２０１３年度

デミング賞 受賞報告講演要旨

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RSB Transmissions (I) Limited,
Auto Division (Jamshedpur (Unit 1), Pune & Pant Nagar Plant)

RSB TRANSMISSIONS (I) LIMITED

Auto Division – Jamshedpur (Unit 1), Pune plant and Pant Nagar plant

India

TOTAL QUALITY MANAGEMENT PRACTICES

Contents:

1. OVERVIEW OF RSB:

RSB Transmissions (I) Limited belongs to the RSB Group, India. RSB group was established in the year 1975 to cater to the needs of Tata Motors Limited, a leading Automobile manufacturer in India. RSB Group employs a work force of 4260; with an annual turnover of Rs 13,411 million (JPY 23,432 million). RSB group caters to the needs of 5 major automotive manufacturers and 12 non-automotive manufacturers in India, as of 2012-13.

RSB group's basic philosophy lays EMPHASIS ON CUSTOMER SATISFACTION and FIRM BELIEF IN HIGH ETHICAL VALUES IN BUSINESS. The founders Mr. R.K. Behera and Mr.S.K. Behera remain committed to QUALITY, SERVICE AND RESPECT FOR HUMANITY.

1.1 RSB Group structure:

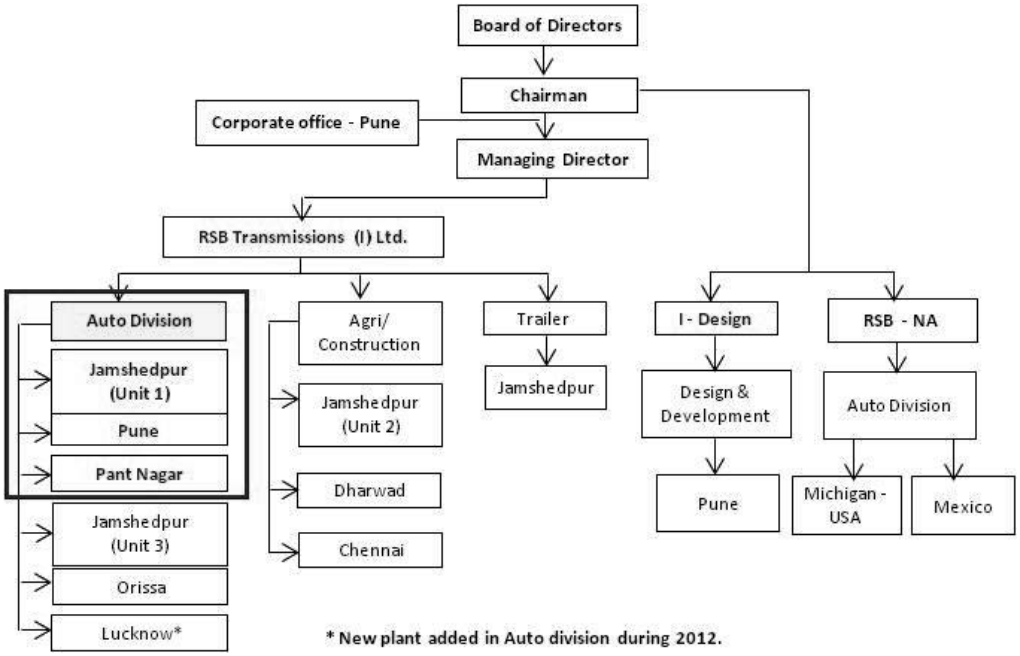


Chart 1.1

1.2 Auto division plants

Auto division consists of 6 plants.

1. Jamshedpur (Unit 1) - Established in 1990 (Propeller Shaft)

2. Pune - Established in 1996 (Gears)

3. Pant Nagar - Established in 2007 (Front Axles)

4. Jamshedpur (Unit 3) - Established in 2008 (Axle Beam)

5. Orissa - Established in 2008 (Forging unit)

6. Lucknow plant - Established in 2012 (Propeller Shaft)

RSB has won the Deming application prize- 2013 for the 3 plants of

Auto division: 1) Jamshedpur (Unit 1), 2) Pune 3) Pant Nagar (Refer Chart 1.1)

1.3 Products Applications & Features:

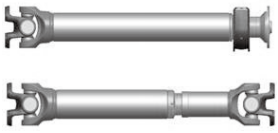
 [M&HCV]	 [Propeller Shaft]	To transfer Torque and rotation from the Gear Box to the Axle in a smooth and continuous action	Coated sliding joint with Involute splines. Universal joint with Teflon thrust washer & multi lip seals Lower Torque to weight ratio
 [Passenger cars]	 [Gears]	To transmit power and motion between rotating shafts	Minimum noise & effort Ground & Honed Gears to DIN class 6 accuracy
 [SCV]	 [Front Axles]	Front Axle supports the vehicle at the front, connects two front wheels, and allows free rotation of the wheels and helps manoeuvring of the vehicles.	Tubular low cost design Disc Brake

Fig 1.1

1.4 Products – Market segment – Customers:

RSB has classified its products into two categories - 1) Transmission components (81% of sales revenue) & 2) machined components (19%). The product category with target market and key Customers are briefly described in Fig1.2.

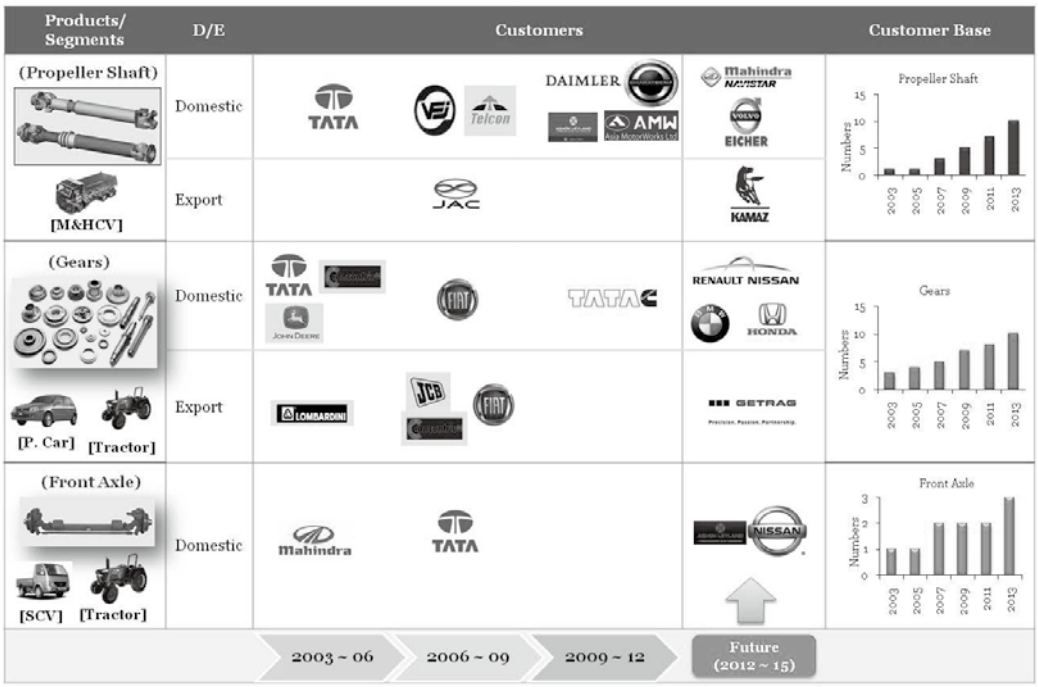


Fig 1.2

1.5 Market position:

Due to continual improvement in Product Quality and Customer focus, RSB could improve the share of business and emerged as market leader in its core competency area; Propeller Shaft, Gears & Front Axle. Propeller shaft (M&HCV)

(1) Propeller Shaft:

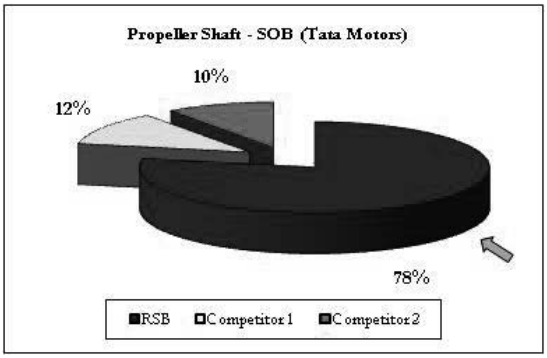


Fig 1.3

(2) Gears:

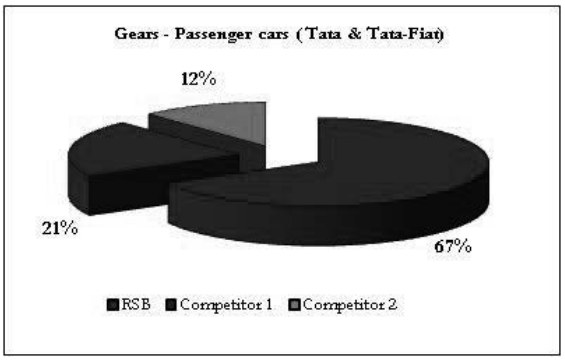


Fig 1.4

(3) Front Axle:

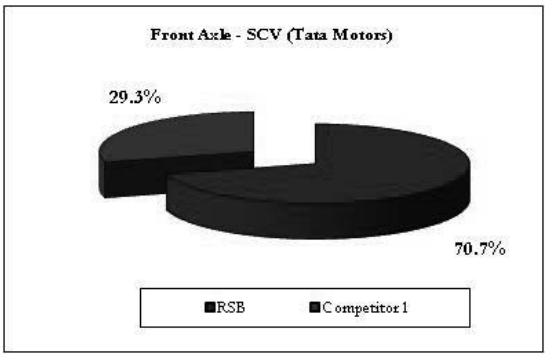


Fig 1.5

1.6 TQM Policy:

RSB TRANSMISSIONS (I) LTD is committed to delight Customers by implementing TOTAL QUALITY MANAGEMENT (TQM).

We shall achieve this by:

* Providing consistent product quality at right time and price.

* Effectively and efficiently utilizing man, machine, materials and technology.

* Developing employees by providing adequate training.

* Involving & motivating all employees (TEI: Total Employee Involvement) for continual improvement in work place and processes.

Date: 25-09-2006 R.K.Behera

Rev.: 01 Chairman

1.7 Mission – RSB Group:

"To be amongst the most admired Organizations with significant global presence"

1.8 Vision – Auto Division:

"Be a leading Indian manufacturer of Transmission components and Systems with global presence"

1.9 Quality Management System:

RSB started improving product Quality & Customer satisfaction from the inception stage. In the initial stage the major thrust was establishing a Quality Management System. Hence RSB chosen ISO 9001 and TS 16949 (Automotive specific standard) and obtained certification from Underwriters Laboratory.

After establishing a basic QMS, RSB started focusing on fully blown up TQM activities from 2006.

2. OBJECTIVES AND STRATEGIES

2.1 Background:

Until 2005, RSB was using Business planning activities focusing on Business volume without evolving a clear strategy. Due to this there was a huge gap in the performance and profit level. Customer satisfaction was also low. RSB was not clear on selecting business segment.

After the introduction of fully blown up TQM activities in 2006, RSB made a systematic approach for overall business improvement, Customer satisfaction and improving capability of the people. The new approach is focusing on evolving clear "STRATEGIES" for achieving the business objectives and satisfaction of the stakeholders including Customers.

2.2 Overview

RSB was established in the year 1990 and started manufacturing machining components from 1990. RSB growth journey is explained in figure 2.1.

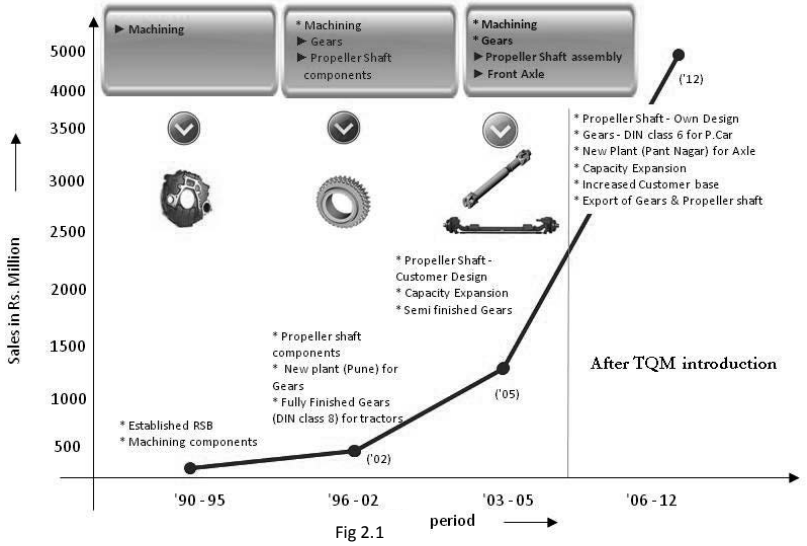


Fig 2.1

2.3 RSB's Business Environment (Prior to 2005):

Focused business: RSB was focusing on Gears and Machining until 2004.

(1) Propeller Shaft (M&HCV - India):

After 2004, started manufacturing Propeller Shaft for M&HCV, using the relationship with Tata Motors.

* Managing new business was difficult and warranty rejection was high, which lead to Customer dissatisfaction.

* Hence the focus was to satisfy Customers to develop defect free new products, thereby expanding business.

In this process, RSB was on the lookout for own design.

(2) Gears - Passenger cars and Tractors:

Until 2005, RSB was focusing Gears only with few Customers. RSB was producing Semi-Finished Gears for Passenger cars and fully finished Gears for Tractors (DIN class 8~9 Quality). Passenger car Gears manufacturing was not outsourced by many OEM's.

(3) Front Axle - SCV

RSB manufacturing Front Axle based on customer design for Tractors and SCV segment focusing on single Customers.

(4) Machining:

This is an old business from the inception stage focusing on selected Customers (sub contracting activity).

2.4 BUSINESS OBJECTIVES & STRATEGIES (2006 ~ 12)

(1) Business Objectives:

After starting of TQM practices and based on the analysis of various factors and RSB's core competencies, RSB evolved a measure for Vision, which are given below:

Vision: "To be amongst the most admired organizations with a significant global presence"

We will achieve this by meeting the expectations of "STAKEHOLDERS" by benchmarking 'best in Class' Indian Auto companies

1. **Be a preferred Supplier to the CUSTOMERS.**
2. **Provide job satisfaction to EMPLOYEES and continuously engage in development of talent & skill.**
3. **Satisfy INVESTORS by value creation of their investment.**
4. **Respect for environment and care for the COMMUNITY development.**
5. **Satisfy the GOVERNMENT by complying with all the rules & regulations.**
6. **Satisfy the SUPPLIERS & VENDORS and be a friendly Customer.**

Based on the Vision, RSB set definite goals to be achieved (Refer Table 2.1).

Table 2.1 Objectives

#	Objectives	Base Level	Target	Benchmark (Best in class company in India)
		FY' 05-06	FY' 14-15	
1	Customer satisfaction Index			
2	Employee Satisfaction Index			
3	Return on Capital Employed (ROCE)			
4	Corporate Social Responsibilities - CSR Index			
5	Statutory Compliance - %			
6	Supplier retention - %			
7	Export Sales - % over total Gear sales			

RSB analyzed once in 3 years all factors (External and Internal) and evolved medium term business objectives. This will be further analyzed year wise and set objectives for every year as explained in Policy Management.

(2) Strategies (2006 - 09):

In order to achieve the Objectives set, RSB evolved strategies based on various factors like Business Environment analysis, critical issues etc., including SWOT analysis. The strategies are Classified into 4 categories:

Table 2.2 Strategies (2006

#	Category	Strategies	Sub-Strategies
1	***Challenging Customer Oriented Business Strategies***	*1) Improve Propeller Shaft Business*	*1a) Develop competency for own Design* *1b) Cost advantage through Backward integration*
		2) Improve Gear Business	*2a) Expand Gear business through Tata-Fiat* *- Develop capability for fully finished Gears with DIN Class 6 accuracy level* *- Expand Capacity*
		3) Establish Front Axle Business	3a) Establish a new plant 3b) Capacity Expansion
		4) Improve Export Business	4a) Develop capability for Export
		5) Improve After market Business	5a) Gain advantage through Tata network
2	Infrastructure strengthening Strategies	6) Reduce wastage all over	6a) Focus on prevention of rejections & accidents 6b) Yield improvement
		7) Create Kaizen Culture	-
		8) Cost reduction through group Buying	8a) Procurement from China 8b) Bulk purchase for the group for raw materials and other key input materials
3	Cultural related Strategies	9) Become a learning organization 10) Improve training	9a) Hire consultants for training & development 9b) Use of External facilities like AOTS 9c) Learning's from Best in Class organizations (Companies won Deming prize & JQM)
4	Methodology related strategies	**Practice TQM concepts**	

2.5 BUSINESS OBJECTIVES & STRATEGIES (2009-12)

(1) Strategies FY'09-12

Table 2.3 Strategies (2009-12)

#	Category	Strategies	Sub-Strategies
1	**Challenging Customer oriented Business Strategies**	*1) Expand Propeller Shaft Business*	*1a) Business through Ashok Leyland* *1b) Improve product range* 1c) Improve Design to reduce warranty failure 1d) Business through VEVC/AMW 1e) Development for Daimler India
		2) Gain advantage through Gear technology	2a) Productionize the FIRE model gears for Fiat. 2b) Identify potential Customer for Gears
		3) Stabilize Front Axle Business	3a) Retain SOB with Tata Motors
2	Infrastructure strengthening strategies	4) Stabilize Export Business	4a) Leverage the Gear Technology - Export to Brazil & Argentina 4b)Export Propeller Shaft to Russia
		5) Reduce wastage all over 6) Major thrust for cost reduction	-
		7) Enhance Plant capacity	7a) Improve capacity for *Propeller shaft* , Gears and Front Axles
3	Cultural related strategies	8) Improve Skill level & retain talent 9) Create Kaizen culture	a) Focused training b) AOTS training c) Developing internal trainers d) Focused welfare measures e) Appraisals & Promotions f) Creating safe work environment
4	Methodology related strategies	**Practice TQM concepts**	

2.6 Status of Objectives (2006-12):

At defined frequency, the achievement areas and non-achievement areas were reviewed by top management. The Objectives and Strategies were reviewed at year end and course corrections were done. In this process, RSB could achieve improved Business performance and Customer satisfaction as given in the table 2.4.

Table 2.4 Status of Objectives (2006 – 12)

#	Objectives	Base level 2005-06	Effects					
			06-07	07-08	08-09	09-10	10-11	**11-12**
1	Customer satisfaction	75	90					**94**
2	Employee Satisfaction	64	71					**90**
3	Return on Capital Employed	12.6	11					**25.4**
4	CSR Index	65	69					**80.5**
5	Statutory compliance,%	100	100					**100**
6	Supplier retention,%	97.6	98.6					**99.3**
7	Export % over sales	9	13.0					**21.9**

2.7 BUSINESS OBJECTIVES & STRATEGIES (2012-18) - FUTURE:

At the beginning, RSB top management evolved Vision during 2006. In order to improve Business performance, RSB senior management reviewed the need for revising the Vision. After a thorough review by senior management along with top management, revised Vision for Auto Division.

(1) Vision 2018 - Auto Division:

"Be a leading Indian manufacturer of Transmission components and Systems with global presence".

The Vision was revised to establish more focus on selected market (India) and to become a leader in India in order to become an admired organization. A measure was established for the realization of Vision:

(2) Strategic Business Planning (SBP):

To realize Vision 2018, RSB adopted Strategic Business Planning process.

The Strategy Business Planning process is facilitated by senior management team headed by President. All Senior and middle management team members participate and finalize Business plan for the mid-term (3 years). The Strategic Business planning process is carried out as per the flow chart given in Fig 2.2

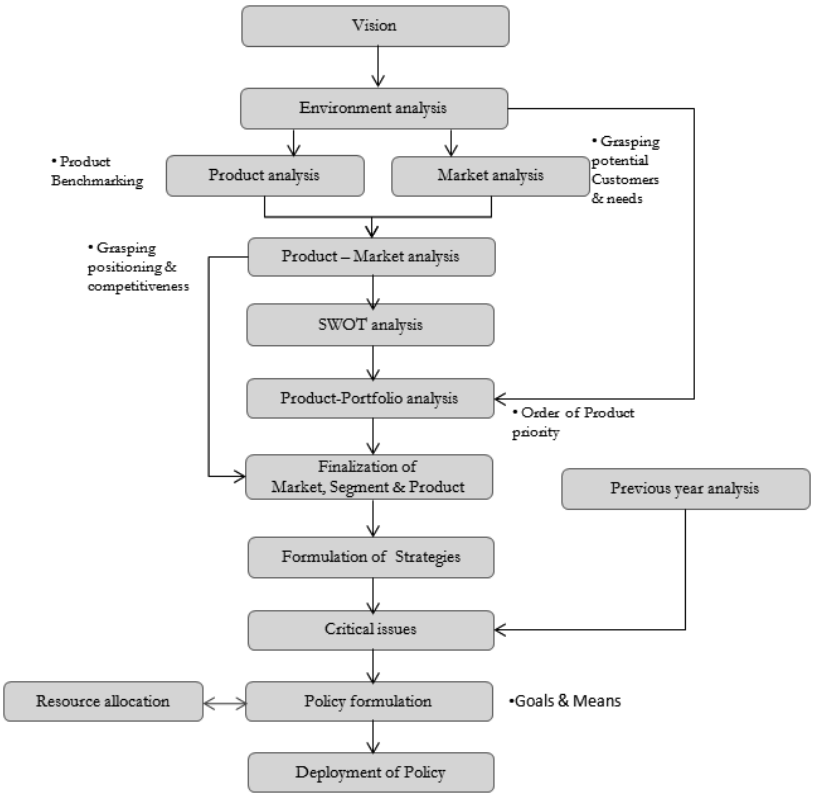


Fig 2.2

The Strategies are evolved for the finalized products and markets. Critical issues are identified based on the above analysis and previous year performance. Policy is formulated and deployed to plants and department level, which is explained in section 4.1. Resource allocation analysis carried out based on product prioritisation and Policy.

(3) Business Objectives (2012-18):

Table 2.5 Objectives (2012-18)

#	Business Objectives	UOM
1	**Share of Business - Propeller Shaft**	**%**
2	**Share of Business – Gears**	%
3	**Share of Business - Front Axle**	%
4	**Sales revenue**	Rs. Million
5	**Profit**	
6	**Customer Satisfaction Index**	Index
7	**Export sales**	Rs. Million

(4) Strategies (2012-15):

Strategies are evolved based on the above analysis for the accomplishment of Objectives.

Table 2.6 Strategies (2012-15)

#	Category	Strategies
1	Customer oriented Business Strategies	1) Expand Propeller Shaft business in M&HCV - India *2) Enter new segment for Propeller Shaft - SCV* 3) Expand Gears, Hubs & Sleeves business in P.Car - India 4) Expand Front Axle business - SCV 4a) Develop Front Axle to second Customer (SCV segment) 5) Stabilize in Machining business with Existing Customers 6) Export Hubs & Sleeves in Gears for Passenger cars 7) Export Propeller Shaft components and Shafts in M&HCV 8) Achieve Quality Excellence by Improving Product Quality
2	Infrastructure strengthening Strategies	9) Expand Capacity 10) Major thrust for Cost optimization 10a) Backward integration for casting to become cost effective 11) Develop capability of People
3	Methodology related Strategies	12) Continual TQM promotion

3. TQM INTRODUCTION AND PROMOTION

3.1 Why TQM was chosen at RSB?

* With the introduction of Propeller Shaft assembly using own design, RSB was growing but there was no systematic approach and analytical ability was low.

- Warranty rejection was high.
- Internal rejections increased.
- Supplier rejections were not under control.

RSB realized the need for a different approach, but at the same time simple to link all the functions. Hence Total Quality Management (TQM) was chosen.

3.2 TQM initiatives

1. The aim of TQM promotion finalized

    * Realizing the Vision of the company

2. TQM model finalized

3. Training on basic concepts of TQM started (Refer section 4.5)

* POLICY MANAGEMENT
* DAILY WORK MANAGEMENT
* CONTINUAL IMPROVEMENT

4. Appointment of CONSULTANT for training on TQM

5. Policy deployment commenced

6. Structured Daily work management commenced

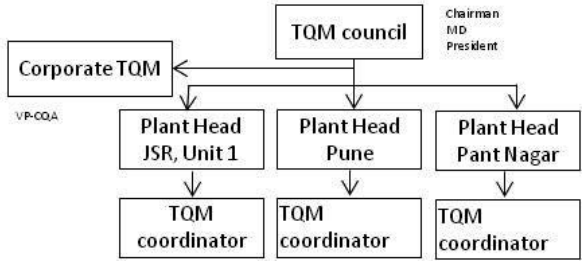
7. Focus on increasing customer satisfaction

8. Focus on improving the technical capability

9. Improving new product quality

10. Cross functional activities and improvement in Kaizen

3.3 TQM Organization:



Role of each individual decided to promote TQM. Fig 3.1

3.4 Aims of TQM promotion:

Aim of TQM is based on the RSB Group philosophy which lays emphasis on Customer satisfaction and firm belief in high ethical values in business.

Through the practices of the concepts of TQM, RSB believes in achieving the Vision of the group. RSB believes that Stakeholders satisfaction can be achieved by improving the business performance and organizational efficiency through the involvement of all the employees.

The above commitment as explained in the TQM model adopted by RSB has helped the company to achieve better business performance.

4.0 IMPLEMENTION OF TQM

4.1 POLICY MANAGEMENT

(1) Background

To align the effort of all employees towards (the company) Vision, RSB provided training on "Policy management". Based on the training, RSB made a procedure for policy management. Long term objectives were evolved to realize Vision. Mid-term objectives & Strategies are evolved to achieve long term objectives. Annual policy evolved to realize these Objectives. These annual policy is deployed to plant level and further to department level.

(2) Policy Deployment :

The aim of TQM is realization of Vision. RSB used the Policy management process to realize Vision. Figure 4.1. Indicates how the President policy is formulated in line with Vision and Strategic Business plan. The President policy is derived based on the Business plan, Strategies and critical issues of the Company.

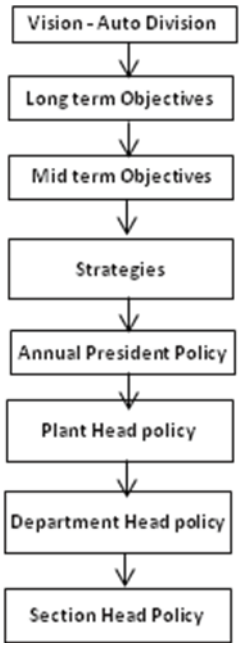


Fig 4.1

President policies are deployed to all plant and department heads and then to section heads. The Goals & Means are developed at each level and deployed. The Catch ball session at plant level and functional level enables the communication of targets, measures across the company and enhances the commitment level for managing points.

A detailed action plan is prepared at each level to meet the objectives.

Review is carried out by top management at defined frequency to verify the performance results. Also an Half yearly review is carried out to verify the achievement and suitability of Policies. Policy is revised where required.

4.2 DAILY WORK MANAGEMENT (DWM)

(1) Background:

RSB established Daily Work Management by defining and monitoring the Key processes. Role clarity provided to all Managers and each manager identifies the accountability area. The accountability area will have Managing Point and each Managing point will have Process Indicators (Check points). The Daily Work Management adopted by RSB is given in fig 4.2

(2) Daily work Management Process:

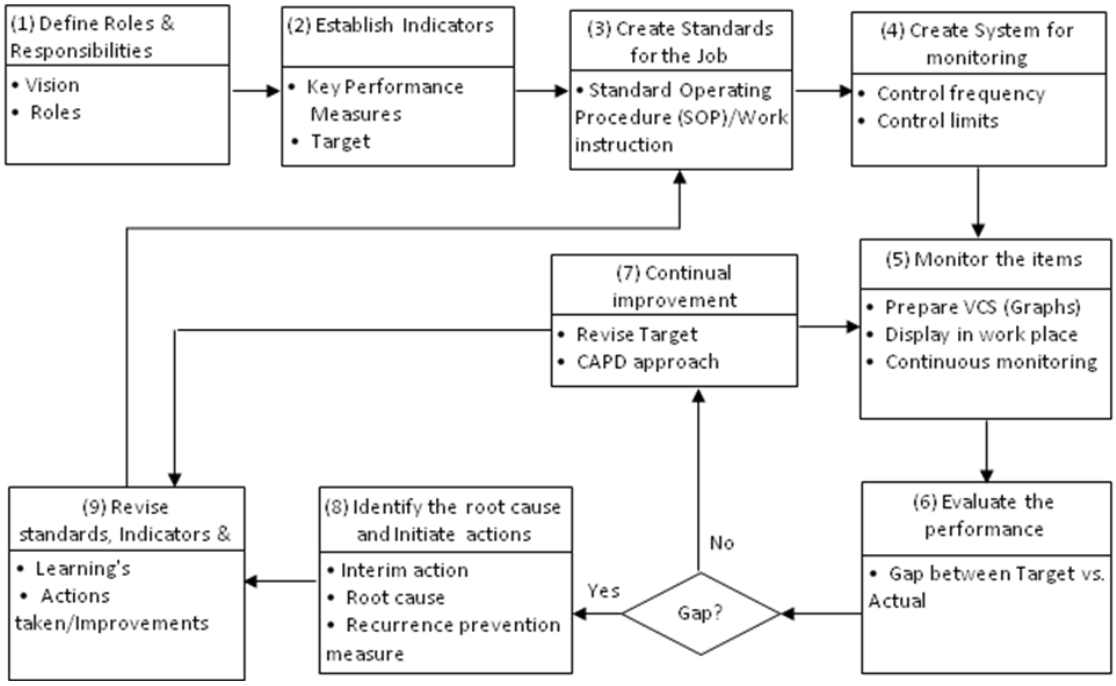


Fig 4.2

(3) Promotion of Daily management:

Table 4.1 Promotion of Daily Management

System development	Deployment of the system	Evaluation & Assessment	Improving the system
• Daily Work management flow chart for manufacturing, Quality, Maintenance, Materials, HR and Business development	• Training on DWM • Display of VCS	• Daily reviews within department & between department • Monthly review by management	• Establishing control limits • Sharing of information's between departments & between plants

4.3 QUALITY MANAGEMENT

(1) Background

To enhance Customer satisfaction and confidence in Product Quality, several initiatives have been taken by RSB to become market leader

* Improving Quality by Product and Process Improvements.

* Actions taken to reduce variation and prevention of defects at design and development stages.

This was achieved by integrating Quality Assurance activities through TQM promotion. QA activities are carried out by the respective plant QA. Corporate QA is ensuring uniform system across plants. QA system chart established focusing on Customer satisfaction

(2) Quality assurance activities

Establish and maintain Quality Management System throughout the organization for improving Product Quality and Customer satisfaction.

Table 4.2 Quality Assurance activities

Before 2005	2006-09	2009-12
*** ISO/TS 16949 system**	**SYSTEMATIC TQM PRACTICE**	
* Focus on **Quality Control:** **- Detection** than Prevention - No Systematic approach for problem solving - No CFT approach **- Design & development** not aligned with QA. **- Less number of "Poka-yoke"** - Repetitive failures are high - Supplier Quality Assurance manual conveying RSB requirements to the Suppliers * Customer ratings commenced * PFMEA to identify potential failure modes * Calibration of Inspection & test equipments * Process audit * Product audit	Focused Quality assurance activities **1) Customer Quality:** *1.1 Warranty rejections (End user)* * Weekly interaction with Customers *** Phenomena wise analysis and actions** *** Field failure analysis** *** Design Improvements (Type 3 initiatives)** * Phasing out of Customer design *1.2 Customer rejections* (Immediate Customer) * Detection at source (filtering) * Return part analysis * Root cause analysis by CFT *** Revisit of FMEA** *** Installation of Poka-Yoke** * Kaizen for Quality issues * Customer rating (perceptions) obtained and improvement made based on that. **2) Inprocess Quality:** *** Phenomena wise analysis** * Daily analysis & actions (DWM) *** Kaizen approach** *** QC Story approach** *** Installation of Poka-Yoke** *** Tool/fixture improvement** * Process capability improvements **3) NPD Quality:** * Use of Finite element analysis * Rig test & validation * Competitor analysis * Type 3 (Pro-active) design * Use of NPD flow * 4 stage design reviews * FMEA * Technological requirements identified **4) Supplier Quality:** * Supplier monitoring * Supplier audit & training * Supplier involvement in problem solving **5) System Quality:** * QA Diagram * NPD flow	Activities mentioned in 2006-09 are continued. In addition the following new activities are implemented. **1) Customer Quality:** * Analysis of design abuse * Identification of "end user" requirements and improved Product Quality **2) Inprocess Quality:** * Poka-Yoke verification audit * Operator involvement in rejection review * SOP in local language * Simplification of inspection *** Online SPC monitoring** * Online gauges for critical operation **3) NPD Quality:** * 5 stage design reviews * Continual of interaction with Customers for technology development * Technology level improvement - Tool improvements - 3C concept for storage & improvements * Modification of collaborator design **4) Supplier Quality:** * Supplier process improvement **5) System Quality:** * QA diagram improved * Recurrence prevention measures documented * Cross learning & exchange of ideas * Source inspection (Preventing defects going to next process)

(3) Quality Assurance Diagram:

After the introduction of fully blown up TQM activities, RSB developed Quality Assurance diagram and linked with ISO/TS 16949 Quality Assurance system. However this was not a user friendly chart. The chart was revised based on experience and based on the guidance by TQM diagnosis audit, flow charting system developed for Quality Assurance diagram. This has enabled all to understand to use it effectively to improve the product Quality.

(4) System for Recurrence Prevention :

In order to avoid re-occurrence of any defects, the important activity is to identify the root cause and take action to eliminate the root cause. This requires a structured approach. RSB evolved a structured approach for recurrence prevention measure and used. This has helped RSB to reduce Customer and warranty rejections.

4.4 NEW PRODUCT DEVELOPMENT

(1) Background:

① Until 2005 RSB was developing products based on Customer design. The focus was improvement of manufacturing process, tool & fixture design.
② After 2006 with introduction of Propeller shaft, RSB started focusing on Product design. The biggest challenge was to design products to suit Indian usage conditions, at a lower cost and superior than the existing competitors. RSB overcame these challenges by improving NPD process and continuously improving parts for reducing filed failures (Warranty), cost and weight.
③ In this process for the past 6 years (2006-12) RSB developed products to satisfy Customers and improve sales revenue. RSB's shares in all India Market for Propeller Shaft have improved to 50% (2011-12) and became a Market Leader. RSB obtained technical superiority over all competitors in India for Propeller Shaft and now in the process of obtaining Patent right for its design.
④ RSB also developed Gears for Passenger Car to meet the international standards (DIN Class 6)*.
⑤ RSB is producing Front Axles using improved process and maintain consistent Quality standards.
* Highest standard for Passenger car is DIN class 5 (Lexus - Toyota).

(2) NPD Classification

Propeller Shaft is designed and developed by RSB. For Gears and other products, RSB uses Customer design and develop process. RSB also took own initiatives to improve the Design for Quality and Cost. In RSB, the new products are classified into 3 categories (Type 1, Type 2 & Type 3), as given in below Table 4.3.

Table 4.3 NPD classification

#	NPD Category	Own Initiatives					Product Design	Process Design	Applicable Products
		Trend/ Technology	Bench marking	End user requirements	Attractive Quality	Product differentiatio			
1	**Type 1** **Customer design**	-	-	-	-	-	Customer	RSB	1. Gears, Hubs & Sleeves 2. Front Axles 3. Machining components
2	**Type 2** RSB own design	-	-	-	-	-	RSB	RSB	Propeller Shaft (2006 ~)
3	**Type 3** RSB's own initiatives **(Pro-active type)**	RSB					RSB	RSB	Propeller Shaft (2010 ~)

(3) Core capability development

Over the period of the time, RSB improved its Design, Process and technology over its competitors and obtained technical superiority. The following table illustrates the improvements done in various products category in last 6 years.

Table 4.4 RSB's core capability development

#	Product	2004-06	2006-09	2009-12	2012-15
1	**Propeller Shaft**	*Core capabilities*		*New Capabilities added*	
		NPD process: Type 1	NPD process: **Type 2**	NPD process: Type 3	
		* Process Engineering * Component manufacturing * Assembly technology * Dynamic balancing * Painting technology	* International technology through technical collaboration * Understanding immediate Customer requirements * Product design * Benchmarking * FEA - Offloaded * 2D drawing -Auto CAD-6 * 3D modelling - Pro-E * Testing capability -Static wind up -Torsional fatigue	* Competitor analysis * Understanding end Customer requirements * Product differentiation * 2D drawing -Auto CAD-11 * 3D modelling - Pro-E Wildfire 4 * Finite Element Analysis (FEA) - IDEAS/ANSYS * Testing capability *Assembly level test* - Sliding joint wear test - Mud slurry test - UJ - Grease expulsion test for centre Bearing sub assy. * Field validation - Sliding joint -Universal joint - Seal validation	* 2D drawing -Auto CAD-13 * 3D modelling - CREO 1 * Testing capability *Assembly level test* - Vibration & resonance test for Centre Bearing - Endurance test in X,Y&Z direction -Vibration & resonance test - Static & Dynamic stiffness test in X,Y&Z direction *Part level test* Centre Bearing Bracket & Rubber: - Static pull test at +vet & -ve temperature - Mud slurry for Centre Bearing ***- Vehicle simulation test for Vibration analysis*** * Field validation - Vibration on vehicle - Centre Bearing life - Grease life

Table 4.4 RSB's core capability development continuation

#	Product	2004-06	2006-09	2009-12	2012-15
2	**Gears**	* Semi Finished * DIN class 8~9 * Application: - Tractors	* Fully Finished *** DIN class 6 ~ 9** * Heat treatment-Gears - Hardening & tempering - Is annealing - Carob nit riding - Plug quenching * Application: - Passenger cars	* Shifter Sleeve manufacturing capability to international requirements * Gear analyzer * KISS soft - software for Gear data analysis	* Gears for International requirements * Heat treatment **- Induction hardening**
3	**Front Axle**		* Tubular Rigid type * Capacity - < 1 Ton	* Independent suspension type	* Tubular Rigid type * Capacity - 2.1 Ton
4	**Machining**	Semi Finishing of Cast iron parts	* Fully Finished Cast iron parts * Semi Finished Aluminium parts	* Fully Finished of Aluminium parts	* Foundry for casting development

RSB continue to improve the core competency as explained above in all the product lines.

Due to this, Customer satisfaction, sales increased. Some of the effects are indicated below (Table 4.3).

Effects:

Table 4.5 Effects

#	Product	Parameters	2006-09	2009-12	2012-15
1	**Propeller Shaft** ***(Type 3)*** ***Pro-active design*** *(Type 2)* *Own design*	NPD capability Vehicle Category : No. of Series Torque range Maintenance Testing No. of Customers Patent search	Type 1 M&HCV 1 6500&8500 N-m 500 Kms 2 4 0	[Type 1,2] [Type 3] M&HCV 7 6500 ~ 30,000 N-m 9000 Kms 6 7 0	[Type 1,2& 3] [M&HCV] [SCV] 9 2000 ~ 30,000 N-m 9000 Kms for graspable UJ 100,000 Kms for sealed UJ 12 10 5
2	**Gears** ***(Type 1)***	Type Accuracy Segment No. of Customers	Semi-Finished DIN class 8 ~ 9 Tractor 7	Fully Finished DIN class 6 ~ 9 P.Car & Tractors 8	Fully Finished DIN class 6 ~ 9 P.Car & Tractors 10
3	**F.Axle** ***(Type 1)***	Type	Tubular Rigid type	Tubular Rigid type	Independent suspension & Rigid type
4	**Machining components** ***(Type 1)***	Parts	Aluminium - Cylinder Head Cast iron - Fly wheel housing & Clutch housing	Aluminium - Finished cylinder Head Cast iron - Gear box housing	Castings - Fly wheel housing, Clutch housing, Gear box housing & Hubs

(3) Technology developments linked with NPD

Unique activity 1:

① Aim:

1. To align with our Vision to be a market leader.
2. Satisfy Customer with better Quality Propeller Shaft.

② Background:

Until 2003, RSB was manufacturing only (child) parts for Propeller Shaft.
RSB started producing Propeller Shaft assembly based on Customer design in 2004. However, various Quality issues and Warranty failures reported. RSB took initiatives to overcome these issues by introducing own design.

③ Challenges faced by RSB:

1. RSB did not have product design capability.
2. Many failures in the existing design (Customer design).
3. RSB need to compete with already established international competitor.

④ Technology Development:

In order to develop technologies, RSB created a separate and independent group company called i-Design. RSB in close coordination with i-Design and Customers (B-B & B-B-C) started developing design and testing capabilities for Propeller Shaft. The Indian usage conditions and past failures were analyzed and used as an input for developing parts. "Finite Element Analysis" extensively used to understand the high stress zone to improve design Quality.

⑤ Benchmarking:

RSB benchmarked with Competitor, who was the market leader until 2009, and Klein-Germany and used for Design & Development.

⑥ Design & testing capabilities development:

Using i-Design, RSB has developed Propeller Shaft in India for M&HCV. Over a period of time, RSB improved design & testing facilities, in order to simulate the actual usage condition. This has helped RSB for speedy NPD as well as reduces warranty failures. Refer Table 4.4 for core capability developed for Propeller Shaft.

Out of the 3 Key Suppliers of Propeller Shaft assembly, RSB is only have own Design & Development centre in India. This has helped RSB to reduce development time.

⑦ Training on Design & Development:

RSB Engineers have been trained on various topics to improve design & development capabilities.

1) Auto CAD
2) Pro-E & CREO for 3D modelling
3) IDEAS, ANSYS for Finite Element analysis
4) DOE and GD&T
5) FMEA

⑧ Testing & Field trial

Initially RSB developed Propeller Shaft for Tata Motors, who is the market leader in M&HCV segment (>60% share). After stabilizing with Tata Motors and consolidated the share of business (>70%), RSB took initiative to develop Propeller Shaft for other Customers like Ashok Leyland and AMW.

RSB developed Propeller Shafts using Customer design (Type 1), then progressed to own design (Type 2) and then started proactive designs (Type 3) for Product differentiation. In this process, RSB could over come many warranty failures and became a market leader in India. RSB also developed capabilities for Exporting Propeller Shafts.

⑨ Effects:

By this effort, RSB became a system supplier from a component Supplier. RSB is considered as a solution provider by the Customer.

Table 4.6 Effects of technology development for Propeller Shaft

Parameters	Better	Until 2003	2004-06	2006-09	2009-12	2012-13
SOB in M&HCV	↑	N/A	21%	42.3%	50%	51.4%
No. of Customers	↑	1	1	4	7	8
No. of series developed	↑	0	1	7	9	16
Warranty rejection (IPTV)	↓	N/A	68.7 to 27.4	27.4 to 18	18 to 6.6	6.6 to 4
Market Segment	↑	1 (M&HCV)				2 (M&HCV and SCV)
Conversion to RSB Design	↑	0	0.1	43%	87%	90%
Patents	↑	N/A	0	0	0	Applied for 5

(4) Process Innovation:

RSB is focusing on Process Innovation to improve the efficiency of the Business performance.

(4.1) Process Innovation process:

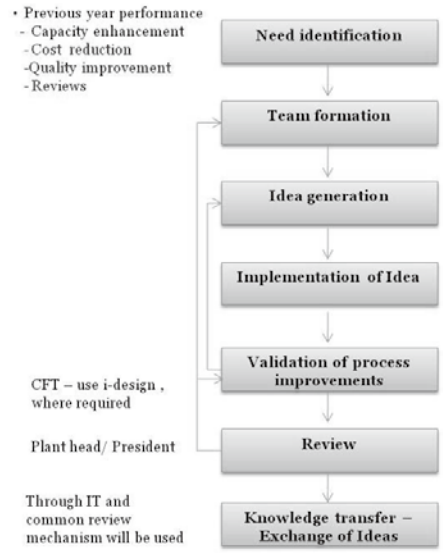


Fig 4.3

Process Innovation – Typical Example:

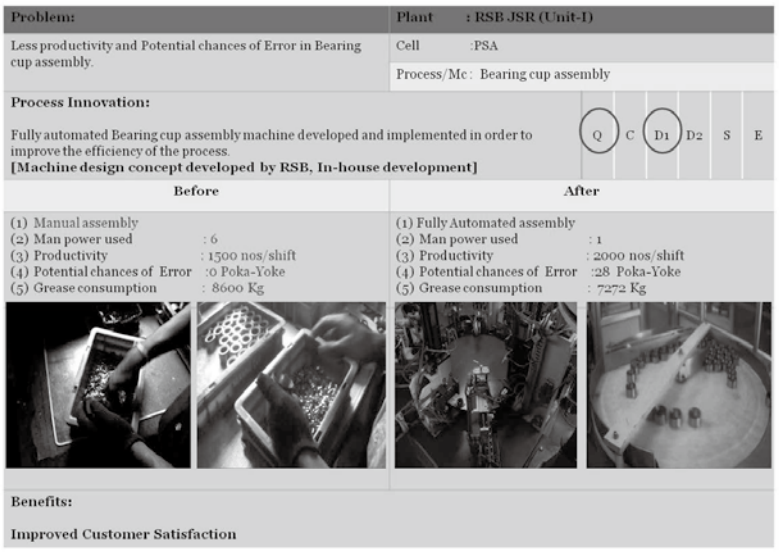


Fig 4.4

4.5 HUMAN RESOURCE DEVELOPMENT

(1) Background

RSB is one of the learning organization, have penchant for learning new skills and always being at the forefront for introducing new ideas. RSB has faced many challenges throughout its progress in the past 2 decades.

- Severe recessions in Auto Industry
- Increase of input cost and rejections
- Issues related to new product development (NPD)

These challenges have been faced and overcome by RSB employees. All the employees are motivated to suggest and participate in improving the organizational performance. All the employees including the new employees were given training from time to time in accordance with the requirements and no section of the employees were allowed to lag behind in acquiring knowledge to enhance the understanding of TQM.

(2) Scenario after TQM promotion

Table 4.7 Scenario in HR after TQM implementation

#	Area	2006-09	2009-12
1	Training	* Training adopted as a key strategy * Training process improved * Structured training plan made * Focused on the job training for operators * Training deployed as key measures	* Skill requirements identified for each category of employees * Training coordinator appointed *** Learning's through Books** *** Learning's through consultants** * Develop internal trainers
2	Employee motivation & empowerment	* Employee motivation process established established * Employee satisfaction measurement commenced * To motivate employee, Man of the month function started *** Gemba walk by management to** understand the improvements made * Structured suggestion system implemented * Subsided canteen facilities	*** Man of the year function** started * Grievance redressal based on employee feedback * Improved canteen facilities
3	Personnel safety	*** Safety audits (3 months)** * Root cause identification for accidents * Incident monitoring commenced	*** Safety audit including Operators (Fortnightly)** * Safety committee formation * Suggestion for safety *** Near miss monitoring** commenced * Mock drills, emergency preparedness and response

(3) UNIQUE ACTIVITY 2 - ENHANCEMENT OF EMPLOYEE SKILL:

① Aim:

RSB wanted to upgrade from component supplier to assembly supplier and later to Design supplier, through which the Customer expectations can be fulfilled through Quality products at optimum cost, Ontime delivery and Service. To achieve the above, the Skill level of employee is important and to be upgraded continuously. Hence RSB took initiatives to enhance the skill level in each category of employees.

② Challenges:

The current training is based on "On the Job" and give more focus on machine operation and 5S. There was less focus on technology and future requirements and employee Skill improvement.

③ **Activities:**

Skill mapping process was evolved for various categories of employees like Associates, Staff, and Junior Management & Middle management. Skills are categorized like "Critical operations", "TQM awareness & promotion", "Technology & Process", “IT & Soft skills", "system" and "General" . Competency mapping is done for each category of employees and the gap in skills is identified. This is done by each department head in coordination with HR department. The skill of each person is evaluated once in a years. Evaluation is done on a 4 point scale viz., Level 1 - Beginner, Level 2 - Intermediate, Level 3 - Expert and Level 4 – Master

Beginner (1) - New joined/Undergoing training/Basic training given
Intermediate (2) - Can perform the job under expert guidance
Expert (3) - Has complete knowledge of the job/subject and can work independently
Master (4) - Can be mentor for the job/subject and handle for any kind of emergency related to it.
After the evaluation of the gap between the required and actual skills, training requirements are identified and prioritized.

④ **Evaluation of training programs:**

After sufficient time, the effectiveness of training is evaluated by the immediately superior. Based on the evaluation, if required retraining programs are arranged by plant HR based on the recommendation of the supervisor. A separate training program is organized for temporary employees and trainees.

⑤ Identification of faculties:

Over a period of time, RSB understood the need for developing internal faculties. Hence RSB developed a program called "Train the trainer", which generated more internal trainers. After the training feedback is obtained from the participants and the feedback is used to improve the subsequent training program.

⑥ **Growth & Development:**

During Employee Satisfaction Survey, which is done once in a year, feedback on training provided to the employee is obtained and the training programs are improved based on the feedback. This enables employees to give overall feedback on training and development.

⑦ Effects:

1) RSB converted from components supplier to market leader.
2) People requirements for the green filed projects have been met using internal people (No outside recruitment).

(4) UNIQUE ACTIVITY 3 - EMPLOYEE RELATIONSHIP DEVELOPMENT:

(1) Aim:

Involvement of People in Improvements and increase employee participation in TQM activities and improve motivation and through that retain people.

(2) Background:

In line with the Mission of RSB, one of the stakeholders is employee, without the involvement of all employees, overall improvement cannot be sustained. Hence RSB took the initiatives to improve the relationship with employees and retain people.
When RSB became a larger company (Multi location), the connectivity between various category of employees with the top management needs to be improved in order to create ownership for the overall performance improvement. Hence RSB initiated a process called "Gemba walk" by top management combined with "Man of the month" and "Man of the year" celebration. This motivates the employees and improves participation in Kaizen activities.

(3) Activities:

① Gemba walk by top management:

RSB established a process for Gemba walk. At a fixed frequency, top management (Chairman or MD) visit the plants (Once in 3 months) to see the improvement made by employees.
During the Gemba walk, employees explaining improvements made and benefits thereof, personally to the top management.

② Man of the Month & Year:

Every month, an employee is selected as the "Best employee" based on various criteria like 1) Suggestions, 2) Productivity, 3) Attendance, 4) Customer rejection, 5) 5S, 6) Safety and 7) Others. This evaluation is done by immediate supervisor for associates. Based on these analysis and number of times a person is awarded as man of the month, he has been promoted to the level of supervisors from Associates (Operator).

During the award function, besides the top management, Key Customer representatives, prominent person visiting RSB including suppliers also participate. The employee who has been selected maximum time as "Man of the month" will be selected as "Man of the year". The selected employee along with his family is rewarded, which is the motivational factor for the employee. "The family members visit the actual work spot (Plant) and understand the contribution by his/her relative". This is also an unique feature of RSB.

The employees, who have been selected as Man of the month & year, photographs are displayed in prominent place in the shop floor as a motivational factor.

③ Employee Satisfaction Survey:

Employee Satisfaction Survey is carried out once in a year under than 5 major topics related to job (work), growth development, infrastructure, supervisor behaviour and management. The employees are having the freedom to express their dissatisfied area freely to the management for improving and creating good work atmosphere.

(5) Employee motivation Process

All employees are encouraged to participate in improvements and to provide suggestions for improving organizational efficiency.

Table 4.8 Employee motivation process

#	Activities	Frequency	Check points	Process used for motivation
1	**Obtaining inputs**			**1. Awards**
A	* Discussion with employees	Weekly	* Grievances	*** Man of the Month/Year**
B	* Counselling	Need based	* Chronic leave * Low productivity	* Suggestion awards **2. Sponsorship**
C	* Safety audits * 5S audits	Once in 15 days Monthly	* Unsafe conditions * Unsafe act * Statutory compliance	* Higher studies **3. Personal protective Equipments**
D	* Routine reviews	Monthly	* Consolidation of various points identified during these discussions, reviews and audits	* Industrial shoes * Goggles & Gloves **4. Other facilities** * Common dress code * Medical centre
E	* Employee Satisfaction Survey **(ESS)**	Yearly	* Area of concerns	* Medical benefits * Subsidized Canteen
2	**Review of needs**	Once in 6 months	* Guidelines by Management	* Sports events * Social functions for both
3	**Evolve action plan**	Once in 6 months	* Categorization into Least, normal & Maximum efforts	Employees & family *** Training** **5. Participation in problem**
4	**Execute action as per the plan**	Need based		**solving & task achieving actions**
5	**Check effects**	**ESS #**		**6. Annual increments & promotions**
6	Continue from # 1			

RSB evolved a method for determining Employee Satisfaction (ESS) and annually calculating this index to measure the extend of Satisfaction. Based on this survey, employee motivation efforts are made.

4.6 CROSS FUNCTIONAL ACTIVITIES (CFT promotion)

(1) Background

During TQM diagnosis by top management, it was observed that:

1. Involvement of employees across department is not uniform.
2. No systematic monitoring system and approach for rewards and recognition
3. Top management involvement is low.

To overcome these, the following steps were taken by RSB. After TQM promotion, RSB started focusing on team building.

1. Training of all employees QC story approach.

2. Training on Basic 7 QC tools and advanced Statistical Tools.
3. Suggestions schemes (termed as Kaizen in RSB) introduced.

(2) Total Employee involvement

All important activities are carried out through employees (Task force, CFT and suggestion scheme) Management permits all employees to be involved in taking important business decisions and improvements related to Quality, Cost, Delivery, Safety and Environment.

Table 4.9 Improvements type

Objectives	Methodology	Who
Small improvements	Suggestions (Termed as Kaizen)	Associates & Staff
Major improvements	QC Story - Department	Within department (By Staff & Managers)
	QC Story – CFT	Along with other departments CFT approach (this includes Managers, Associates & Staff)

4.7 CONTRIBUTION TO ENVIRONMENT AND SOCIETY

(1) Background:

The founders Mr. R.K. Behera and Mr.S.K. Behera remain committed to Quality, Service and respect for humanity and this is the philosophy of all the group companies. RSB realizes that environmental issues are critical for business continuity, growth and image.

- Product liability issues arising out of environmental non-compliance
- Increased public awareness on environmental issues
- The need for adopting the best available clean/green technology.

(2) CONTRIBUTION TO ENVIRONMENT

RSB Group strongly believes keeping in mind the environment health and safety of the society & employees. Hence RSB took several initiatives to improve the Environment and the upliftment of society.

1. RSB is certified for ISO 14001 (Environment Management System) & OHSAS 18001 (Occupational Health & Safety system).
2. RSB complies with all regulations and laws related to Environment and others. This is a KRA for HR department (in each plant) and directly monitored by the top management.

(2.1) Tree plantation

1. Environment day is celebrated by RSB and as a social responsible organization "Trees are planted" and taking care of these trees.
2. Besides this RSB also planted and maintaining trees outside the premises.

Fig 4.5

Fig 4.6

(2.2) Natural resource conservation measures by RSB

1. Ground water consumption reduced from 11000 (2006-07) to 4039 Kilo litres (2011-12)
2. Total tree planted: 736 as of 2011-12.
3. Lux level improved in shop floor from 63 (2006-07) to 220 (2011-12) using Natural light.
4. Wood consumption (packing) reduced from 6789 cubic feet (2006-07) to 1680 cubic feet through reusable Metal pallets.
5. Oil reclamation from cutting chips improved from 200 litres (2006-07) to 533 (2011-12).
6. Diesel consumption reduced from 172,641 (2008-09) to 28,000 litre/year (2011-12).
7. Energy cost reduced from 2.07% (2007-08) to 1.08% (2011-12).

(3) CONTRIBUTION TO SOCIETY:

(3.1) **CSR activities by RSB**

RSB from the inception stage, even at a small level in size, started focusing on improving the society. The CSR activities started in a small way and it was directly monitored by the two brothers, the founder of RSB groups. Later when the company started expanding, a person was appointed at the group level to monitor the CSR activities. Funds are allocated at the corporate level for CSR activities. From the beginning, RSB practices business ethics and comply with all government regulations. RSB also released code of conduct for employees to avoid discrimination and forced labour.

(3.2) CSR Index calculation

RSB evolved own method for calculating the CSR index, which is a measure for CSR. The following table 4.10 indicates the method and attributes for CSR index.

Table 4.10 CSR index criteria

#	**Attributes**	**Weightage**
1	Child/Forced labour	20
2	Discrimination	20
3	Compliance to regulations/Law	20
4	**Social welfare activities**	
	* Environment, Health & Safety	7
	* Education	7
	* Rendering help during natural disaster	6
5	**Overall spent for CSR**	20
	Overall CSR Index	**100**

(3.3) Health and Safety

① Blood donation camps - regular basis by RSB (Sponsored by RSB group)
② Clean drinking water during summer period
③ Appointment of Doctor for a clinic sponsored by RSB
④ Health checkups cap in rural areas for the poor - Free medicines and spectacles
⑤ Donation of Tractors for poor agricultural areas

Fig 4.7

Fig 4.8

(3.4) Education

① RSB sponsors education of orphan/poor girls/ boys, encouraging the idea of educating and making them independent.
② RSB believes in the supremacy of education and contributes in educating under privileged students by distributing text books on a regular basis.
③ RSB adopts a school and provides material help in rural areas

(3.5) Others:

① RSB sponsored a school in rural area.
② RSB putting up new plants in rural areas to provide employment to rural people.Due to these efforts in improving employees LIFE STYLE and various contribution to the SOCIETY, RSB never had any IR disturbances or closure in the last 3 decades (30 YEARS).

4.8 UTILIZATION OF IT

(1) Background

RSB is a multi location and multi products company. Each plant is an independent unit and practicing an unique IT system for sales, purchase and finance activities only. All these 3 activities were not integrated. When the group started growing with more multi location plants with multi products, RSB felt the need to integrate the entire business process, centralize the database to meet the challenges of Speed and Accuracy of data & Record keeping for future reference. To meet these requirements, RSB started focusing on developing a suitable IT system uitlizing "ERP system".

(2) Aim of IT System in RSB

● Provide timely, accurate and qualitative information's to all users.
● Qualitative reports for team members for effective decision making process.
● Integration of different programs to reduce lead time and improve efficiently.
● Supporting manufacturing processes for systemization of process flow as applicable.
● Improve data processing speed through networking and hardware maintenance.
● Provide Applications to capture business Information (data) related to Plant Operations and business

To satisfy the above needs, IT department modified the JDE system through simple and complex programs which are developed through Software development process.

(3) Major IT systems implemented in RSB:

① Sales module
② Procurement and Inventory module
③ Manufacturing module (including Manufacturing cost)
④ Accounts & Finance module
⑤ India Localization for Excise, Service Tax ,VAT and TDS
⑥ HR module - Salary Processing and Attendance System

5. EFFECTS OF TQM

Fig 5.1

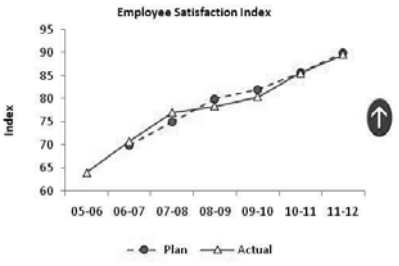


Fig 5.2

Fig 5.3

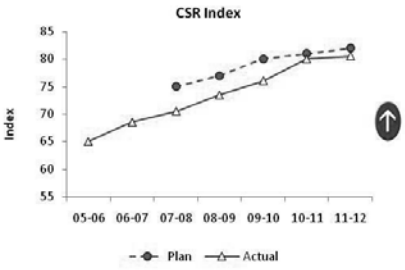


Fig 5.4

Fig 5.5

Fig 5.6

Business Performance

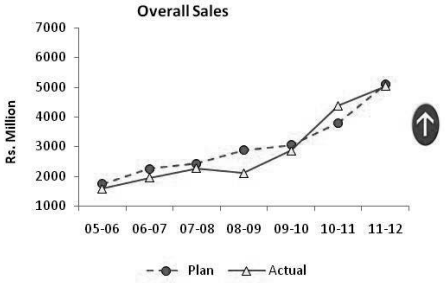


Fig 5.7

Fig 5.8

Quality:

Warranty rejection

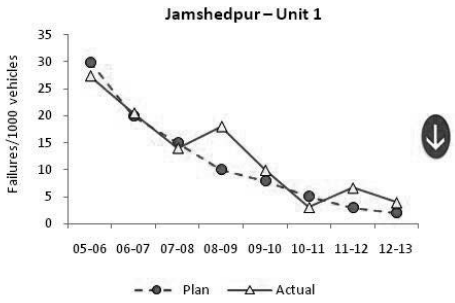


Fig 5.9

Customer rejections

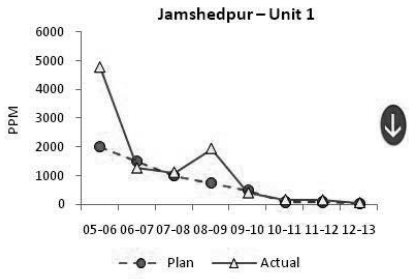


Fig 5.10

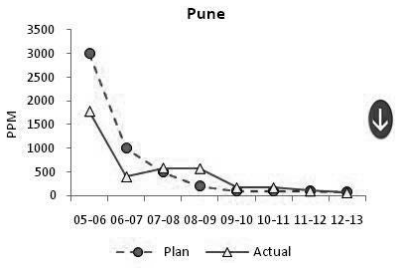


Fig 5.11

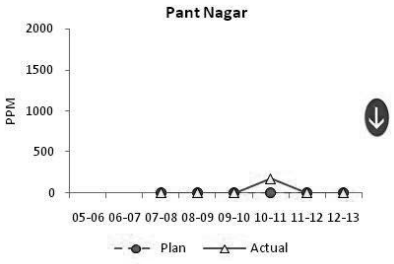


Fig 5.12

Kaizens

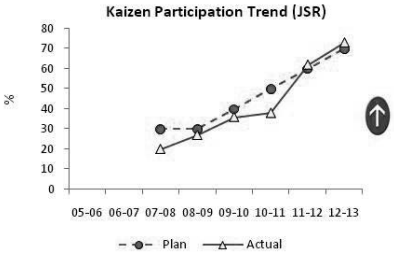


Fig 5.13

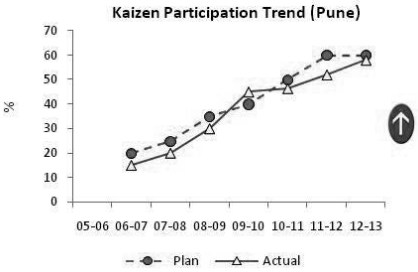


Fig 5.14

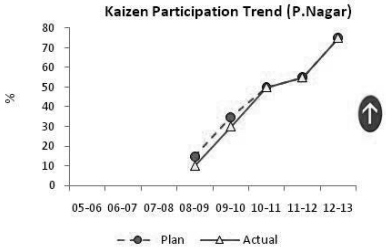


Fig 5.15

6. APPEALING POINT OF TQM IMPLEMENTATION

After implementing TQM for nearly 6-7 years, there are many learning points.

Policy deployment helps to understand the business direction and align every one towards a common direction to achieve the Goals, helping RSB to satisfy all "stake holders" and enhance business performance

- *The Power of Team work and Cross functional activities realised by all.*
- *Analytical ability improved due to the systematic application of TQM tools and to prevent recurrences.*
- *Systematic approach as a foundation in all activities to achieve sustainable results in all areas.*

1. **Technology development- Moving from Component supplier to System supplier and have market share of >50.0% (Refer unique activity number 1)**
2. **Improve the capability of people – Unique activity number 2**
3. **Employee relationship development- Unique activity 3**

7. FUTURE PLAN:

7.1 Plan to promote TQM:

(1) Strengthening Policy Management process

(2) Improve Effectiveness of DWM to reduce troubles – Implementation of KMI/KPI at all levels.

(3) Promotion of TPM

(4) Implementation of TQM in other plants

(5) Transfer of TQM knowledge to Suppliers & Vendors

(6) Focused training to all – Enhance employee analytical and problem solving skills and focus on Technology development

(7) Obtaining Deming Grand Prize