Expansion)</b>		<b>1080</b>

Table 2: Plant Locations, Capacities & Categories

Nagpur are equipped with advanced manufacturing equipment and technologies. The Outsourcing units contribute close to 33% of the total sales volume for CEAT. For these units, CEAT supplies raw materials and provides technical support.

### 1.7 Raw Material Management

In the tyre industry, cost of raw material (RM) accounts for close to 60% of Net Sales. Amongst the various raw materials used, Natural Rubber, Synthetic Rubber, Carbon Black and Fabrics constitute close to 80% of the tyre weight and cost. Most of key RM are derivatives of crude oil which is subject to sharp price fluctuations. De-risking the supply of RM while managing cost pressures, is therefore critical, and is managed by the Materials function, based out of Bhandup and Kochi.

### 1.8 Research And Development

In FY91 CEAT established an exclusive R&D facility in Mumbai, which later shifted to Halol plant premises in FY11. The centre focuses on product development, design and simulations, alternative material development and indoor tyre testing. Recently, investments of close to Rs500 Mn have been made to put in place the latest testing equipment, like the Flat Track machine, the TBR Endurance Machine and the High Speed Uniformity Machine amongst others. To facilitate faster prototyping of products, a Pilot plant facility has also been setup, which is a first in Indian tyre industry. CEAT has also tied-up with institutes of global repute such as Indian Institute of Technology (IIT). It also collaborates with global experts to encourage open innovation.



Fig 8: R&D Facility at Halol

### 1.9 Corporate Social Responsibility (CSR)

At CEAT, our purpose of smart and safe mobility - everyday, extends beyond the road, to touch the lives of the people in the communities around which we operate and also the society at large. This is done through CEAT’s CSR touch-points, which encompass a range of activities, extending from education to healthcare, water and sanitation. Details of the key projects carried out under CSR are outlined below -

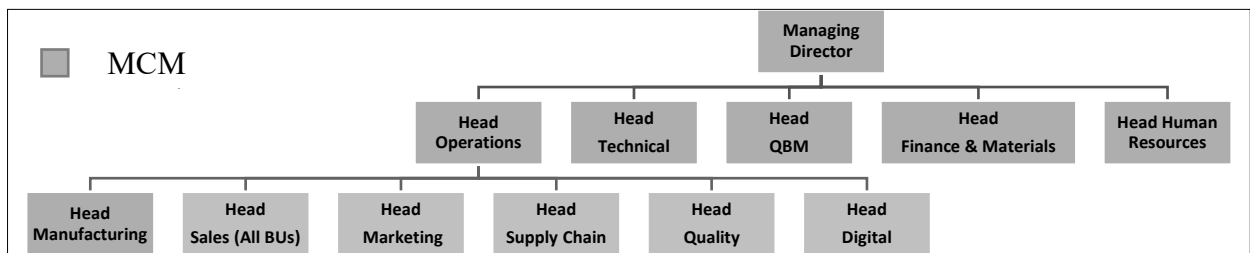
- **Netranjali** Focused on preventive eye care, and reaches out to truckers, school children and elderly patients.
- **Swayam** Promotes women empowerment, by helping them become drivers.
- **Pehlay Akshar** For helping children improve their English communication and reading skills
- **Saksham** Imparts vocational and technical training to youth and women from the underprivileged.
- **Jeevan** Improves all-round quality of life, in and societies around our plants

These initiatives have had a significant impact and have affected positive change in the society

### 1.10 Organisational Structure:

Leadership system in CEAT works at various levels:-

- **MCM** refers to Management Committee Meeting and is chaired by the Managing Director. This committee reviews the Annual Policies, Strategies and Projects (Policy Management), every month.
- **OpCom** refers to the Operations Committee, which is chaired by the Executive Director - Operations and is attended by all Functional Heads (VP and above). This committee reviews the monthly Operational Performance
- **Cross Functional Councils**– There are three cross functional councils - Delivery Management, Product Development and Quality Assurance. These are chaired by an MCM executive with members from OpCom.



### 1.11 Key Honours and Awards (FY16-FY17)

- Ranked Number 1 in J.D. Power 2017 India Original Equipment Tyre Customer Satisfaction Index (TCSI)
- Winner in the “End to End Customer Solution” category at 6th Annual Manufacturing & Supply Chain Awards
- Sword of Honour and 5 Star Rating from British Safety Council for Halol Plant
- National Award for Excellence in Employee Relations for Bhandup Plant
- Gold Award for the Best Use of Digital Media by Emvies
- Gold Award for the Best Use of Mobile Media and Bronze Award for Social Media at The ABBY’s (Goafest)

### 1.12 CEAT Financial Highlights (Excluding Subsidiaries)

CEAT's exciting journey of QBM has played an instrumental role in positively impacting its financial health

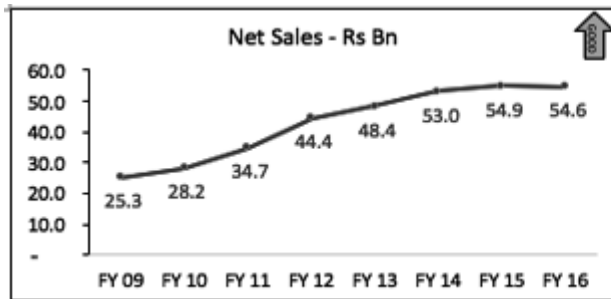


Fig 9 : Net Sales has grown at CAGR of 12% since FY09

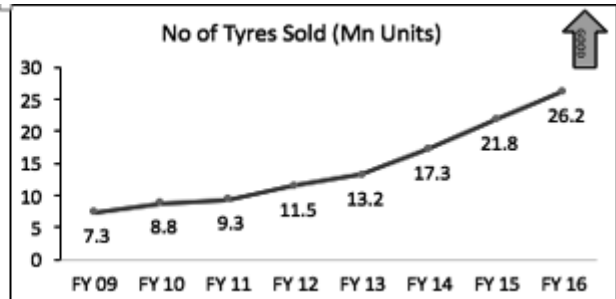


Fig 10 : No of tyres sold has increased consistently

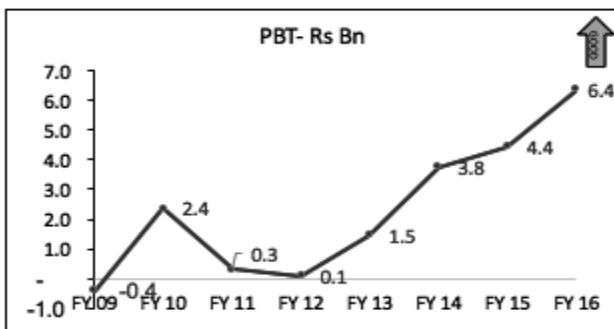


Fig 11 : Profits steadily growing since FY12

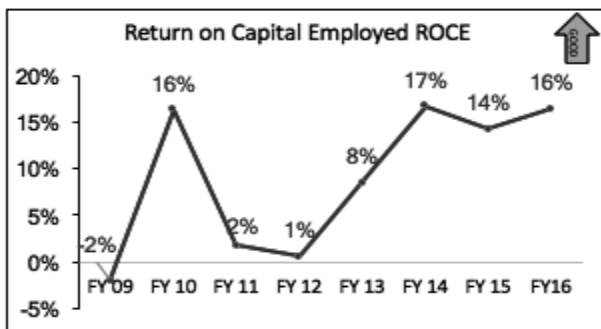


Fig 12 : ROCE changed from -ve to 16.4%

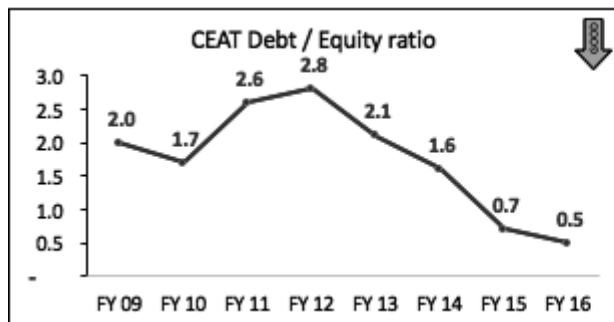


Fig 13 : Consistent profits have ensured lower debts and better debt equity ratio

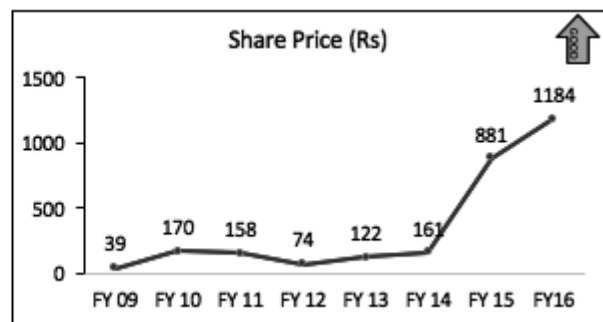


Fig 14 : Value creation for stakeholders has been enhanced

## Chapter 2 Business Goals and Strategy

### 2.1 Background

Prior to FY08, the organization faced many challenges.

- **Volatile profits:** Operating profits varied as a result of inability to correct selling price to offset raw material price swings (Natural Rubber) due to low brand pull. PBT% varied from -1.4% to 8.5% in the period, depending almost entirely on commodity rates.
- **No Leadership in any product category:** CEAT was predominantly a truck and bus category player with 8% market share (4<sup>th</sup> ranked player). The category contributed to more than 50% of sales turnover.
- **Higher conversion cost:** Poor profits hindered CEAT's ability to spend on overhaul and replacement of equipment in old plants leading to poor reliability, thus further increasing costs. Many of the plants were located in high tax zones with 80% of turnover being contributed by these plants.
- **High Debt Equity Ratio:** The average debt equity ratio was 2.13 in FY07 due to low profits and cash flows, which in turn reduced the ability to invest.

However, in spite of the above challenges, CEAT was cognizant of certain strengths that were not fully leveraged. These strengths were:

- **Highly salient heritage brand equity:** CEAT was the pioneer in the Indian tyre industry in the 1980s and early 1990s and it had a strong brand equity among consumers. Its brand image was still strong with an established presence in big cities and towns.
- **Experienced outsourcing partner:** Technical capability of CEAT's key outsourcing partner was good.
- **Wide product portfolio:** CEAT made tyres ranging from scooter to off the road.
- **Wide dealer network:** CEAT had a wide domestic dealer network, both rural and urban.

### 2.2 QBM Period 1 (FY09 - FY11)

Starting FY09, CEAT decided to follow a strategy that leveraged its strengths. Given its brand equity and wide distribution network, it focused on the passenger segment. On account of certain opportunistic measures, in FY08, CEAT earned healthy profits amounting to a PBT of Rs. 1.97 Bn. Given this context and keeping the passenger focus in view, CEAT decided to set up its first greenfield plant in 25 years in Halol, for producing Passenger Car Radial (PCR) Tyres, though also capable of producing Truck Bus Radial (TBR) Tyres. For two wheelers, it was decided to leverage the existing experienced outsourcing partner and a Memorandum of Understanding (MoU) was signed towards expanding its capacity from 0.25 million motorcycle tyres per month to 1 million motorcycle tyres per month. The CEAT logo was also redesigned during this period. Extensive feedback was received from employees, customers and partners, serving as input for the new logo, which represents CEAT today. A new logo reflected a new warmth and modernity backed by solidity. However, though these initiatives had a clear strategic rationale, there was a need for them to be better articulated as well as have a longer term view. The logos are shown in Marketing Chapter (No.4)

### 2.3 QBM Period 2 (FY12–FY16)

In FY11, CEAT decided to take a more strategic and sustainable approach towards achieving long term goals. CEAT's strategy was designed to counter specific challenges around profitability, market share, costs, etc. and also take advantage of its key strengths. Three major paradigm shifts were defined to provide CEAT with a clear direction over the long term:

- **From Turnover to Profit:** Till FY11, CEAT was largely focussed on maximising turnover and throughput. It was decided to shift focus to profit since this was the key to survival and growth of the organisation.
- **From all categories to categories where there was a Right to Win (RTW):** Earlier, CEAT used to be present in all categories without focussing on any category in particular. CEAT decided to focus on B2C categories where brand and distribution play a key role, thus allowing the brand to create a sharp RTW.
- **From commodity products to differentiated products:** CEAT decided to focus on launching differentiated products that would enable it to stand out from competition.

#### 2.3.1 Vision & Strategy development process for FY12-FY16

**The steps followed in defining the Vision and Strategy were as follows:**

- Define CEAT's long term aspiration
- Develop comprehensive list of growth opportunities (Through bottom-up approach and involving people via Focus Group Discussions and One on One discussions)
- Consolidate and finalise the priority growth opportunities and aspirations

- Identify keystones (success pillars) based on Strengths, Weaknesses, Opportunities and Threats (SWOT) and market attractiveness study(Fig 1)
- Set, deploy and review target

Fig 1: SWOT Analysis

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> <li>• Strong brand saliency</li> <li>• Outsourcing capacity</li> <li>• Pool of excellent people</li> <li>• Presence in all product categories</li> <li>• Apolitical culture</li> </ul>	<ul style="list-style-type: none"> <li>• Weak balance sheet</li> <li>• Silo mode of functioning</li> <li>• Low execution capability</li> <li>• Culture of satisfactory under performance</li> <li>• Low scale of operation</li> </ul>	<ul style="list-style-type: none"> <li>• India growth - rural and semi urban</li> <li>• Growth in passenger category</li> <li>• Overseas emerging markets</li> </ul>	<ul style="list-style-type: none"> <li>• Entry of MNCs across categories</li> <li>• Radialisation in truck</li> <li>• Environmental risk - resulting in closure of largest plant - Bhandup</li> </ul>

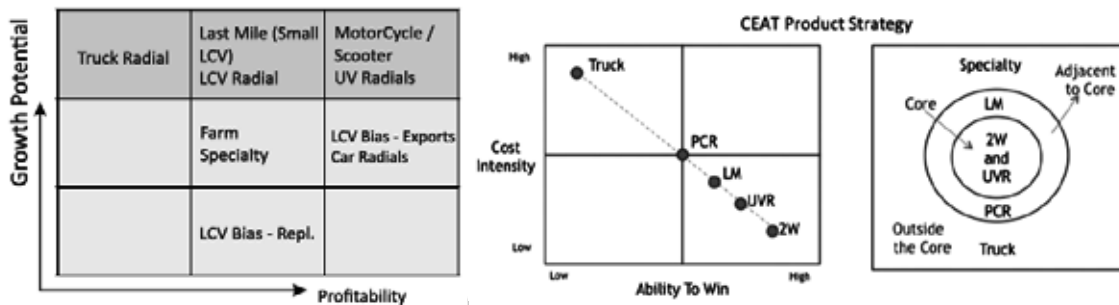


Fig2 Comparison of CEAT's ability to win in the category vs cost intensity of the category

Based on the above analysis, strategy was drawn up as shown in the vision house.

A task force was specifically set-up for cascading of the vision house. Each of the keystones was broken into year-wise plans and the strategy was deployed through a regular annual planning process. Clear targets and roadmaps were defined for each year

**2.3.2 Challenge:**

However, In FY12, the vision and strategy was updated in light of certain insights and developments, and a similar exercise was undertaken in FY13 and FY14. This PDCA resulted in a more pragmatic and impactful strategy through certain keystone changes as shown in Table 1. Based on above PDCA, the vision house was strengthened and the final vision house was as below.

Table 1: Keystones Modification based on PDCA

Year	Keystone Removed and Rationale	Keystone Added and Rationale
FY12	The plan to integrate backward into rubber plantations to arrest RM volatility was dropped because it was highly capital intensive and high on risk.	Become No. 1 in UVR was added since UVR was one of the core profitable segments in Product Strategy and allowed CEAT to create differentiation
FY13	Conversion cost was benchmarked inaccurately and had to be revised	Conversion cost target revised based on better understanding of benchmarks and scope expanded to all CEAT plants.
FY14	Target of becoming No. 1 in 5 neighboring countries dropped as achievement of the objective would lead to minor revenue gain (Cambodia, Myanmar, etc.)	Changed to include big clusters of countries thus targeting a sizeable revenue gain (South East Asia, Middle East, etc.)

**2.3.3 Result of vision & strategy FY12 – FY16**

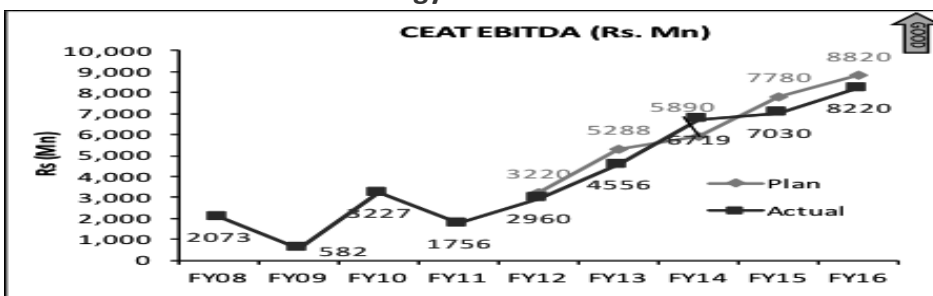


Fig 3: EBITDA : Volatility reduced, profit steadily improving

### 2.3.4 Key Learnings from FY12-FY16 Strategy and Deployment

Area	Learning from FY11-2016 Strategy	Learning incorporated in FY17 – FY21 Strategy
Strategy Formulation	<ul style="list-style-type: none"> <li>• Though CEAT had a clear ‘what’ in its strategy, it discovered that a strong ‘why’ that gave meaning to its long-term existence, was missing</li> <li>• Lack of detailed external data based validation had led to many iterations in the vision house</li> <li>• CEAT had come close to meeting targets but had fallen short of achieving them - breakthrough innovation was identified as the critical missing link</li> </ul>	<ul style="list-style-type: none"> <li>• Purpose of ‘making mobility safer and smarter everyday’ was incorporated to guide strategies</li> <li>• Continued involvement of managers at all levels</li> <li>• Data based validation of goals was done through an external agency. This ensured that goals were well thought through from an external, long term and execution perspective</li> <li>• Lateral insighting was done to identify innovative practices; Specific focus was given to developing key capabilities that would allow for breakthrough innovations</li> </ul>
Strategy Execution & Review	<ul style="list-style-type: none"> <li>• Ad-hoc process for review of strategic agenda and milestones lead to shifting focus</li> </ul>	<ul style="list-style-type: none"> <li>• Separate strategy cell was incorporated</li> <li>• A clear strategy review process deployed</li> </ul>

## 2.4 QBM Period (FY17 – FY21)

### 2.4.1 Introduction of Purpose starting FY17

CEAT realised that though it had its vision and strategy in place, it did not have a clear purpose. CEAT’s MD, Anant Goenka put across a series of questions to employees eventually arriving at the brand’s purpose. Some of these were - Why do we all wake up on a Monday morning and turn up for work? Is it only because we need our salaries? Or is it because from the bottom of our heart, we love making and selling tyres? What is it that truly motivates us? What is the legacy that we will leave behind? After intense dialogue and deliberation across the organisation, the purpose was articulated as below:



Fig. 4: CEAT Purpose Statement

### 2.4.2 Vision and Strategy Formulation Process (FY17 -FY21)

After a tremendous journey in the last 5 years, CEAT’s sights were set higher, - **‘To be among the top 10 EBITDA making tyre companies globally’**. It means growth would be pegged at 3.5X in the next 5 years. In order to do this, CEAT adopted **BHAG (Big Hairy Audacious Goal)** concept to arrive at the vision. It encouraged the company to define visionary goals that are more ‘game changing’ and also emotionally compelling.

The strategy formulation had better rigor in execution through detailed planning of strategy up to the last person responsible. An external strategy consultant was also deployed to validate key hypotheses and assumptions around main markets and growth levers. Key capabilities needed to achieve the vision and strategy were also identified. Broadly, the strategy for FY17-21 was defined using the following steps:

**1) Execution Milestone:** For each keystone, execution milestones were set for both market share and EBITDA.

**2) Building Blocks:** To achieve the strategy, building blocks were identified in terms of channel, product development, branding, etc. **3) Review Plan:** Review mechanism of building blocks is set up by dedicated strategy cell to check the progress and remove bottlenecks, if any. **4) PDCA:** Annual PDCA of the strategy is being planned to ensure that CEAT is on track to achieve its milestones and take corrective actions, if required.



## Chapter 3 Quality Based Management (QBM) Promotion

### 3.1 Overview

Since 1996, CEAT has experienced a long period of low profitability and financial stress. CEAT offered products in all categories, with leadership position in none of them. CEAT was not part of top-of-the-mind customer consideration when they purchased tyres in the market, since it was predominantly a price player with no differentiated product to offer. In FY06 it overcame the financial stress by restructuring and other activities. CEAT also repositioned itself in the market as a refreshed brand catering to youth, showing dynamism and flexibility. This change was made with management support and intervention. By FY08 there was a need to reform the management system in order to improve the health of the company. TQM was considered as the management system suitable to CEAT’s situation.

### 3.2 History of QBM Journey

#### 3.2.1 Need for QBM

Due to a large number of breakdowns, CEAT’s old manufacturing plants at Bhandup and Nashik were unable to deliver the daily planned capacity. The plants had been around for decades but did not undergo maintenance of equipment. The quality department was only focussed on meeting basic product specifications, while the workmen were rarely engaged in any improvement activity and their skill development was stagnant. The plant had a high level of Muri, which resulted in several accidents. The worker morale was at an all-time low.

During a top management exercise in FY08, the team’s view of CEAT was as follows:

***“The current CEAT is slow, conservative, inward-focussed and complacent in good times, while being a survivor in times of crisis - getting together and showing flexibility. At all times, it is ethical with good values and its quality is reasonable and brand image good.”*** The key concerns identified were:

Internal Issues	External Situation
<ul style="list-style-type: none"> <li>• Poor production efficiency</li> <li>• Unsustainable momentum and low energy level of company</li> <li>• Status of quality is unclear</li> <li>• Stressful product delivery process with poor delivery record</li> <li>• Low plant performance with high levels of Muri, Mura and Muda</li> </ul>	<ul style="list-style-type: none"> <li>• Low market share in commercial</li> <li>• No presence in Truck/Bus Radial (TBR) and negligible in Passenger Car Radial (PCR)</li> <li>• Tyres reached the dealers in very poor conditions</li> <li>• High overall claims</li> <li>• No innovative product to offer</li> </ul>

To overcome these concerns, the management decided to adopt a new way of thinking, executing and managing, known as Quality Based Management (QBM). This means management that is centred on the primary objective of quality and not short-term profits. TQM in CEAT is called QBM. It also incorporates few tools and techniques from Toyota Production System (TPS) and Total Productive Maintenance (TPM).

#### 3.2.2 QBM Journey

The key objectives of QBM at the time of launch were: 1) Become a customer centric organisation. 2) Significantly improve plant performance, and 3) Raise people capability while establishing a culture of continuous improvement.

QBM implementation in CEAT is categorised in three phases explained as below:

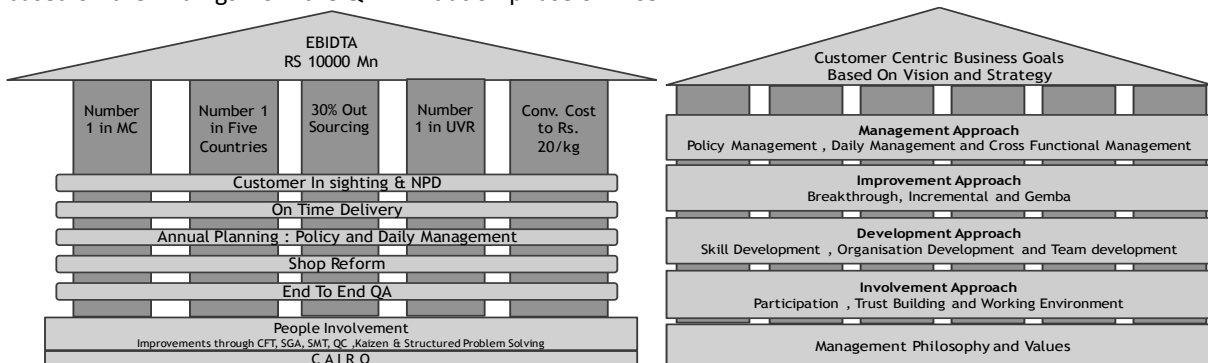
Time Period	Phase	Key Purpose
FY09-FY11	Initial	Introduction of QBM in manufacturing, quality and delivery
FY12-FY15	Development	Roll out QBM across the value chain of CEAT
FY16-FY18	Consolidation	Company-wide integrated QBM approach for capability building and strategic planning for future vision

**Table 1: Three phases of QBM journey**

Period	FY09 – FY11 Initial Phase	FY12 – FY15 Development Phase	FY16-18 Consolidation Phase
<b>OBJECTIVES</b>	1. Improve performance and working conditions of plants 2. Improve relations with worker unions 3. Upgrade Quality Assurance (QA) scope from product to full value chain 4. Improve delivery performance to customers	5. Expand QA across the value chain 6. Implement QBM across all functions and levels 7. Extend Cross functional management to product development	8. Enhance the product quality levels proactively 9. Enhance analytical capability of the organization 10. Further deepen improvement systems (chronic issues and abnormalities) 11. Enhance ownership of QBM by line managers
<b>STRATEGIES</b>	1. Initiate Muri reduction projects in Bhandup & Nashik 2. Launch 'JAI HO' program for development of workmen and supervisors 3. Establish Cross Functional Management system (CFM) for Quality	4. Roll out QBM in manufacturing by common system called 'Sparsh' 5. Establish improvement management system (Kaizens, QCC and QIPs) 6. Introduce management diagnosis	7. Capability building on advanced problem solving and statistical methods through training 8. Establish review system using input and output parameters for all functions including QBM 9. Extend management diagnosis from function level to cross-functional level
<b>EFFECTS</b>	1. 1230 abnormalities and Muris eliminated 2. 'Before Usage' rejection reduced by 27% 3. Plant Committed Line Item Performance (CLIP) improved by 126%	4. 235 new NPD launched 5. 300 QIPs and 7.66 Kaizens/person achieved 6. Replacement claims (% of sales) reduced by 49%	7. Significantly improved QBM training coverage
<b>PROBLEMS CARRIED FORWARD</b>	<ul style="list-style-type: none"> <li>Pilot success of QBM was not leveraged well enough</li> <li>Cross functional working in NPD was not adequate</li> </ul>	<ul style="list-style-type: none"> <li>Inadequate quality of analysis (policy means and QIPs)</li> <li>Abnormality detection and resolution needed improvement</li> </ul>	

### 3.3 CEAT way of Management – QBM Model

A structured and integrated QBM implementation approach was developed in FY12 in line with the new vision and based on the findings from the QBM initiation phase of FY09-FY12.



**Fig 1: Role of QBM for Achieving FY16 Vision\***

**Current QBM Model\*\***

\* Annual Planning: PM and DM for deployment of policy objectives and regular objectives

\* Cross functional management approach for implementing best practices to product development, delivery control and end to End QA to become number one in vision categories

\* Shop floor reform to improve the plant reliability and employee morale

\*\* QBM redefined in FY15 by incorporating the findings from years of QBM implementation

The horizontal bars in vision FY16 were the QBM enablers planned as a means of achieving the vertical objectives (strategic keystones) leading to the achievement of vision. This approach for QBM was redefined in FY16 by incorporating the findings from the Initial and Development phase of QBM and converted to the new QBM model. The horizontal enablers are now defined as Management, Improvement, Development and Involvement.

### 3.3.1 Management Approach

#### (1) Policy Management

Policy development and deployment process are built into CEAT’s Annual Planning system. It is a six month process starting in the month of September and ending by March. The current process has undergone many changes based on findings from the last 4 years through review of progress of policy objectives as well as internal management diagnosis. Policies defined at the company level are owned by the MCM members. These policies are deployed through the top management level to the respective functions. In addition to these, Policy objectives are also identified at functional level (Level One or L1) which are deployed by the functional heads.

#### (2) Daily Management (DM)

While the policy management focuses on strategy, the daily management is practiced by all employees at all levels and functions. It starts with a basic role clarity to each individual on what is expected from them on a routine basis. This is provided by means of a ‘Role Template’ which outlines the blueprint of a role by providing objectives and KPIs to be measured as well as an overall role definition. Role template is unique to a role/position. Different individuals in the same role, but working in different categories/shifts/locations, have the same role template. For 1144 managers in CEAT, there are 186 unique role templates. To ensure linkage of KPIs across the employee grades, the KPIs are deployed down the line(fig 4) through these role templates. These role templates are reviewed on a yearly basis to check whether the objectives and KPI of a particular role are still valid. Otherwise need-based revision to role template is done and signed off.

DM is more evolved in the manufacturing function. Until FY16, shift wise review of production performance was carried out and all issues were analysed in DM meetings. The review of abnormalities was mixed with that of chronic issues and hence DM meetings were less effective. The system was changed to hourly monitoring of production for more effective identification of abnormalities versus chronic issues. Abnormalities are discussed in DM meetings and abnormality reports created to track and resolve them. Chronic problems are taken up as Quality Improvement Projects (QIPs) for a 7 step problem solving approach. Similarly, DM in sales happens in the form of Performance Dialogue (PD) based on routine inputs from channel partners on product, delivery and service performance. Effectiveness of DM is measured in terms of number of standards revised/created each year. Standards in the form of work instructions, SOPs, engineering standards, process manuals, functional and training modules are created or revised based on need. The internal CEAT web portal called ‘CEAT Connect’ hosts the ‘CEAT Management System’ (CMS) site which is a centralized repository and control system for all standards created and revised.

Period	Standards	
	New	Revised
Base in FY14	2929	
FY15	356	1600
FY16	668	645
FY17	453	827
<b>Total</b>	<b>4406</b>	

Fig 2: Standards developed

#### (3) Cross functional Management

In order to achieve the targeted Quality, Cost and Delivery parameters with highest impact on customer satisfaction, a horizontal virtual structure was established at CEAT through cross functional councils. Cross functional councils

Table 2: CEAT Cross-Functional Management

Council	Purpose	Council Chair	Council Secretariat	Examples of Systems Developed
<b>Quality Assurance</b>	Make important company level decisions impacting quality to the customer by grasping an end-to-end view across the value chain	ED Operations	Head - QA	<ul style="list-style-type: none"> <li>Company-wide Quality Assurance</li> <li>Supplier Quality Assurance System for developing and managing suppliers</li> <li>Customer complaints management</li> <li>Manufacturing QA</li> </ul>
<b>Delivery</b>	Design and implement an effective Delivery Control System from Supplier to Dealer/Distributor in CEAT to ensure high customer satisfaction	SVP Mfg.	Head – Supply Chain	<ul style="list-style-type: none"> <li>Unique pull model for supply chain in tyre industry</li> <li>Order booking system via BPO</li> </ul>
<b>NPD</b>	Drive the NPD roadmap through customer insights and strategic planning. Launch breakthrough products	ED Technical	Head - Marketing	<ul style="list-style-type: none"> <li>NPD stage-gate system.</li> <li>Product Lifecycle Management</li> <li>Platform based product architecture</li> </ul>

For product development, delivery management and quality assurance are in place at CEAT for several years. They review the end-to-end value chain of the business process and deploy the QCD goals accordingly. They drive the improvements outside the system and set the policy for the future. The councils are chaired by respective MCM member and its secretariats are the respective functional heads, with 5-6 cross functional members. The various councils, their purpose and managing committees are presented here along with key systems developed and deployed by each. Many of these key systems are discussed in detail in subsequent chapters.

### 3.3.2 Improvement Approach

In CEAT, all improvements are classified under various levels: (1) L1 and L2 are Gemba based improvements which refer to Just-Do-It Kaizens and Why-Why Kaizens. The goal of Gemba improvements in CEAT is to encourage participation by all in improvement activities. Only implemented suggestions are considered as Kaizens. These Kaizens are reviewed and best Kaizens are recognized and rewarded. For FY17, the participation rate at the company level is 11 Kaizens/person/year.

Levels	L1	L2	L3	L4
Stratification				
Improvement Level	Idea / Kaizens	Why - Why Kaizen	QC Circle (Sparsh Circle)	Execution / Problem Solving / Task Achieving QIPs
Improvement Type	Suggestions		Incremental / Radical	
Typical Grouping Type	Individual		Small Group Activity (12 Step Approach)	Team (7 Step Approach)
Typical Personnel	Workmen / Supervisors / Sales Persons			Managers
Management Bucket	Typical Daily Management			Daily & Policy Management

Fig 3: CEAT Improvement Model

(2) L3 are quality circle (QCC) or ‘Sparsh Circle’ based improvements which are conducted by the workmen and associates operating on the shop floor. While these improvements are Gemba based, they are more scientific in nature compared to kaizens. The permanent QC teams prioritise problems from a pool of problem bank, created from chronic issues identified in DM, and work towards improving the QCDSM parameters in their workplace. After feedback from Deming Diagnosis, the QCC training has been strengthened in FY17 with new circles formed and new projects completed. Overall project completion rate for FY17 is 1.2 projects / QCC.

(3) L4 Improvements: Quality Improvement Projects (QIPs)

QIPs solve chronic issues affecting the key KPIs in QCDSM spectrum in any function. These are generally taken up by Cross Functional Teams (CFTs). Members of the CFT are first trained in the 7 step problem solving methodology through the in-house one day training module. Results of each QIP are tracked for 3 months from closure date to check for sustenance. The QBM academy team has developed a standard QIP assessment model which rates each QIP on aspects of the 7 steps, depth of analysis, standardisation done and sustenance of results. A score of 60 and above is considered a good quality QIP. The number of QIPs scoring more than 60 has been steadily increasing since the assessment was initiated. This has aided a common understanding of the level of improvements carried out across the organization and points to focus on in order to enhance the quality of improvements. Inputs have been provided in terms of capability building in 7 QC tools and hypothesis testing and advanced tools and techniques. The effect of this is measured through the increase in QIP assessment score. The number of QIP projects completed has also witnessed a rising trend over the years

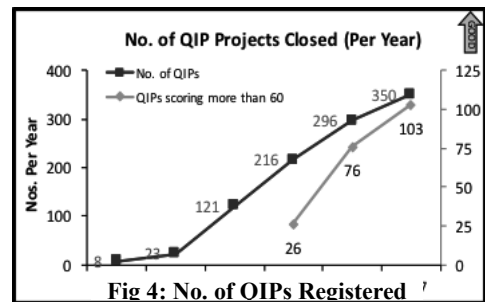


Fig 4: No. of QIPs Registered

### 3.3.3 Development Approach

#### 1) QBM Knowledge and Skill Building

Skill building for all employees is addressed under two main branches: QBM skill and Functional / Business skill. The basic awareness course starts with the new employee induction program where 100% people are covered. For current employees, the courses range from basic to advanced training modules, taken up by both internal and external faculty to build capability in the organization related to QBM (Table 3) Based on the internal diagnosis as well as Deming Diagnosis report, specific QBM training programs were strengthened to accelerate the building of a higher level of capability in the fundamentals of problem solving. The training has resulted in significant improvement in the quality of QIPs and sustenance of results.

Table 3. Training Model

Employee Level	General Level 1 (All)	Functional Level 2 (All)	Improvement Level 3 (All)	Advanced (Select)	Special Seminars /Coaching
Senior Management	QBM Basic Course (2 days)	Functional QBM (1 day)	QIP (2 days)		JUSE JIPM HIDA
Middle Management	QBM Basic Course (1 day)	Functional QBM (2 days)	QIP (2 days)	Annova /DOE TRIZ Ad. Statistics	TPS TPM Diploma in Quality Mgmt
Workmen and Associates	QBM Basic Course (1/2 day)	5S/3M/ Kaizen SPARSH	QCC (1 day)		

**(2) Review System**

A strong review process is followed right from the shop floor and sales locations all the way up to the MCM team. This serves as a backbone for alignment of all goals and priorities and focus at all levels. Policy objectives are reviewed at the MCM level, while operational aspects are reviewed by the OpCom team in the monthly OpCom meeting. This is apart from the cross-functional council reviews. The line reviews are similarly held by head of departments in the Monthly Operational Review to discuss gaps and corrective actions. A snapshot of review process is shown **(Table 3)**.

**(a) Dashboard Review at Functional level**

At a functional level, dashboards are reviewed periodically (typically monthly) to check the progress of both the processes (inputs) and the results (output). Gap analysis and actions are identified based on review of these dashboards.

**(b) P03 Review at individual level**

Goal action planning sheet (P03) for every KPI is prepared at the beginning of the financial year and is reviewed on a monthly basis. Root causes for variation are analysed during the review and necessary corrective action is outlined. P03 review system enables the following:

- a) Detailed planning exercise at the beginning of the year to identify actions
  - b) Systematic analysis of gaps between the plan and the actual situation
  - c) Periodic review with the boss to review progress and the action plan.
- This ensures no priority issue stays hidden or action delayed due to lack of focus.

**Table 4: Review System**

Resource	Review of	Review Frequency
MCM	Company Strategy	Monthly - Policy Update Six Months - Management Diagnosis
OpCom	Company Operations	Monthly - OpCom Meeting Six months - management diagnosis
C/F Councils	Critical C/F customer issues	Monthly / Quarterly as per need
Function Head	Functional DM performance	Monthly with functional team
Line Mgr.	Section	Weekly with Team
Academy	Functional/ Plant / Departmental	Monthly with QBM Monthly - academy team
Corporate QBM	Company Level	Monthly with respective MCM member Monthly / quarterly review with MD

**3.3.4 Involvement Approach**

(1) Trust Building: As an outcome of various QBM activities, engagement of managers as well as workmen/associates is measured through various internal and external means. There has been a complete transformation of the Bhandup and Nashik plant where the situation has changed from a hostile environment to a safe and secure workplace. The ‘Red Book’ system of recording employee grievances and resolving them before they become big irritants has been very effective in developing this trust.

(2) Participation: Worker satisfaction is reflected by improvement in the workmen engagement score. This increase in employee satisfaction is an indication that the actions taken are in the right direction. The outcome is visible in the increase in the total employee involvement score over time. QBM involvement metrics are calculated monthly (companywide) and published in QBM report to the MCM committee as well as the CEO report to the Chairman

(3) Boosting Employee Morale: Employee morale is boosted through various internal rewards and recognition schemes and forums for Kaizens and QIPs. Best QIP projects are presented at the OpCom meeting on a monthly basis, where employees are felicitated by top management. Participation in external competitions (CCQC-Chapter convention of Quality Concept / NCQC - National convention of Quality Concept) for best QIP projects is also encouraged. (Awards mentioned in table)

**3.4 Management Diagnosis at Company Level**

Our top management team conducts management diagnosis across the company on a periodic basis to assess the effectiveness and acceptance of the QBM way of management. The first set of diagnoses was done in FY15 by the MCM members. Various two member teams conducted the diagnosis of select departments using a comprehensive checklist. The diagnosis session was divided in three parts (i) Presentation by function where status of PM, DM and improvement management was presented (ii) Gemba visit- [plant round, market visit, office walk-through] by examiners (iii) Feedback and Q&A session with the members of the function. At the end of the diagnosis, a one page report was submitted by the examiners on the good practices of the department and scope for improvement. An overall diagnosis score for the company is provided basis a 25-point checklist and a 5-point rating scale. This exercise enabled CEAT to achieve the key objectives of diagnosis mentioned below:

- Diagnosis of the progress of policy management and major KPI through the application of QBM
- Free exchange of viewpoints on challenges and actions between top management and the company at all levels
- Top management grasping the true status of the QBM implementation
- QBM way of management made practical

The management diagnosis process was further strengthened in FY17 after Deming Diagnosis and was extended to OpCom and conducted across the organization. As an outcome of the diagnosis process, some key issues were identified

at the company level, apart from specific issues at functional levels. Counter-measures were implemented and their progress continues to be tracked for effectiveness

### 3.5 Overall QBM Effects

In order to understand whether the 3 phases of QBM have incremental impact on the various KPIs, a log graph is used.. A steeper slope from the initial period to the development and consolidation period is an indication that the rate of improvement over time is increasing.

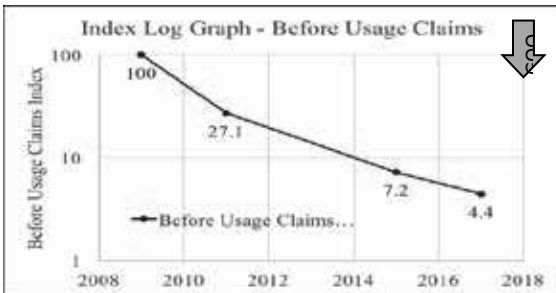


Fig: 5 Before usage claims reduced by 95%



Fig: 6 Breakdown hours in old plants reduced by 80%



Fig: 7 Overall accidents reduced by 95%

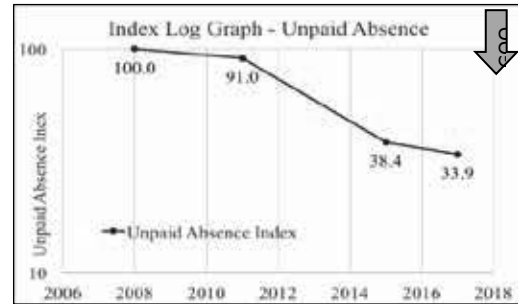


Fig: 8 Workmen unplanned absence reduced by 66%



Fig:9 Improving Satisfaction score of Direct Customers



Fig: 10 Total involvement score of 92% at the end of FY17

## Chapter 4 Quality Assurance

### 4.1 Overview:

Quality Assurance in CEAT covers the entire value chain, starting from product development to sales, service, raw material suppliers, and manufacturing, including Outsourcing vendors. CEAT supplies to leading Original Equipment Manufacturers (OEM) such as Suzuki, Renault Nissan, Hyundai, Honda Motorcycle, Yamaha, Hero, JCB, Caterpillar, TATA, and Mahindra & Mahindra. The company’s total product portfolio comprises of 800+ SKUs. Tyres are produced with 163 different types of raw materials sourced from 170 suppliers and 50 rubber dealers for natural rubber procurement. On an average, 90 new products are developed annually in line with CEAT’s vision and strategy. Our R&D test lab is approved as a European Union (EU) candidate lab for measuring rolling resistance by TUV Germany.

#### 4.1.1 Develop claim management module and phenomena wise improvement:

The customer claim management process was revised to ensure effective and faster resolution. Claims are categorized into phenomena. Based on severity, further classification is done - critical, **major and minor**. Based on the criticality, cross functional teams including service, R&D, manufacturing, supply chain, technical and QA are formed to resolve the phenomena. Past trouble database is developed to utilize this knowledge for new product development and setting up new manufacturing facilities. The input is also used to strengthen quality table, PFMEA and control plan. This helped CEAT to convert administrative controls to engineering controls like pokayoke to eliminate failure mode for phenomenon. A total of 2535 poka yokes have been implemented so far in all the manufacturing locations.

This resulted into continual reduction in claims over the period

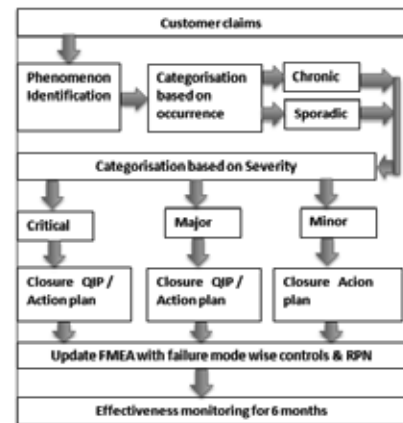


Fig 1: Process of addressing customer claims

#### 4.1.2 Develop quality management system at Outsourcing vendors:

The Outsourcing vendor is selected cross functionally through a robust selection process. Support is then provided to align his manufacturing process to required product standards. The Quality Assurance approach in Outsourcing is designed to complement the Outsourcing vendor by helping him develop his own quality management system. Various types of trainings are given to those vendors in the areas of problem solving through 7 QC tools, 5S, Kaizen and safety. All these vendors are encouraged to participate along with CEAT in various forums like QCFI (Quality Circle Forum of India) to demonstrate joint improvement. All Outsourcing vendors are rated periodically on quality and delivery and a cost and development plan is prepared for partners who are rated low. Outsourcing units are OEM approved plants and direct supply to OEMs Honda, Suzuki, and Hero.



Fig 2 : Quality System Audit Score

Complaints on Outsourcing products are analysed and resolved jointly including customer visits. Fig. 2 shows improvements in Quality System Audit score. An annual vendor satisfaction survey is conducted to build long term relationships with these partners. 90% of Outsourcing partners are associated with CEAT for more than 15 years.

#### 4.1.3 Strengthen internal process controls; PFMEAs, Control Plan (CP) revised based on market feedback and internal non-conformance:

Until FY08, usage of PFMEA/CP was restricted to certification only. Since the past issues were not captured in the system by periodic revisions, abnormalities converted into chronic issues. To revamp the whole system, process wise CFT formed including production, QA, technology and engineering. 87 officers across all plants were trained, the PFMEA Manual developed along with procedures to revise PFMEA, CP and work instructions (As shown in figure 7). Product requirements, learnings from failures, complaints etc. were integrated during development of these standards. Workmen participated to prepare work instructions in local languages. Actions were initiated based on a criticality matrix and periodically monitored for closure. Critical characteristics (CC) and

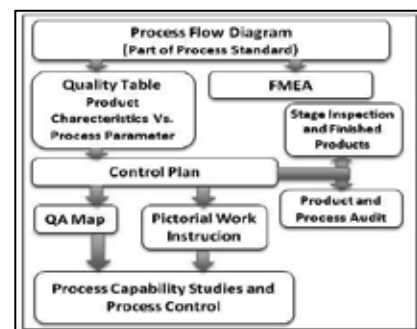


Fig 3

significant characteristics (SC) are identified based on guidelines. For CC and SC, special controls were put in the form of SPC, Pokayoke and inspection. These standards are reviewed periodically. This helped CEAT improve process controls, reduce variations and therefore reduce internal and external defects. The reduction in cured tyre defective is shown in figure 8. The effects of manufacturing quality on end customers captured in overall effects.

**4.1.4 Upgrade new product development process with design reviews:**

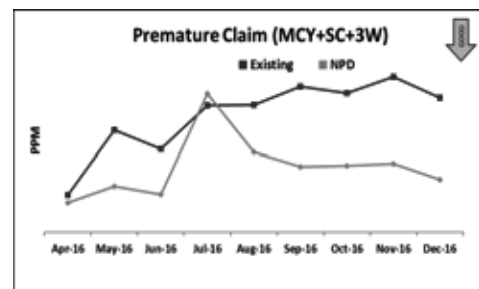
Till FY12, the new product development process was in line with APQP (Advanced Product Quality Planning). In FY13, this process was revised with gate approval systems and robust design reviews at appropriate stages. (fig.9).

Critical quality assurance activities like customer insighting and benchmarking resulted in preparing true customer requirements. Cross functional teams for each category between Marketing, R&D, QA, Tech, and Manufacturing have been facilitating the new product developments through PLM (product life cycle management).

PLM has helped govern the new product development process and document all records. The R&D test lab was developed to simulate various field conditions in-house. Various test tracks available internationally and domestically are utilised to test new products. CEAT is associated with all leading testing agencies like TUV Germany, Smithers USA, ARAI (Automotive Research Associations of India) and others. This helped CEAT undertake joint development along with OEMs for their respective new products. Some of the products even got tested at the OEM’s test lab and got approved. For e.g. Honda motorcycle did extensive testing and product comparison at Honda Japan before approval. Fig10 shows the comparison between premature claims (reported within three month of service) for new SKUs developed w.r.t. existing SKUs for 2W and 3W category. There is a significant reduction in premature claims of new products compared to regular SKUs. Lessons learned are used to upgrade existing SKUs.

Gate 1	Gate 2	Gate 3	Gate 4	Gate 5
1.0 Statement of requirement (SOR) acceptance	2.0 Approval of business case 2.1 Design Review 2.2 Beta review	3.0 Prelaunch run and sign off	4.0 PPAP review and sign off	5.0 Claim review and feedback

**Fig 4: Cross Functional Gate System for NPD**



**Fig 5: Premature Claim of NPD lower than existing products**

**4.1.5 Benchmark against Value Proposition With Respect To Competition:**

Benchmarking is a proactive approach, which is carried out without reacting to a customer complaint or a voiced demand. Products are benchmarked against the nearest competitor’s product proactively. Gaps and strengths are evaluated, and accordingly product development or a sales pitch is carried out. Marketing, QA and R&D teams jointly identify the products and their nearest competitors across all critical categories. Key value propositions are determined, considering the statement of requirement (SOR) established at the time of initial development, along with the current

Category	Tyre size- CEAT	Competition	Key value proposition	Product characteristics	Key findings	Target setting and action plan	Target date	Status
TBR	295/80 R22.5 Pattern R10	Competition 1 Competition 2	Fuel economy	Rolling resistance test	Competitor 1 is better by 5% than CEAT. CEAT is better by 11% than competitor 2.	3 % better than Competitor 1	Jun-16	Achieved and validated

**Fig 6 : example of a product identified with one of the gaps and its subsequent developments**

customer requirements. The scheme of evaluation is determined and the products are evaluated by the QA. Evaluation includes tests such as mileage, fuel economy, wet grip, dry grip and few other tests, which varies across categories along with key value propositions. The results are evaluated by teams and an action plan is developed. The action plan includes means of product development, in case gaps are identified or a sales communication to leverage sales, in case it shows strengths. Revalidation of the product is carried out after the product development stage.



## Chapter 5 New Product Development

### 5.1 Overview

New Product Development (NPD) at CEAT is a cross functional activity, which plays a significant role in achieving the company’s vision. A robust stage gate NPD system driven on a Product Lifecycle Management (PLM) software is in place to meet the large number of new product development requirements and ensure "first time right" products. The NPD process also ensures products meet the ever-evolving national and international regulatory standards.

After achieving good results as per the Vision of FY16, the new Vision FY21 was rolled out identifying focus product categories, their development strategy and key objectives.

The CEAT NPD process is a structured 5 stage gate process as shown. It covers Entire Product Life Cycle of the product

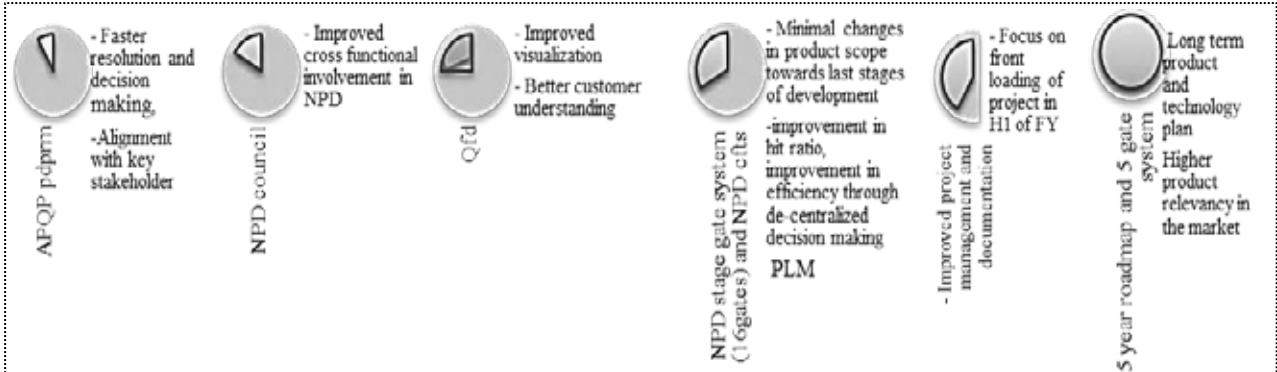


Fig 1: Evolution of NPD system

from new platform development, size extension, OEM product development and continuous product improvements. The platforms once released are continuously monitored and their performance is compared periodically through a structured benchmarking process. The upgraded/refresh products are launched after improvements done based on market feedback and gaps brought out through benchmarking.

#### 5.1.1 TBR Win Series development with product re-engineering and technological development

##### Project Objective

Develop TBR product range meeting customer needs and expectation of good mileage, Loadability and fuel efficiency in domestic market

Project Challenge	Key Development Steps	DOE Design
Technology development <ul style="list-style-type: none"> <li>• Mileage</li> <li>• Low RR</li> <li>• Loadability</li> <li>• Extensive testing</li> </ul>	<ul style="list-style-type: none"> <li>• Benchmark analysis.</li> <li>• Setting of performance targets</li> <li>• Product re-engineering and development (DOE Analysis) →</li> <li>• Evaluation against benchmark</li> <li>• Launch of TBR product range</li> </ul>	<ul style="list-style-type: none"> <li>• 5 Factors (partial factorial)</li> <li>• 16 Test Runs</li> <li>• 3 main factors and 2 interaction factors are significant</li> <li>• Response optimizer used to obtain best results with 100% desirability</li> </ul>

**Product Testing-Indoor Testing:** Product testing was conducted against the best in the category

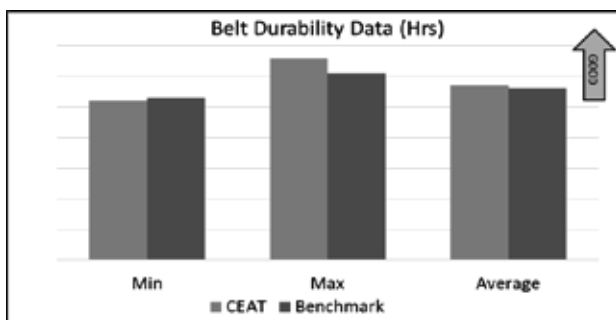


Fig 2: Structural durability of tread package 2% better than benchmark

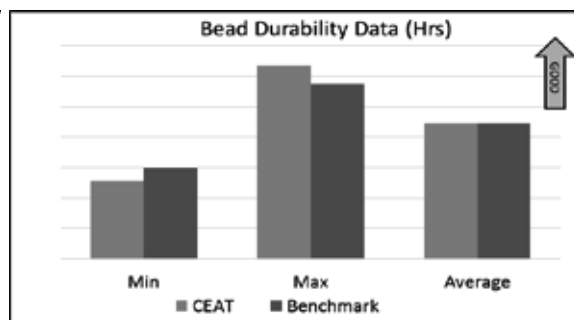


Fig 3; Overload durability in line with benchmark

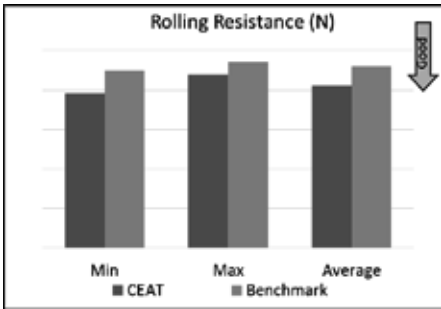


Fig 4: Fuel efficiency 2-6% better than benchmark

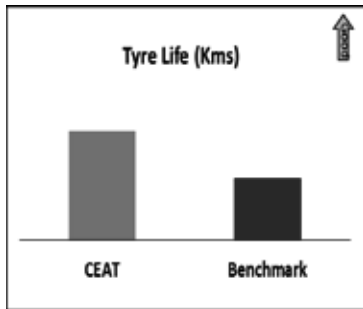


Fig 5: Tyre life 5-7% better than benchmark

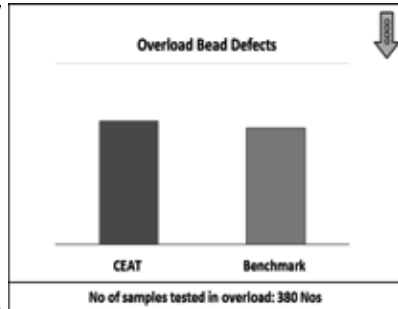


Fig 6: Overload performance inline with benchmark

Output



Fig 7

Outcome



Fig 8

5.1.2 Gripp 2W tyre development using semantics and evolved design

Project Objective

Develop differentiated product through an elaborate customer in sighting exercise and identifying the top concern of the customer as safety from skidding.

Challenge

Product which conveys Gripp to customer and features to meet high grip and off road conditions

Methodology

**Pattern Geometry** – While tyres give grip, the customers connect the grip to an unknown geometry. With the help of the industrial design department of IIT Bombay, a block pattern imaging a coir rope was evolved based on semantics and design input

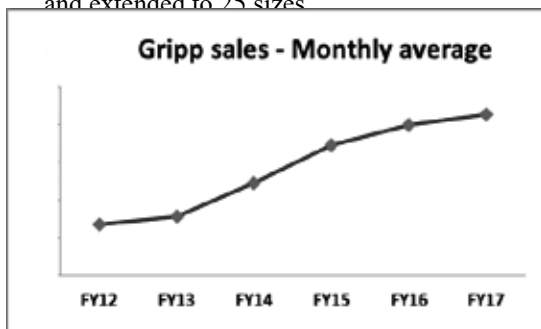
Performance Validation

Product is tested and validated against benchmark and found superior in ride and handling performance.

Output:

New Gripp platform developed in 2W category and extended to 25 sizes

Outcome



## Chapter 6 Delivery Control

### 6.1 Overview

CEAT manufactures 1176 active tyre Stock Keeping Units (SKUs) in 4 in-house plants and 11 Outsourcing tyre units. CEAT sells to 4576 dealers, 279 distributors, 46 OEM customers in India and 139 export distributors based in 76 countries. We have a distribution network of 2 Mother Distribution Centres (MDCs), 14 Distribution Centres (DCs), 117 Carrying and Forwarding Agents (CFAs), 16 OEM warehouses and 1 export warehouse. The physical movement of finished goods is managed through 56 primary transporters. The number of tyres sold has increased at a Compounded Annual Growth Rate (CAGR) of 19.9% over the last 6 years which leads to a far greater complexity.

#### 6.1.1 Well integrated Planning system (Long Term Planning to Daily Scheduling)

CEAT’s evolved and comprehensive planning system extends from a 5- year horizon Long Term Demand and Supply Planning system to a daily machine level scheduling system. Long Term planning helps us align our demand and supplies in tune with our vision whereas short term planning helps us service customers as per their actual demands

Policy Management		Daily Management	
Process	Horizon	Process	Horizon
Long Term Demand Planning	5 years	Quarter Planning	3 months
Long Term Supply Planning	5 years	Month Planning	1 month
Annual Planning	1 year	Weekly Planning	1 week
		Daily Planning	1 day

Table 1 : Planning system

#### Capacity expansion executed to bridge demand supply gaps:

- **Nagpur 2W Plant-** Terminal capacity of 1.2 million (Mn) tyres/ month
- **Calicut unit Ramp up-** Ramp up from 85,000 to 1,40,000 tyres/ month done
- **Bhandup 2W project-** 88,000 motorcycle and 50,000 scooter tyres planned and produced from Bhandup per month
- **Kolhapur unit-** 80,000 Motorcycle and 35,000 Scooter tyres per month.
- **Hyderabad 2 Expansion-** An expansion of 0.2mn tyres per month done.

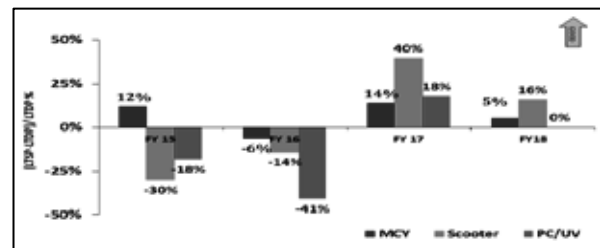


Fig 1: Demand Supply Gap (LTSP-LTDP)/LTDP. Goal is to have a positive gap.

**6.1.2 Responsive Production System** CEAT has developed a customer friendly manufacturing system in-house. The company has a PPDS (Production Planning & Detailed Scheduling) system running at Bhandup and Nashik, while the newly established Halol and Nagpur plants operate on Kanban.

**Kanban:** Production scheduling in Halol TBR and Nagpur is done basis the Kanban signals. This avoids unnecessary inventory build-up while simultaneously reducing production halts due to WIP shortage. It also empowers line managers to schedule the machines based on the live progress of production and not schedules. Minimum and maximum inventory levels are calculated at all work stations. Work centres are scheduled by calculating the gap of actual inventory against calculated levels. This permits “demand pull” rather than schedule push. FIFO is also maintained with the help of Kanban cards by attaching the Material Handling Equipment number to the card.

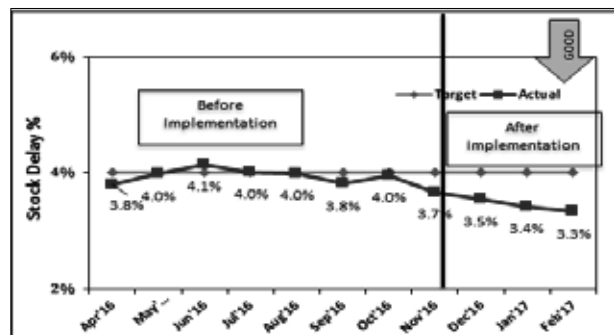


Fig 2: Stock delay is lower than target after Kanban implementation

**Process Adherence KPI:** Stock delay at the Tyre Building process due to inventory drop/ stock out at preceding supply work centres is set as the measure of process adherence.

**More flexible manufacturing systems:** To improve flexibility at manufacturing plants, various SMED projects have been implemented due to which more sizes in growing categories can be produced at any given time.

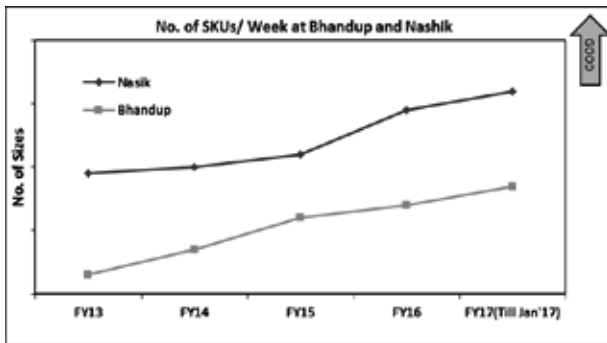


Fig 3 : 42% increase in Bhandup & 27% in Nashik

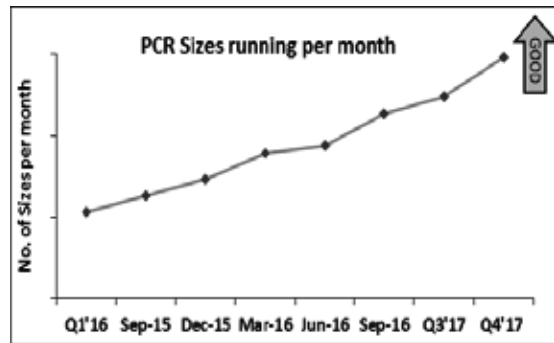


Fig 4 : 180% increase in sizes

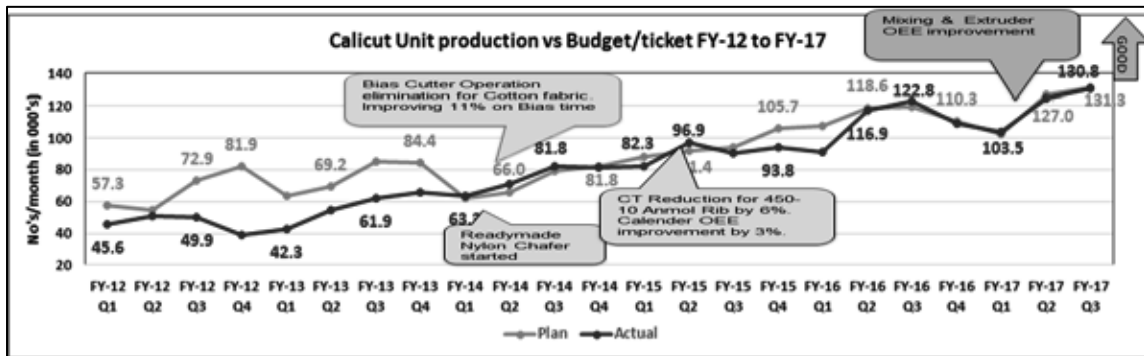


Fig 5: Rapid increase in production at Calicut unit

### 6.1.3 Reducing Month End Sales Skew

In FY'11, CEAT continued to face high sales skew of 40.3% in the last 5 days compared to only 13% in the first 10 days of the month. High sales skew led to high inventories, sales loss, market price fluctuations and liquidity crunch for the dealer. The following counter measures were implemented to resolve this problem: 1) Closure of the sales two days before the calendar month-end 2) Billing to close at 7 PM everyday 3) No extension of credit limit over and above policy limits to dealers 4) Policy of not billing overdue customers was implemented 5) Ensure 100% material availability in DC as per forecast by the 25<sup>th</sup> of the month 6) Increasing contribution to total sales from the distribution channel with significantly better skew. Sales skew in the last 5 days has come down to 30% in FY16 while Sales in the first 10 days has improved to 21%. The focus is now on reducing the variation within quarters through weekly planning and mapping secondary sales to primary in distribution.

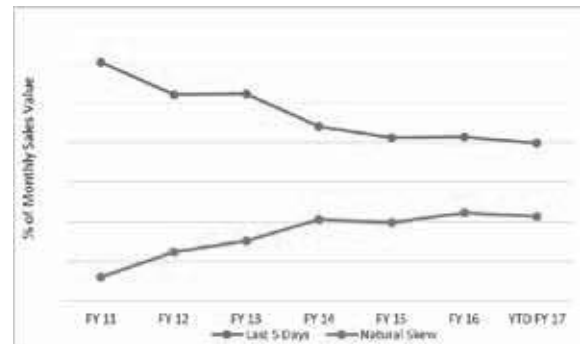


Fig 6: Green-sales done in last 5 days, Blue-sales done in first 10 days. The gap has reduced over last 7 years

## Chapter 7 Overall Manufacturing

### 7.1 Overview

CEAT has its own manufacturing plants at four locations in India (Bhandup, Nasik, Halol and Nagpur). There are 20 outsourcing partners associated with CEAT, who supply tyres, tubes and flaps. Our outsourcing model is on a conversion basis, where CEAT supplies raw materials and provides technical support. The locations of CEAT manufacturing plants and major outsourcing units are shown in the figure. With the increasing demand of radial tyres, CEAT came up with a new green field project in FY10 at Halol in Gujarat. It is a state of the art manufacturing facility for producing passenger car radial and truck & bus radial tyres. During FY11 and FY16, 100% of 2/3-wheeler tyres were outsourced. To meet the increasing demand, CEAT started manufacturing 2/3-wheeler tyres in FY16 at the Nagpur plant with an investment of Rs. 4.5 Bn. The plant at Nagpur is technologically one of the most advanced 2 wheeler manufacturing plants in India.

**Table 1: Summary of CEAT manufacturing**

Plants	Established	Permanent employees (Managers + workmen)	Category Produced	Tyre Type	Unique feature
Bhandup	1958	1248	Truck, Bus, Tractor, 2-wheeler	Bias	Only old plant to operate in Mumbai suburb
Nasik	1973	1551	Truck, Bus, Light truck, tractor and passenger car	Bias & Car Radial	High product mix
Halol	2010	1049	Passenger car, Truck/ bus and 2-wheeler	Radial	State of the art plant operates on self-managed team model
Nagpur	2016	574	2/ 3 wheeler	Bias	Most advanced tyre plant in India.

#### 7.1.1 SPARSH

QBM in manufacturing is called SPARSH, which is a Hindi word which means, Touch of Life. It is an acronym that stands for Sustainable, Productive, Accurate, Reliable, Safe and Healing. Interestingly, the name was the result of a competition held across all the plants, under the QBM awareness program in FY11. The SPARSH model has five pillars- 1) 5S 2) Muri reduction 3) Autonomous Maintenance 4) Preventive Maintenance 5) Improvement Projects (QIP)/SPARSH Circle). 100% employees were trained under the SPARSH from FY12 - FY 15. A unique "SPARSH score" is in place to measure the effectiveness of SPARSH across all the plants. It consists of 5 input parameters and 5 output parameters covering safety, quality, cost delivery and morale



Year	FY13	FY14	FY15	FY16	FY17 YTD
<b>Sparsh Score (avg. of all plants)</b>	64.2	73	69.6*	80.7	84.5

\* Measurement methodology changed to further improve the effectiveness.

#### 7.1.2 New Machines Development

During Halol phase-I, we faced problems with the tyre building machines in terms of a higher cycle time, low machine availability and low yield. Imported machines were expensive and so was their delivery time. When Halol phase-II started, we decided to develop our own machine. The key objective were to reduce the project execution time, reduce investment cost and achieve higher productivity and quality output.

**Development phase:** Learnings from breakdowns of Halol phase-I machines were documented in the form of Maintenance Prevention (MP)sheets for developing new machines. Machine shop and fabrication facilities were developed near Halol. The first machine was developed for PCR tyre building. Engineering drawings and machine specifications were made. Simulation of machine assembly and machine function was checked through a simulation software prior to start of the machine manufacturing. First machine was developed in FY15 and commissioned. Problems encountered during commissioning were listed down, analysed and corrective action taken. Changes made in

the first machine were documented and necessary corrections were made in the machine standards for future references. After successful commissioning of first machine, nine more machines were developed.

**Result achieved: (Table 2)**

Comparison	Quality (Uniformity yield)	Machine cost (Tyre Building)	Delivery (Ramp-up time)	Productivity (Cycle time)
Halo Phase-I	85% (RMS Machines)	140 million	36 months	42 Sec.(RMS Machines)
Halol Phase-II	87%	70 million	15 months	36 Sec.

**Way forward:** We have now expanded our machine development facility in the Halol plant. New machine development for the Nagpur plant has also been initiated. One tyre building machine and one curing press is being developed for the Nagpur plant.

### 7.1.3 Technological Advancement

Both the Bhandup and the Nasik plant's manufacturing technology is of an older generation. Most of the operations are manual. When the Halol plant was initiated in FY09, CEAT came up with a state of the art plant for the manufacturing of passenger car and truck/bus radial tyres. In FY15 CEAT came up with the most advanced 2/3 wheeler tyre manufacturing plants near Nagpur. Some of the unique features were - spool system for storing and handling of treads, cassette system for cut ply handling, automated tyre building machines, multi-release system for inside paints and automated run-out and balancing measurement system. In FY15, CEAT established its own machine manufacturing set-up. All the tyre building machines installed in Halol phase-II are developed in-house. One tyre building machine and one curing press was also developed for the Nagpur 2/3-wheeler plant.

**Table 3: Achievements through technological developments**

Parameters	FY12	FY13	FY14	FY15	FY16	FY17
No. of processes improved at Halol	5	5	12	10	12	9
Cycle time reduced at no. of processes- all plants	3	3	3	6	6	10

In FY17, CEAT initiated implementation of MES (manufacturing execution system) through application of IoTs in Nagpur plant, which will be the first tyre plant in India to run on the MES platform.

In order to create significant competitive advantage in manufacturing processes, radical innovation in manufacturing has been initiated to support a leap in capital productivity, as stated in vision 2021. The objective is to reduce the cost of investment, increase productivity and reduce conversion cost. One such innovative project is single stage mixing. Aim of the project is to reduce non-value added time in the process. This will eliminate the aging time between deferent stages in compound processing. Pilot stage is completed and further confirmation trail will be taken in production and like this, there are 4 more projects are running and a road map is prepared.

### 7.1.4 Outsourcing Development

As a part of our FY11 strategy, we decided to expand our outsourcing capacity and capabilities. QBM initiatives were taken up at major outsourcing units. More outsourcing partners were added during FY12 and FY15 as part of our strategy to increase outsourcing production. Through various QBM initiatives, capabilities at outsourcing units have improved along with the overall vendor rating. Our Hyderabad outsourcing partner has received approval from OEM buyers. Now, our focus has shifted towards enhancing the in-house production capacity and maintaining the supplies from Outsourcing.

### 7.1.5 Strategy for Digital Manufacturing

Manufacturing has developed its strategy "Digitisation in manufacturing processes" to expand the digital capability across all the manufacturing plants. Halol plant is first to adopt digitisation in the manufacturing processes. Systems like, usage of sensors in the machines for safety and quality improvement, on line data acquisition from process and MIS generation, barcode and RFID scanners for product identification and error proofing, automatic storage and retrieval system for material handling, etc. are the major digital initiatives taken in Halol plant and a detailed roadmap is also created for future expansion. Our New plant at Nagpur is in the process of implementing MES (Manufacturing Execution System) on IoT (internet of things) platform. The first phase of the project is to be completed by Dec-2017. Major activities covered in this phase are:1) Advanced process control automations for quality improvement, 2) Real time data capturing for faster decision making, and 3) Smart engineering control and electronic poka-yoke for preventing errors. In the traditional plants at Bhandup and Nasik, digitisation will be implemented, as suitable.

## Chapter 8 Utilisation of IT Systems

### 8.1 Overview

Information Technology is an important enabler for CEAT and is responsible for delivering competitive advantage for business. IT system enables business to execute strategies and provides the necessary backbone for process controls and automations. CEAT business applications give 360-degree coverage of its 1145 plus internal and 4500 plus external customers. It supports multiple business applications covering 2500 plus users. The organization’s tactical knowledge and data is secured on a centralized knowledge management system. IT with its integrated digital initiatives and platform, opens up doors for future business and new markets. These initiatives also facilitates smart manufacturing and intelligent products as demonstrated below.

#### 8.1.1 New Distribution Channel – Distributor Management System (DMS)

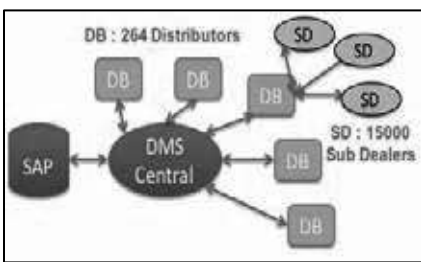


Fig 1 MCY sale

To deliver quick sale and service to consumers, CEAT decided to introduce the concept of distribution for the first time in Tyre industry. The initial system was built on the consumer durable goods model. Through learnings from pilot implementation, tweaking and problem solving, CEAT has now

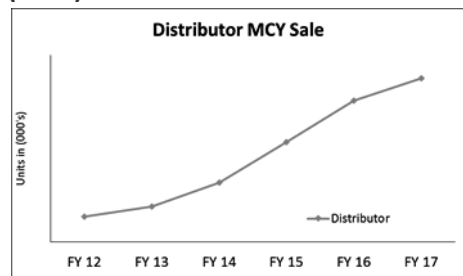


Fig 2 Distribution channel Growth

established distributor model which defines the whole process of appointment, management and review of distributor business performance. The distribution channel piloted in FY12 has now grown to 73% of total domestic sales. The DMS system is centralised ‘Standard Billing’ system for all 279 distributors, helping to keep control on sales channel, market operating price, secondary sales and inventory. The overall effect of DMS implementation is ‘Reach Improvement’, ‘Sales Skew Reduction’ and reduction in ‘Slow Moving Inventory’, enabling a revenue of more than Rs 12Bn. from distributor channel.

#### 8.1.2 Implementation of Product Lifecycle Management (PLM) for New Product Development

**Issue: Product Development cycle time was high, due to cross-functional involvement and multi-party sign off requirement.**

There are more than 100 new products in the pipeline for market launch throughout the year. It was cumbersome to carry out the R&D activities manually which in turn impacted launch of new products and accuracy of data, resulting in sales loss. The PLM system focussing on areas of ‘New Product Developments’, ‘Compound Development’, ‘Indoor Testing’, ‘Design’ and ‘Vehicle Dynamics’ was introduced. The system provides a complete, accurate, high fidelity virtual representation of the product. In the next version of the system digitisation with PLM helped to pioneer the first production worthy 3D modelling concept. We are able to make the product design drawings and models easier to interpret with fewer errors, while saving time. The service information is critical to installing, operating and maintaining the product. Traditional 2D forms can be replaced with much richer and easy to use 3D models. PLM is now being effectively used for New Machine development leading to high impact on machine cost and delivery timelines.

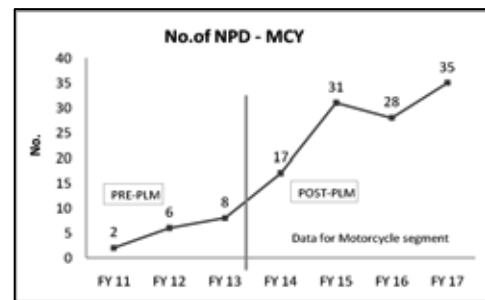


Fig 3 NPDP

## Chapter 9 People Management

### 9.1 Overview

India is one of the most diverse countries in the world in terms of geography, language, religion and culture. CEAT is a good example of this diversity, comprising employees from different states, speaking different languages and following different religions. The average age of employees has been progressively coming down and today it is at 40 years. CEAT believes in creating a great work experience for its employees, which is then extended to our customers. CEAT is a pioneer in hiring women employees for shop floor functions in the tyre industry. Currently, CEAT employs 163 women associates at its Halol and Nagpur. An overview of demographics follows: (Fig: 1 to 4)

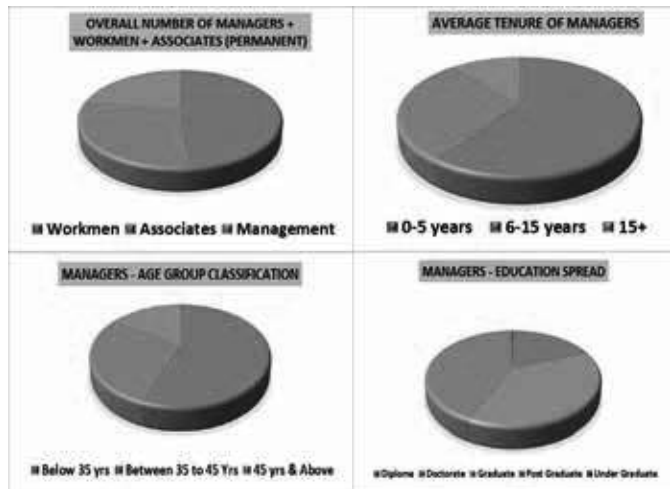


Fig 1-4: Demographic profile of CEAT employees

#### 9.1.1 Frontline Attrition

Frontline salespersons, have a high impact on customer satisfaction and demand generation. They are young, have high mobility and ample job opportunities in the market. These external factors have a bearing on retention. In FY 13, Frontline attrition was 34%. The 1<sup>st</sup> QIP was done to understand and analyse the underlying issues. Managerial support and empathy emerged as a major concern. Number of initiatives like Contact norms, Attrition Risk Profiling were taken to address the concerns. Our drive resulted in attrition dropping to 11% over 2 years. By end of FY16 attrition increased to 20%. A 2<sup>nd</sup> QIP was again undertaken to analyse the reasons for increase in attrition despite implementation of number of initiatives.

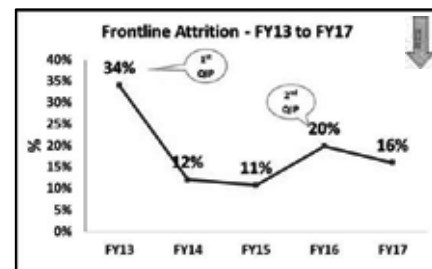


Fig 5: Frontline Attrition dropped by around 50% over 4 years

Analysis led us to understand that delighters had become basic needs. Promotion assessment and performance communication were amongst the main pain points. Our endeavour would be to drive continual improvement.

#### 9.1.2 Happy Workmen

In the legacy plants at Bhandup and Nashik, relationship between workmen and management was strained. Inadequate two-way communication, high number of Muris, unsafe conditions and a low level of trust between union and management were resulting in low engagement levels. CEAT's people philosophy enabled a turnaround and transformation of the legacy plants. Some key initiatives like employee development, communication, Muri elimination, improvement in basic infrastructure and recognition resulted in a steep increase in the Happy Workmen score. The Happy employee survey showed a steep increase from 79% to 93% at Bhandup and 62% to 95% at Nashik over a period of 3 years.

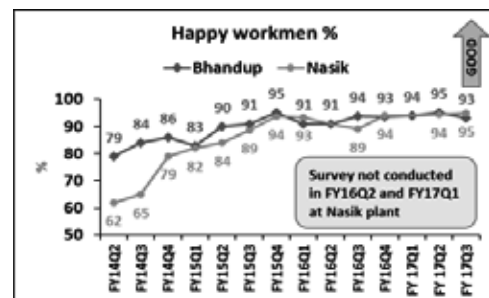


Fig 6: Bhandup and Nashik Happiness score is 93% & 95% resp. in FY17 Q3

#### 9.1.3 SMT Deployment

Basis learnings from the legacy plants, CEAT mandated autonomous operations on the shop-floor in the new plant in Halol in 2010. To create a modern work culture, the company adopted the Self-Managed Team (SMT) philosophy. SMT is an empowered group of people with operational decision-making authority on the shop-floor. Young technical graduates were recruited and trained on technical and behavioral competencies for 90 days before they were given charge of sophisticated machines. This led to a creation of an effective and highly skilled pool in a short span of time. Most of these young graduates were commissioned right from the installation process of the hi-tech machinery and hence it instilled a high degree of ownership. The team largely handles plant operations on its own, with minimal supervision. In day to day operations, managers 'coach and mentor' instead of 'command and control', leading to a self-sufficient team. Implementation of SMT in the newer plants helped plug the current gaps which are stated below:



Differentiating Parameters	Old Manufacturing Plants	New Manufacturing Plants (SMT Philosophy) – Halol and Nagpur
Machinery / Equipment	Semi-automatic	Predominantly automated with very little manual operations
Profile of workmen	Semi-literate	Technical graduates
Style of management	Supervised, controlled	Autonomous, team work
Work levels	Multiple levels amongst workmen basis seniority	Significantly reduced work levels. Associates differentiated basis skill levels

**In order to deploy the SMT philosophy, the following initiatives were co-created:**

Philosophy / Objective	Tool / Method Used – Purpose
Teamwork and ownership	The workforce was divided into teams with their own identity and team name. This enabled faster decision making because of empowerment
Leadership	STAR CAP - Employees from across SMT areas were responsible to drive initiatives pertaining to HR, planned maintenance, quality assurance and production planning over and above their regular duties. It helped in reduction of supervision time leading to sharper focus on improvement activities.
Self-governance	A cross functional value governance team comprising associates and management staff was setup to take suitable actions in order to uphold values
Reward and recognition	Various forms of recognition, example, Best SMT Area, Best STAR Cap project etc. were introduced to motivate and encourage desirable behavior
Transparent and timely communication	SAM (Shift Assembly Meetings) at the end of every shift, DWM (Daily work management) meetings, monthly open house.

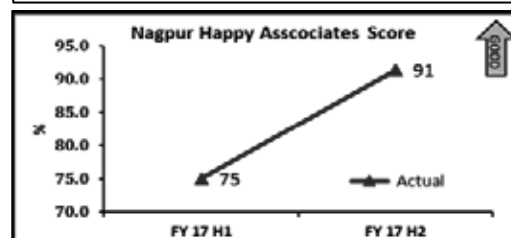
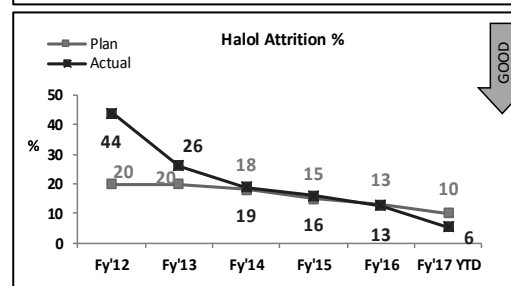
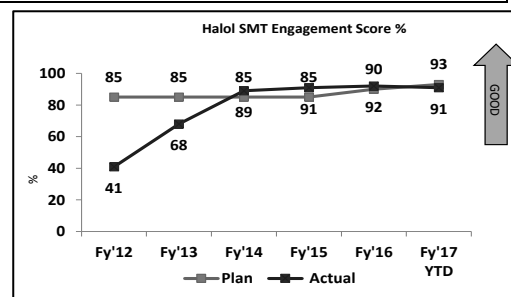
In order to further streamline processes, companies which had successfully implemented SMT, were benchmarked around organisation structure and people practices. Improvement areas identified were a number of work levels, multi skilling, autonomy, empowerment of associates, role of HHTs (Hand Holding Team members) etc.

Lessons learned from Halol and the benchmarking exercise were used to streamline SMT processes in Nagpur Plant are-

- Reduction in work levels to 4 from existing 5
- Manufacturing associates perform the routine QA, Engineering, Technology and Safety functions
- Planned job rotation across functions for associates in order to increase multi skilled pool
- Role of HHT (Hand Holding Teams) changed from being a manager to eventually becoming a coach
- Standardised tool to measure effectiveness of SMT processes.

Key business benefits from SMT implementation are as below:

- Exemplarily safe work environment which is endorsed by the British Safety Council (CEAT was awarded the Sword of Honour making it the only tyre plant in India with this distinction).
- Automobile OEMs approval to Halol Plant highlighting superior quality of tyres
- Increased productivity and continual improvements vis a vis legacy plants (Halol plant better by 24 metric TPD)



**Fig 7: Reducing Halol attrition trend, improving workmen happiness trend in Halol and Nagpur**

## Chapter 10 Outstanding Activities, Overall effects and Future Plan

### 10.1 Leadership in Domestic Motorcycle Market

**Status in 2011** CEAT was ranked fourth in the overall Indian tyre market, predominantly dealing in the Truck and Bus segment, which had a high cost structure. To meet its vision of profitability in FY16, CEAT decided to focus on the highly profitable Motorcycle (MCY) business, which was slated to grow at a rapid pace with a CAGR of 14%. Due to capital constraints, CEAT adopted the outsourcing model to grow capacity rapidly. The 2-Wheeler market was dominated by the market leader, with an established dealer presence, strong visibility, brand pull and comprehensive product range. CEAT was the No. 4 player in MCY with limited product range, low brand preference and small OEM share with constrained in-house capacity.

**Developing New Products:** To close gaps in range and to create customer pull, CEAT had to develop breakthrough products at a rapid pace. To develop technical capability in the product development system, the R&D team was realigned along the product categories and technology platforms. Further, team expertise was developed, through training in advanced technologies and joint project development with technology centres and suppliers. Using the newly developed expertise and consumer in sighting methods, two blockbuster platforms were developed in MCY - GRIPP and MILAZE - to drive MCY growth. The GRIPP pattern has received the IMARK award in FY15 for innovative design. The CEAT product range has now grown to cover most of the MCY vehicles in the Indian market through accelerated product development– 125 new MCY SKUs were added in the period FY11-FY16.

**Quick Ramp Up of Capacity:** To create motorcycle capacity quickly and with minimal investment, CEAT had to develop reliable and capable outsourcing partners. CEAT began stationing a unit Manager from the CEAT payroll in outsourced plants to share technical expertise and extend QA. Also, joint participation in improvement activities like SMED and QIPs to improve OEE helped develop the technical capability as well as engagement of outsourcing partners. Long term agreements and regular vendor satisfaction surveys ensured stable relations with the partners. Today key OEMs like Honda, Yamaha and Hero have approved CEAT’s outsourcing plants for supply of motorcycle tyres. This has helped ramp up outsourcing production volume from 0.35 to 1.2 Million MCY tyres annually.

**Creating Brand equity:** Compared to the competition, CEAT was largely inactive in Mass media advertising in 2011. With the development of the new GRIPP platform, CEAT launched its first TV communication for MCY based on the ‘Superior Grip’ message. This was based on the insight that Indian motorcycle riders were primarily concerned with grip and safety. The message was further strengthened with the Monsoon Smart campaign to project CEAT tyres’ capability to provide superior grip even in wet road conditions during the monsoon season. The TV campaign was supported on ground with Influencer (mechanics) engagement program, ‘Gaadi ka Guru’, to engage influencers.

**Developing OEM Business:** Till FY11, CEAT used to be an additional supplier for the economy segment vehicles of OEMs. To grow in the OEM space, CEAT adopted the strategy of moving into premium products of OEMs to gain market share through its Key Account Management module. CEAT is now a first source supplier for many key OEMs. To further improve engagement with OEMs and showcase technical expertise, joint development projects for new technologies were undertaken. This has resulted in development of new products like low rolling resistance tyres with Honda. CEAT’s Share of Business (SOB) in MCY OEMs grown from 4% in FY11 to 26% in FY17.

**Distribution system for the first time in industry:** In FY11, the replacement market primarily consisted of the dealer channel which was loyal to the market leader. To grow quickly, CEAT had to develop its own channel and provide proximity of point of sale and quick service, which the consumer sought. Based on this customer insight, CEAT decided to introduce the concept of distribution for the first time in the Indian tyre industry. Initially built on the consumer goods model, CEAT’s distributor module has now evolved to define the whole process of appointment, management and review of distributors. Initially piloted in FY12 in 2 key geographies, the CEAT distribution channel has now grown to contribute to 65% of the MCY Replacement sales volume.

#### Effects



Fig 1: Doubled Market share in 5 years

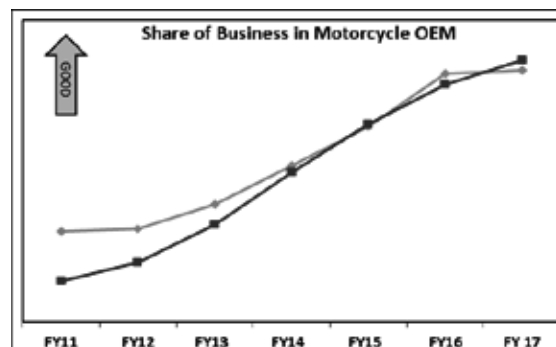


Fig 2: Rapid Growth in MCY OEM – 4% to 26% SOB

## 10.2 Turn around at Old Plants by improving Trust between workmen and management

**Situation in 2008:** In 2008, CEAT’s older plants at Bhandup (50 Years) and Nashik (30 years) were facing multiple challenges. They could not deliver the daily planned capacity due to a high number of breakdowns. In the decades of existence of the plants, maintenance or overhaul of equipment was not done. This put a very high strain on overall output. The workmen were rarely engaged in any improvement activity and their skill development was stagnant. The worker morale was at an all-time low. To improve the above situation, the following holistic approach was launched in FY09.

**Muri Elimination:** For the pilot, two equipment were selected at Bhandup in areas having highest strain and stress. Respective managers had driven the projects by demonstrative leadership and involving all workmen in the area. Fantastic results were achieved at the end of the project. Basis the success of the pilot, a total of 9767 Muri have been eliminated through various Kaizens in Bhandup so far. The same program was initiated at Nashik after the success of Bhandup. Model zones were created in the plants to demonstrate benefits of the drive. Investments were made in improving the quality of basic infrastructure and hygiene. Minimum investments were made to refurbish old equipment, which were then maintained through the practice of CLIT under autonomous maintenance.

**Jai HO Program:** A need was identified to further gain trust by investing in the workmen and appealing to them as individuals rather than as resources. A customised program, ‘Jai Ho’ was launched, strengthening their self-esteem, which led to their self-development. An attempt was made to make them model family leaders and responsible citizens of their neighbourhood. 100% employees were covered under the 3 day program and 100% workmen along with their families were covered under the 1 day program. It resulted in a tremendous change in their mind-set and an improved trust between management and workmen. This turnaround paved the way for their involvement in achieving common goals of the company.

**Chai Chaska:** With the intent to sustain the changes and benefits at a personal level, short duration informal communication programs like ‘Chai Chaska and Hitguj’ were initiated on the shop floor during tea breaks. Their objective was to give employees a refreshing break from their routine job and thereby rejuvenating them.

**People Red Book:** Trust and credibility in management is lost not on big issues but on administrative issues and day-to-day troubles at the workplace. So, to sensitively capture people’s issues and to resolve them in a systematic way, ‘People Red Book’ was initiated. It was designed to collect the voice of the people and convert them into phenomena, which are resolved before they grew into bigger issues. It helped to build a culture of transparency and empowered the workmen to speak to management freely.

**Involvement:** The SPARSH Circles (QC Circle) were initiated in FY16 where training was imparted to the workmen and they selected problems in their area of work and solved them in a structured way. 40% of the workmen have been covered and they have formed 150 circles thus far. The plan is to cover 100% workmen by March FY18. The effect of all these initiatives is visible through a ‘control survey’ which measures whether the initiatives undertaken by management are addressing the concerns of the workmen or not. The ‘Happy Workmen survey’ consists of 20 questions, 19 of which are rated on a 5-point scale, while the 20<sup>th</sup> question is based on a ‘Yes/No’ scale that measures whether the workmen are happy to work at CEAT. The survey is conducted quarterly on a sample basis. The tremendous improvement in the Happy Workmen percentage score proves that the actions taken by the management have had a deep impact on winning the trust of the workmen. This journey of transformation to achieve the vision would not be possible without employee involvement, especially in the two old plants.

Table 1

Approach	Initiative
Inspiring Workplace free of stress and strain	<ul style="list-style-type: none"> <li>• MURI Elimination</li> <li>• 5S</li> <li>• Safety</li> </ul>
Trust Building	<ul style="list-style-type: none"> <li>• People Red Book</li> <li>• Infrastructure Improvement</li> <li>• Communication and Recognition</li> </ul>
People Development	<ul style="list-style-type: none"> <li>• Jai Ho Program / Appreciative Inquiry</li> <li>• Skill Development</li> <li>• Chai Chaska / Hit Guj programs</li> </ul>

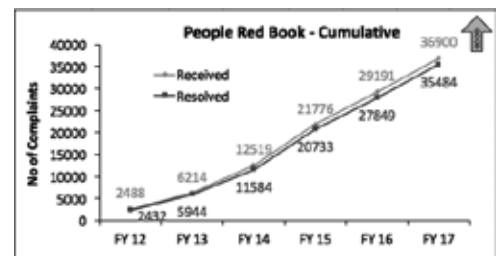


Fig 1

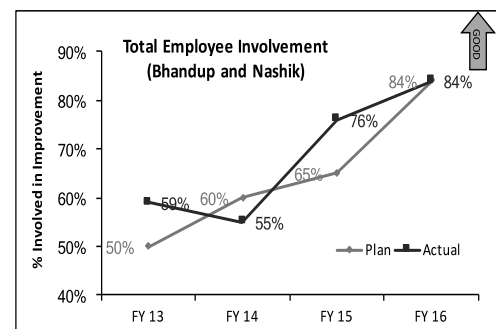


Fig 2: Improving TEI Score

### 10.3 Innovating Delivery Chain through “End to End PULL”

#### Problems before FY’12- “Sell what is produced”

In FY’12, we had a forecast driven system wherein material was pushed to next downstream node resulting in

- Production aimed at maximizing tonnage and distribution’s task was to push material basis forecast and production, irrespective of actual sales. It was leading to several cases of demand supply mismatch.
- There was a manual process of distribution from DCs to CFAs which was a highly time- consuming activity (1-2 hours daily for each Regional Sales Manager) and at the same time, an error prone process.
- The sales team controlled inventory at the CFAs, there was no service metric related to stock availability at CFAs.
- There was a lot of noise regarding material availability, while inventories were also high at the same time.

#### Introduction of PULL system

In Nov’11, we decided to work towards a Customer Centric Consumption based system whereby material would be pulled downstream basis actual consumption. We called it ‘Pull Based Replenishment’. It is a unique initiative in the Indian tyre industry wherein PULL starts from customer and extends right up till RM suppliers. We have setup supermarket levels for all materials, which have been statistically calculated considering factors like Average Lead Time (in days), Average Daily sale (in units), Review Period (in days) for cycle stock requirement and Service levels, Demand variability during lead+ review period, Lead time variability for Safety stock requirement. A system has been created, which senses if the actual inventory levels are lower than supermarket levels and accordingly send a demand signal to the upstream station. The actual replenishment happens only post that.

#### How CEAT customers PULL from Billing Points

##### PULL for Exclusive Customers (CEAT Shoppes) & Distributors:

- Implemented automated replenishment system
- Inventory visibility through billing (POS) system
- Auto delivery order creation by system upon supermarket level gap

Result: Reduced Distributor inventory from 26 days (Nov-16) to 15.1 days (Feb-17)

##### PULL system for Multi Brand Dealers:

- Setup a centralized order processing system (COPS)
- Captures unconstrained orders from dealers
- Auto sales order creation by system

Result: No of Calls received at COPS increased to 6161 calls in Feb -17

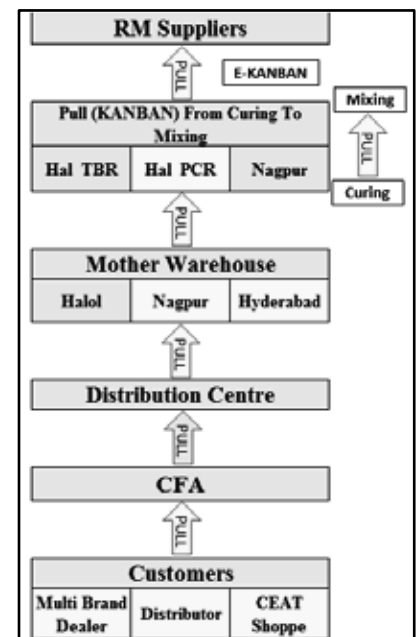
**How Billing points PULL from DCs/ MDCs:** Supermarket levels have been setup at CFAs. System runs at night to calculate the gap between supermarket levels and actual inventory. System then creates an automatic purchase order which is then executed by the DC/MDC team next day. A unique concept of ‘must dispatch frequency’ is also put in place wherein the CFA gets guaranteed delivery at a pre-determined frequency.

**How PULL happens in plants:** Production scheduling in Halol TBR and Nagpur is done basis the Kanban signals. This avoids unnecessary inventory build-up while simultaneously reducing production halts due to WIP shortage and empowers line managers to schedule the machines based on the live progress of production.

##### How Plant PULL Raw Materials (RM):

In 2012, CEAT implemented the Electronic Kanban system for procurement of all local raw materials from suppliers and rubber was on internal Kanban from the Rubber Purchasing Department, Cochin to Plant. Whenever stock in the plants reaches a re-order level, a Kanban signal is sent out by email to replenish the stock.

Result: RM inventory reduced from 24.1 days in FY12 to 18.7 days in FY17



**Fig 1: Status of PULL Implementation across the value chain. Blue- Implemented, Yellow- WIP.**

**Overall Results:**

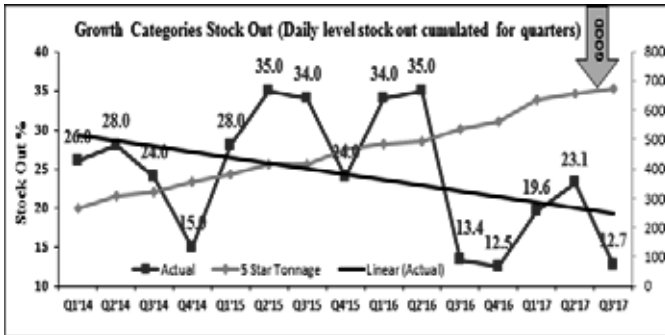


Fig 2

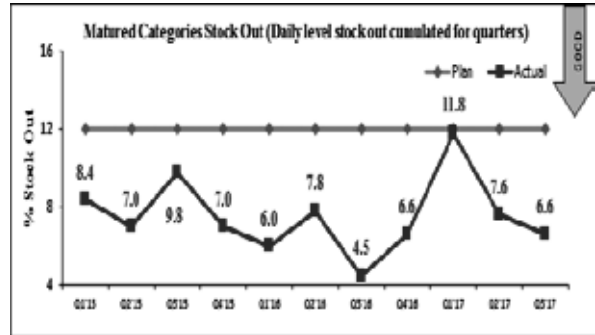


Fig 3

**Reduction in Stock Out:** Stock out has been reduced in capacity constrained growth categories (5- Star), while their sale has more than doubled in last 3 years. Stock outs in matured categories have always been below target.

**Industry Accolade:** CEAT End to End Pull Implementation was adjudged the winner under the End to End Customer Solution category at the 6<sup>th</sup> Annual Manufacturing & Supply Chain Awards among 200 participating companies.

**10.4 Overall Effects**

**No. 1 in J. D. Power Survey**

CEAT ranked highest in India for OEM Tyre overall customer satisfaction (3346 respondents), according to the J.D. Power 2017 India OE Tyre Customer Satisfaction Index (TCSI) Study. CEAT is followed by MRF and Bridgestone. In its first year of participation itself, CEAT's score of 893 (out of a 1,000 point index) is the highest in the last 3 years across all manufacturers.

**Other Effects**

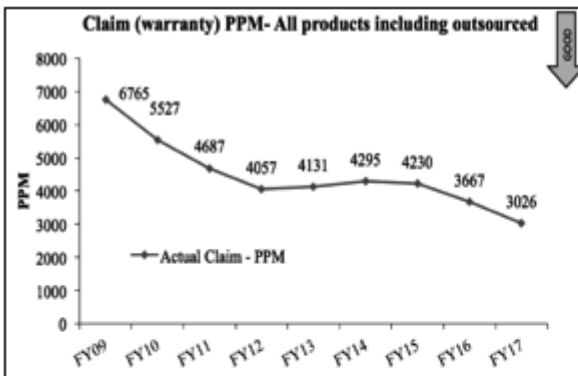


Fig 1: Steady decline in Claim PPM over the years

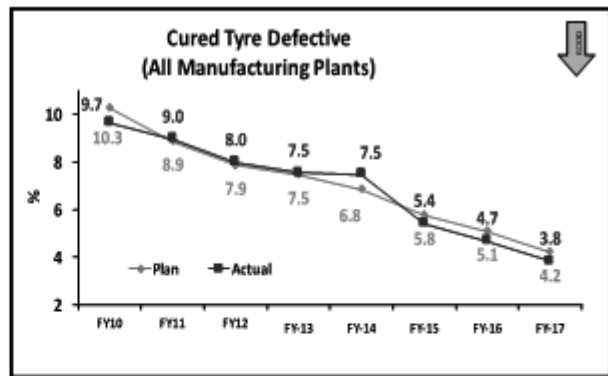


Fig 2: Manufacturing defect rate reduced to 3.8%

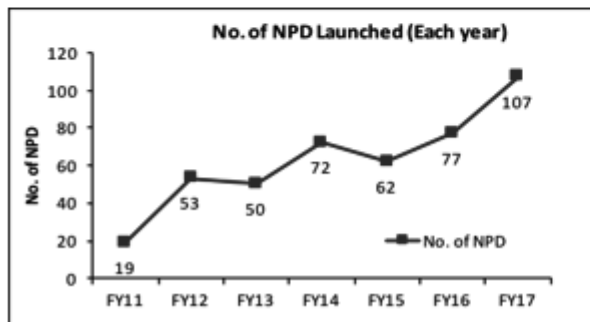


Fig 3: 400+ New SKUs launched in the last 5 Years

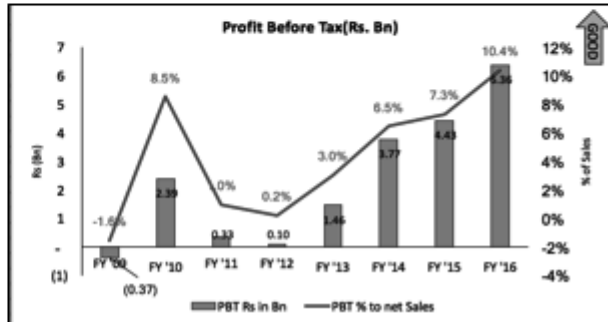


Fig 4: Steady improvement in profit since QBM



Fig 5: Direct Fleet Customer satisfaction score

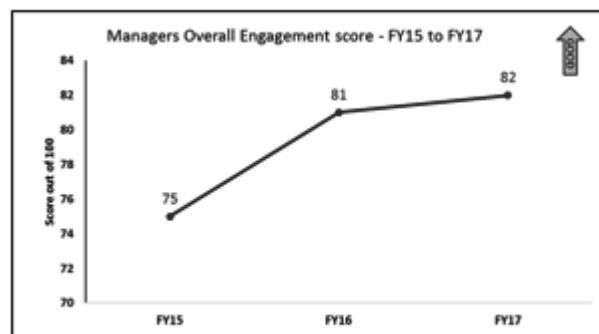


Fig 6: Increasing Managers Engagement Score

While CEAT enjoyed a good market position in the nineties, it also made losses in the first decade of the 21<sup>st</sup> century. It offered products in multiple categories but failed to secure a leadership position in any of them. Top-of-mind customer consideration for CEAT was low, as it was predominantly a price player with no differentiated product offering. The market questioned whether CEAT would survive or perish.

Since the adoption of QBM in FY08, CEAT has steadily and continuously improved its profit and market position in key product categories and created a high brand recall in the mind of the consumer. Some of the salient features and key achievements of CEAT during the QBM journey are mentioned below:

- Continuous improvement in the satisfaction of all stakeholders (customers, employees, society, suppliers, outsourcing partners)
- Transparent and open working culture of the company, which attracts the current generation of employees. Several employees have returned back to CEAT after trying out other career options
- Increasing market presence in domestic as well as international market
  - Our PCR tyres are now being sold in European markets)
- From playing catch-up in the product range, we have launched 400+ SKUs under the NPD process
- Significant increase in Motor Cycle market share and a commendable position in the PCR and UVR segment
- Development of a state-of-the art R&D facility at the Halol Plant
- Two new plants established, with a further plans for both brownfield and greenfield projects in the pipeline
- Creation of some unique practices in the Indian tyre industry:
  - Creation of Pull (order replenishment) system throughout the supply chain
  - Developing puncture safe motorcycle tyres – breakthrough product development
  - Women working at tyre production stations in our new plants – a first in the Indian tyre industry
- Complete transformation of the old plants with high level of employee involvement in improvement activities
- Significant achievement of FY16 Vision with a high focus on achieving the FY21 vision
- Making steady profits over the years

### 10.5 Future Plan for strengthening QBM

- Improve focus of QBM activities on medium term issues of the company
- Further raise problem solving capability with greater use of advanced methods
- Deepen management understanding in paradigm shifts in QBM and modify practices accordingly
- Strengthen QBM practices, particularly in HR and Finance
- Further extension of the QBM way of management to partners of CEAT

**GLOSSARY**

Alphabet	Sr no	Abbreviation	Full Form	Description / Operational Definition
<b>A</b>	<b>1</b>	AM	Autonomous Maintenance	It is a principal component of total productivity maintenance (TPM - JH).
	<b>2</b>	CAGR	Compounded Annual Growth Rate	
<b>C</b>	<b>3</b>	CAPEX	Capital Expenditure	
	<b>4</b>	CFA	Carrying and Forwarding Agent	Third party business partners used to carry and bill stocks to dealers/ distributors/Customers
	<b>5</b>	CLIP	Committed Line Itemized Performance	A performance metric used to measure production adherence at plants. If the warehousing for a SKU falls between 90% to 110% of the plan, CLIP is 1, else 0.
<b>D</b>	<b>6</b>	DC	Distribution Centre	Central warehouse stocked with products (goods) to be redistributed to different CFAs
<b>E</b>	<b>7</b>	EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization	EBITDA = Revenue - Expenses (excluding taxes, interest, depreciation and amortization)
<b>F</b>	<b>8</b>	FY	Financial Year	Accounting period that starts from 1st April and ends on 31st March next year
<b>K</b>	<b>9</b>	KAIZEN		Implemented improvement Ideas suggested by employees
<b>M</b>	<b>10</b>	MD	Managing Director	A chief executive officer /CEO of the company
	<b>11</b>	MDC	Mother Distribution Centre	A central warehouse which is located between plant and distribution centres (DCs) in the supply chain. Stocks from plants move to MDCs while DCs are replenished from it.
<b>N</b>	<b>12</b>	Net Sales	Net Sales Realisation	Gross Sales Realisation minus Excise Duty

Alphabet	Sr no	Abbreviation	Full Form	Description / Operational Definition
O	13	OEE	Overall Equipment Effectiveness	It is a performance metric compiled from three data sources of the machine (or Process) being measured
	14	Open House		Mutual Communication forum to communicate about current performance of company & Sharing issues
P	15	PFMEA	Process Failure Mode Effects Analysis	It is a structured analytical tool used by an organization, business unit, or cross-functional team to identify and evaluate the potential failures of a process
	16	PM	Planned maintenance	Planned maintenance is maintenance that is defined, documented, and done before equipment fails
Q	17	QC	Quality Control	
	18	QCD	Quality Cost Delivery	
	19	QCDSM	Quality Cost, Delivery, Safety, Morale	
S	20	SKU	Stock Keeping Unit	distinct type of item for sale
T	21	TAT	Turnaround time	
V	22	VSM	Value Stream Mapping	VSM is a visualization tool to understand and streamline work processes using the tools and techniques of Lean Manufacturing.
W	23	WIP inventory	Work In progress inventory	Intermediate inventory
Y	24	YOY	Year on Year	A method of evaluating two or more measured events to compare the results at one time period with those from another time period on an annualized basis