

2018年度

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受賞報告講演要旨

Rane NSK Steering Systems Private Limited

DEMING PRIZE - 2018

Rane NSK Steering Systems Private Ltd **TQM Practices at Rane NSK**

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Rane NSK Steering Systems Private Limited



MISSION & VALUE

- ✦ Provide superior products and services to our customers and maintain market leadership.
- ✦ Evolve as an institution that serves the best interests of all stakeholders.
- ✦ Pursue excellence through total quality management.
- ✦ Ensure the highest standards of ethics and integrity in all our actions.



VISION

To achieve profitable growth in steering column Business through technology and people development.



1. Company Profile

1.1 Rane and NSK group profile

Rane NSK Steering Systems (RNSS) is the flagship company of Rane and NSK group companies, established in 1997 as a joint venture. The Rane group comprising of five companies with twenty-three plants across India and one plant in USA, dedicated to automotive component manufacturing was established in 1929. It partners with a wide spectrum of auto majors to provide concept to product solutions. This is made possible by well integrated design, manufacturing & testing facilities at each of the group companies. It employs over 5200 highly trained personnel and has an annual sales turnover (2017-18) of about INR 4,688 crores (~ US \$ 714 million). The group exports to 30+ countries around the world. Four of the Rane group companies have won the coveted Deming Prize and three companies have won the Deming Grand Prize. Rane group manufactures a comprehensive range of automobile components like hydraulic power steering systems, manual steering & suspension systems, valve train components, friction material products, steering columns & electric power steering, occupant safety systems and die casting products.

NSK was founded in 1916 and produced the first ball bearing “made in Japan”. Since then, the company has spearheaded the development of bearings in Japan and now offers a full range and sells them worldwide. Now, the company has the largest share of the bearings market in Japan and is one of the largest bearing suppliers in the world. NSK has used its expertise in precision machining technology, refined through years of bearing manufacturing, to diversify into Automotive products, Precision machinery & parts and Mechatronic products. By further harnessing the potential of its global network, NSK strives to further enhance its R&D, Manufacturing, Sales and Management capabilities.

Among its automotive components, NSK develops and manufactures column - electric power steering (Column EPS) systems that employ a motor to make the steering wheel easier to turn and help drivers control their vehicles safely, comfortably and also improves fuel efficiency. NSK holds a large share of the global market for Column EPS systems.

1.2 Rane NSK Steering Systems (RNSS) background

RNSS was established in 1997. RNSS manufactures and supplies solid steering columns, energy absorbing steering columns, tilt and telescopic steering columns, electric power steering columns. RNSS had an annual sales turnover of INR 12,939 Million in 2017-18 and is forecasted to cross INR 14950 Million in 2018-19. The Figure-1.1 shows the sales turnover and profitability of RNSS over the years.

RNSS has wide customer range and strong presence in the auto industry. RNSS became the preferred supplier to major customers, including Maruti Suzuki India Limited (MSIL), Tata Motors Limited, VE Commercial Vehicles, Ashok Leyland Limited, Mahindra & Mahindra Limited, Toyota Kirloskar Motors Limited, Renault Nissan India Limited and Honda Cars India Limited.



Figure-1.1 : RNSS sales turnover and Profitability

1.3 Infrastructure, Products and Major Customers

RNSS has three plants located in Chennai (Plant-1), Bawal (Plant-2) and Pant Nagar (Plant-3). These were established in 1997, 2008 and 2007 respectively. RNSS Corporate office is located at Plant1. RNSS is in the process of establishing a manufacturing plant in Western India to cater to Suzuki’s (MSIL) products. RNSS plants are equipped with state-of-the-art facilities and the locations on India map are shown in the Figure-1.2.

RNSS Plant-1 manufactures Manual Steering Columns (MSC) which includes solid columns, energy absorbing columns, tilt, telescopic and sliding columns. Plant-2 manufactures Column EPS system and Plant-3 manufactures MSC assembly. The Table-1.1 shows the Plant-wise products, their applications and major customers.

Table - 1.1 : Plant-wise products, their applications and major customers.





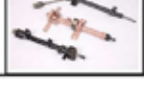
Plant	Products		Application	Major Customers
Plant-1	Solid Columns		<ul style="list-style-type: none"> • Passenger cars, • Light Commercial Vehicles, • Medium Commercial Vehicles, • Heavy Commercial Vehicles 	<ul style="list-style-type: none"> ❖ Tata Motors Ltd. ❖ Maruti Suzuki India Ltd. ❖ Ashok Leyland Ltd. ❖ Mahindra & Mahindra, ❖ VE Commercial Vehicles
	Energy Absorbing Columns		<ul style="list-style-type: none"> • Passenger cars • Utility Vehicles 	<ul style="list-style-type: none"> ❖ Tata Motors Ltd. ❖ Maruti Suzuki India Ltd. ❖ Honda
	Tilt & Telescopic Columns		<ul style="list-style-type: none"> • Passenger cars, • Utility Vehicles • Light Commercial Vehicles, • Medium Commercial Vehicles, • Heavy Commercial Vehicles 	<ul style="list-style-type: none"> ❖ Tata Motors Ltd. ❖ Honda ❖ Mahindra & Mahindra
Plant-2	Column Electric Power Steering		<ul style="list-style-type: none"> • Passenger cars • Utility Vehicles 	<ul style="list-style-type: none"> ❖ Maruti Suzuki India Ltd. ❖ Honda
Plant-3	Solid Columns Assembly		<ul style="list-style-type: none"> • Light Commercial Vehicles, • Heavy Commercial Vehicles 	<ul style="list-style-type: none"> ❖ Tata Motors Ltd. ❖ Ashok Leyland Ltd.



Figure-1.2 : RNSS locations

1.4 Competitors

RNSS mainly focuses on MSC and Column EPS. The main competitors for the MSC are Sona Koyo Steering Systems Limited (SKSSL), Rane Madras Limited (RML), ZF Steering Gear (India) Limited (ZF), Robert Bosch Automotive Steering (RBAS), imported and others. The main competitors for the Column EPS are Mando India Steering Systems Pvt Ltd. (Mando), Jtekt Corporation (Jtekt), Robert Bosch Automotive Steering (RBAS), TRW Steering Systems (TRW), imported and others.



1.5 Technical Capability

RNSS has been associated with joint venture partner NSK, Japan for the design and testing of the products during initial stages. Over the years, RNSS had built its own design and testing capability to serve the customer faster. RNSS test lab consist of facilities like Performance test rigs, Durability test rigs, Angle measurement rigs, Torque measurement test rigs, UJ articulation test rigs, Natural frequency test rigs, Tilt durability test rigs and Torsional strength test rigs. This enables RNSS to increase the number of products designed locally and helps to expand number of products, models and customer base. RNSS has first-mover advantage in introducing technologies / value added features, which has helped in acquiring new businesses.

1.6 Management System Certifications

RNSS plants are certified by TUV-Nord for

- ISO 9001:2015 – Quality Management System,
- IATF-16949:2016 - Automotive Quality System Management,
- ISO 14001:2015 - Environmental Management System,
- BS OHSAS 18001:2007 - Occupational Health & Safety Management System

and RNSS plants are certified by TUV-Sud for

- ISO-27001:2013 - Information Security Management System.

1.7 Awards & Accreditations by Customer and Others

RNSS has been recognized through awards for its contribution towards Product Design & Development, Quality, Cost reduction, Delivery performance, VA/VE and Continuous Improvement from major customers, which includes from Maruti Suzuki India Ltd, Toyota Kirloskar Motor Ltd, Ford India Limited, VE Commercial Vehicles, Mahindra & Mahindra and Rane Madras Ltd.

For Business Management Practices, RNSS won NSK's President Award 2016 from NSK Japan, during their Centenary Celebrations.

RNSS won the Excellence in Business Performance Award 2018 among the Rane Group of companies, during the Maithri-2018 Celebrations.

2. Organization Structure and Management

2.1 Organization of RNSS

Rane NSK Steering System Private Limited (RNSS) is headed by the Chief Executive Officer / Managing Director (CEO/MD), who reports to the Board of Directors. The organization structure comprises of Corporate functions and Plants. The corporate functions are Research and Development, Marketing, Human Resources, Purchasing, Finance & IT, TQM, Safety and Corporate QA. Each corporate function is headed by a 'Functional Head'. RNSS have three plants and each plant is headed by a 'Plant Head'. The plant functions are Manufacturing, Quality Assurance, Manufacturing Engineering, Plant Maintenance, Plant Human Resource, Plant Stores & Logistics and Plant Finance. These departments are headed by managers called 'Department heads'. The organization chart is shown as below in Figure-2.1.

RNSS employees are one of the key strategic resources to deliver the increasingly stringent quality requirements of the customer. The employees are trained and motivated to meet the changing market demands. The Table 2.1 shows the RNSS Manpower break-up as on end March, 2018.

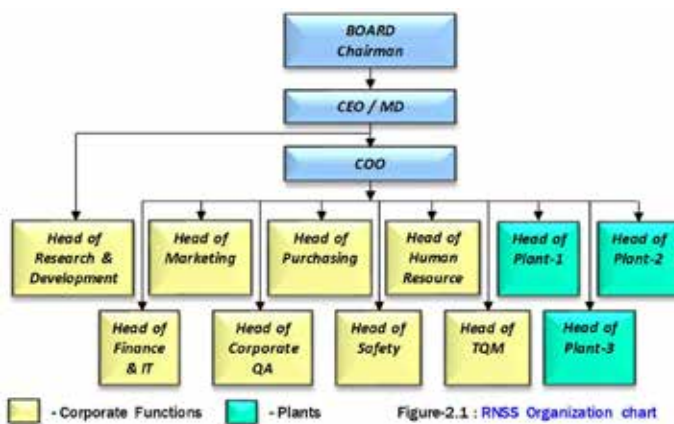


Table-2.1: Man power break-up (As on end March-2018)

RNSS	Managers & Above	Executive to Deputy Manager	Operators & Trainees	Total
Corporate	17	48	0	65
Plant-1	4	54	216	274
Plant-2	9	92	452	553
Plant-3	0	9	26	35
Total	30	203	694	927

2.2 Communication meetings

In the following communication meetings (Table-2.2), relevant information is communicated and shared to all the employees in a fixed frequency and queries of all nature are clarified.

Table-2.2 : Communication meetings

Title / Subject	Purpose	Participants	Chaired by	Frequency
Strategic Business Plan meeting	<ul style="list-style-type: none"> To share marketing forecast, competitive environment, future challenges & opportunities, next 3 years plan and promote involvement 	Management Staff	CEO / COO	Yearly
Employee Communication meeting	<ul style="list-style-type: none"> To communicate previous month / quarterly plant's performance covering PQCDMS, current month plan, market condition, major activities and special events. To distribute awards of TEI activities like QCC, Suggestion and Best performer of the team. 	Management Staff	COO	Quarterly
		Employees	Plant Head	Monthly
Coffee with COO	<ul style="list-style-type: none"> To understand / address Safety and Quality related improvements To understand / address employee related concerns / issues / grievances 	Management Staff / Employees in Batches	COO	Bi-Monthly

2.3 Management Reviews

The following management reviews as shown in Table-2.3 are being carried out at scheduled frequencies to measure the effectiveness of business processes and target achievements.

Table-2.3 : Management Reviews

	Title / Subject	Purpose	Reviewed by	Frequency
SAFETY	• HR & Safety Review	• To address HR & safety issues and suggest actions	CEO & COO	Bi-Monthly
BUSINESS	• Strategic Business Plan / Mid Term Business Plan (SBP/MTP) Review	• To set long term business targets	Chairman / CEO	Yearly
	• Annual Operating Plan	• To set annual business plan targets	Chairman / CEO	Yearly
	• Company Head's Diagnosis	• To review annual performance, identify the root cause for the gap and remaining issues	CEO / COO	Yearly
	• Quarterly Business Review	• To review business performance and guidance	Chairman / CEO	Quarterly
BUSINESS	• ASADHQ (Automotive Steering & Actuator Division Head Quarters) Steering Committee Review	• To review quarterly performance and forecast for the financial year	CEO	Quarterly
	• NPDS TG (New Product Development System Toll Gate) Review	• To review status of new product development	CEO	Monthly
	• CEO Diagnosis	• To review performance with Things Gone Right (TGR) / Things Gone Wrong (TGW) and suggest areas for improvements	CEO	Monthly
	• R&D Review	• To review technology development & function overview	CEO	Monthly
	• Talent Review	• To review the Talent gaps and suggest actions	COO	Half Yearly
	• NPD Status Review	• To review NPD status (Design Reviews – DR0, DR1, DR2, DR3&4)	COO	Monthly
	• Operations Review	• To review performance and suggest actions	COO	Monthly
	• Finance Review	• To review the overall costs ; plan vs actual and suggest actions	COO	Monthly
	• Debtors Review	• To review the Debtors status, Statutory forms collection	COO	Monthly
QUALITY	• Quality Review	• To review quality performance and suggest actions	Head-CQA	Monthly
COST	• Purchasing Review	• To review supply chain risks, function overview and performance	COO	Monthly
DELIVERY	• Sales Review	• To review sales performance and suggest actions	COO / Head –Marketing	Monthly
	• Inventory Review	• To review inventories, schedules, and suggest actions	COO	Monthly
	• Production Review	• To review performance ; plan vs actual and suggest improvements	Plant Heads	Daily & Weekly

2.4 Management Audits

RNSS has evolved a system of audits by internal and external auditors (including customers) to assess the adherence levels and also to identify the areas for improvements to strengthen the system. These audits are conducted at predetermined frequencies.

3. TQM Journey

3.1 Background

Initially, RNSS was incorporated as a manufacturer of Manual Steering Column (MSC). By 2008, major car companies started introducing Column EPS in Indian market, which necessitated Steering Column Suppliers to focus on Column EPS also. Consequently, RNSS had significant volume growth in Column EPS. There were challenges in managing scale and profitability. However, the MSC business faced a survival crisis, as a result of the above migration. These developments called for a total reappraisal of RNSS competencies and business processes. The analysis called for review of Management methods, Competencies, Process of training and Total Employee Involvement.

3.2 Why TQM at RNSS ?

Based on the learning and experience of implementing TQM practices in Rane Group companies, RNSS were convinced that adoption of TQM would be the solution and started implementation from 2012. RNSS learned and applied the major elements of Japanese TQM - Customer Focus, QC ways of thinking (i.e. focus on processes, fact based control of processes and standardization), Daily Routine management, Policy Management and Total Employee Involvement. RNSS realized that TQM as a foundation would help RNSS in achieving customer oriented business objectives and strategies. RNSS is implementing the TQM under the guidance of Japanese Senseis.

3.3 TQM Promotion

The TQM organization structure at RNSS has three tiers consisting of the Business Excellence Council at the Group level, Steering committee at Company and Plant / Function level.

(1) **TQM Business Excellence Council:** It comprises of Chairman, Vice Chairman (Rane Group), Group Business Heads, Company Chief Operating Officer (COO), Group TQM Coordinator and all Company TQM Coordinators. Evolving overall policies, guidelines and assessing TQM implementation status are the responsibilities Business Excellence council.

(2) **RNSS TQM Steering Committees – Company level:** The committee comprises of Chief Executive Officer (CEO), COO, all Functional Heads and Plant Heads. The responsibility of company level TQM steering committee is to promote TQM knowledge and motivate the people for implementation of TQM activities.

(3) **RNSS TQM Steering Committees – Plant / Function level:** It comprises of respective Plant Head / Functional Head and their Department Heads. These committees focus on implementation of TQM activities and improvement points suggested by Business Excellence council and TQM function. Every plant has a Plant TQM Coordinator and Department Coordinators, who facilitate TQM implementation in their departments. They are trained in TQM principles & practices and play a key role in educating their team members.

(4) **TQM Promotion Office:** RNSS has a TQM promotion office at corporate level which provides support, guidance and ensures TQM practices in all functions/plants. Audits and Reviews are conducted at pre-determined frequency to ensure the implementation of TQM practices.

3.4 Major TQM Activities

(1) **Establishment of Quality Management:**

① **Policy Management (PM):** Major TQM Activities pertaining to Policy Management are explained in Strategic Planning and Policy Management Chapter. As a part of Policy Management, Managing Points are deployed from COO policy (Form-1) to functional heads and subsequently from functional heads to their reportees. At all levels, target setting process is carried out through catch balling session. These Policy related Managing points are captured in Form-2 of Individual, with unique numbering system.

② **Daily Routine Management (DRM):** The Form-2 of Individual covers Role related Managing points also apart from Policy related Managing points. For all the Managing points, target setting is carried out through catch balling session and monitored through DRM, as per the frequency mentioned in the Form-2. For all the gaps observed between targets vs actuals, interim and permanent actions are initiated through “Plan Do Check Act” (PDCA) in Form-4. Where required, Cross Functional Teams (CFT) are formed to initiate the actions for the identified gaps in DRMs. All the permanent actions taken through PDCA and standardized for sustenance.

③ **Cross Functional Management (CFM):** The further chapters describes the Major TQM activities pertaining to establishment and operation of Cross Functional Management systems for managing the organization and the supply chain.

(2) TQM Education and Training:

In order to create TQM awareness and promote TQM activities, various training programs are conducted on Problem solving Tools (Q7,M7), QC story methodology and 5S implementation. Training on higher level statistical tools like Design of Experiments (DOE) & Multiple Regression Analysis (MRA) are conducted to improve the problem solving skills with usage of higher level tools. Strategic seven tools training to Senior management was conducted to strengthen the Strategic Business Planning process.

(3) TQM Roadmap

RNSS implemented the TQM practices in a phased manner for which a detailed roadmap was drawn.

3.5 TQM promotional forums

To promote and sustain the TQM system, various communication systems, reviews, audits and competitions were structured.

(1) Employee Communication Meeting:

Communication meetings are conducted every month by Plant Heads. The meeting shares information pertaining to the Company / Plant performance, highlights of the previous month, market conditions and distribution of prizes for the best Kaizen and QCC projects.

(2) Reviews and Audits:

To sustain the TQM activities and monitor the progress, RNSS periodically conducts various reviews and audits.

- **TQM Reviews:** Monthly review by CEO / COO ensures that all departments adopt TQM practices and sustain improvements. Department Heads review the TQM implementation within their respective departments and take actions, wherever improvements are required.
- **TQM Audits:** Every month, TQM department conducts TQM audits to assess the TQM implementation across the plants. In level-1 audit, document adequacy and updations are audited. In level-2 audit, documents verification and DRM practices are audited.

(3) Competitions:

- **Internal Competition:** To promote TQM activities, QCC and QIT, internal competitions are conducted once in a year. These competitions help sharing of knowledge among teams and also to motivate employees.
- **External Competition:** The Winners of QCC and QIT are nominated for Rane Group QCC convention and external competitions, conducted by various agencies like Quality Circle Forum of India (QCFI) and Confederation of Indian Industry (CII). By participating in such competitions, employees' morale has improved and rewards & recognition received by them further motivates other employees.

In last five years, RNSS nominated 24 teams for external competitions wherein teams have won more than 12 Par excellence awards. In 2016 Rane Group QCC convention, RNSS Plant-2 QCC team won the Chairman Trophy for Best QCC project.

4. Strategic planning and Policy management

4.1 Background

History: In the pre TQM period, as a part of policy management, Strategic Business Plan (SBP) would be drawn up as a three-year plan focusing on sales, market share and profitability targets. A three-year capital expenditure plan was drawn up to support the sales plan. Both these were rolling plans. The Annual Operating Plan (AOP) was derived from the first year of the SBP. The company result was measured against these targets. Activities to achieve these targets were also planned.

Short falls: This process focused only on sales and production targets and hence deployment was linked only to marketing related activities. The mid and long term plans were not adequately related to the AOP. Similarly, the strategic plans and goals did not reflect priorities to realize the vision of the organization. The strategies deployment and review was not given adequate focus across the organization. The focus was on quantifying the targets and not on the means of achieving them. The processes and methods adopted were not robust enough to cope with the changes in the business environment due to common strategies followed for distinctive business segments (MSC and Column-EPS) with contrasting environmental conditions, customer expectations and technology. This entire policy management was centered on management by objectives, without focus on the process and measurement of the objectives and results. Policy was not communicated to all levels. Hence there was a mismatch between the organization's goals and execution.

4.2 Major TQM Activities

(1) Strategic Planning

① **Vision:** Vision for the company is set for long term as a part of the SBP process. The company then identifies goals that need to be achieved so as to realize the Vision. Consequently, Strategies and Initiatives to achieve these goals are identified and actioned. During subsequent years as a part of the SBP process, the vision is reviewed for its appropriateness and revised, considering changes in environment. During the SBP process in 2010, RNSS had a vision which is as follows;

Vision - 2010
Achieve Distinct Leadership As a Preferred Source in Domestic Steering Column and EPS Business

This led RNSS to focus on increasing market share. However, RNSS was unable to meet planned profitability due to application engineering issues faced during ramp up of Column EPS volumes and losses in MSC due to lower volumes in MSC Passenger Vehicles. RNSS was unable to penetrate MSC Commercial Vehicle business to offset this drop on account of lack of technical competencies. This prompted RNSS team to change the focus from leadership to profitable growth. To enable this, RNSS identified technology and people development as key drivers for profitable growth. Additionally, RNSS decided to focus only on Column EPS and not on other types of EPS, which is a subset of Steering Columns overall. Consequently, in 2013, RNSS reviewed and revised the vision as;

Vision – Revised in 2013
To Achieve Profitable Growth in Domestic Steering Column Business through Technology and People Development.

This vision prompted RNSS to identify and pursue technology & people development road maps. These roadmaps were reviewed at regular intervals and appropriate countermeasures initiated to ensure that goals identified are achieved. In 2016 as a part of environment analysis, RNSS explored opportunities to serve global markets. To enable this, the vision was further reviewed and revised as under:

Vision – Revised in 2016
To Achieve Profitable Growth in Steering Column Business through Technology and People Development.

Target for Revised Vision: RNSS has set the goals to realize the above vision. This revised vision also enables RNSS to compete globally in the Steering Columns Business.

② **Strategic Business Plan (SBP):** To overcome the short falls and cope with business challenges, the SBP process frame work was revised in 2014 to ensure separate strategy formulation for MSC and Column EPS using S7 tools in a structured manner. The revised planning process is explained in the following flow chart given in Figure-4.1.

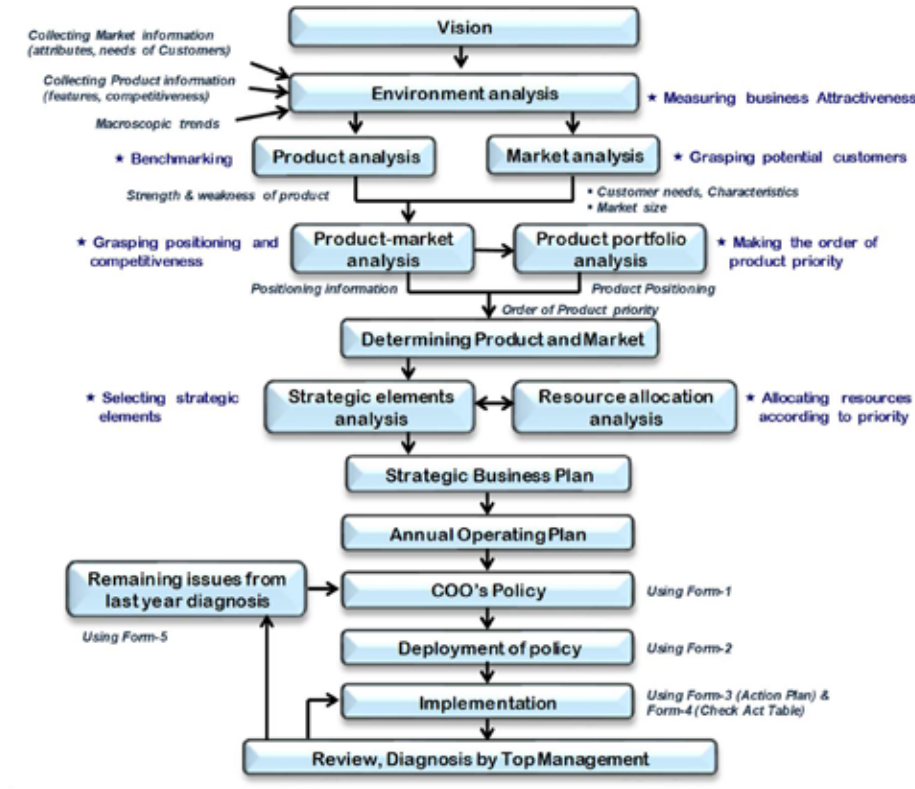


Figure-4.1 : Strategic Business Plan flow chart

SBP Planning process: The environment analysis is done through collecting market and product information through various sources like customers, associations etc., and forecast market growth potential for the next three years. The product analysis is made to understand our product strengths & weakness in comparison with competitor’s products. The needs of customers, characteristics and market size are captured in market analysis and the market competitiveness is assessed through product-market analysis. The priorities to develop products are decided through product portfolio analysis. With the above environment analysis, the products and markets are determined. Based on the strategic elements analysis, strategy and strategic initiatives are reviewed for appropriateness and modified if required for the finalized products and markets by using Strategic tools for Portfolio analysis, Resource & Capability analysis etc., to ensure “Customer In” perspective. This enabled identifying the opportunities more accurately.

SBP Approval process: The review of diagnosis starts during January every year and the discussion on catch ball session (horizontally and vertically) takes one-month time for finalization. Also strategies and strategic initiatives are identified for draft SBP and presented to Rane and NSK Chairpersons. Based on their inputs, the SBP is revised. The final SBP is presented to board and released after approval. The SBP is a rolling plan for three years, which contains detailed year on year plan on all key deliverables.

③ **Annual Operating Plan (AOP) & COO’s policy:** The first year of SBP is converted as Annual Operating Plan (AOP), and the necessary CAPEX (CAPital EXpenditure Plan) is planned accordingly. The final AOP and CAPEX are presented to board and released after approval. The COO’s policy (Form-1) is derived from the AOP so as to focus on critical success factors so as to achieve identified goals and correspondingly the targets & measures are deployed (Form-2) across the organization. The performance is being reviewed on monthly basis by COO & CEO and quarterly by Chairman.

(2) Policy Management

Consequent to the revision in SBP process, RNSS has adopted the following Policy Management system flow chart as shown (Figure-4.2). The revised system provided the clarity on 'what to do' and 'how to do' and linkage to Strategic planning. This brings out i) Linkages between vision, goals, strategies & policies, ii) Involvement of Process owners in formulating the strategy & policy target setting (Catch balling), iii) Focus on process and iv) Clarity in strategy planning & policy deployment process.

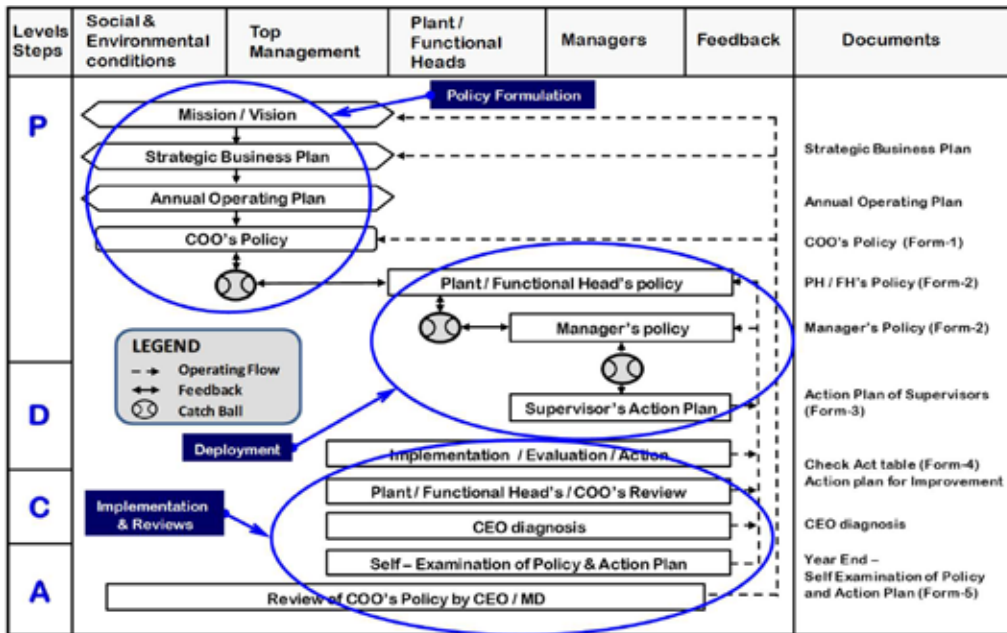


Figure - 4.2 : RNSS Policy Management system flow chart

Policy Formulation and Deployment: As explained in 4.2.1, the formulated COO's policies are deployed to all Plant/Functional heads and Plant/Functional Heads to Managers and to Supervisors using Form-2. The Managing Points in the Form-2 are derived from the Policy deployment and Role descriptions. Each Managing Point has targets defined through catch balling process. Action Plan (Form-3) for each actionable major measure is made to Supervisor to achieve the Managing Points and a clear link is established from COO's policy to last level through numbering system. These action plans are being implemented by the supervisors along with their operators.

Implementation & Reviews: The achievement of Managing Points Target and Implementation of Action Plans (Form-3) are reviewed by Concerned Plant/Functional heads/Manager at defined frequency. The gap against the target is recorded in the tracking sheet and for each gap PDCA analysis is done using Check/Act table (Form-4). CEO & COO reviews all Plant/Functional heads performance during CEO Diagnosis Review, suggest areas for improvements and Rane NSK Chairpersons Reviews Company performance during Quarterly Business Review (QBR) and suggest areas for improvements.

Year-end Diagnosis: At the end of every year, year-end diagnosis (Form-5) is done by all to capture the 'Things Gone Right' (TGR) and 'Things Gone Wrong' (TGW). COO carries out diagnosis on COO's policies. He meets Plant/Functional Heads/Managers and listens to their voice and provides inputs/guidance/support as required for achieving the COO's policies. This helps in enhancing the employee morale. The year-end diagnosis inputs are considered for revising the SBP and AOP.

4.3 Effects

- Challenging targets year on year by improved strategic business planning.
- Alignment of organization towards vision, goals and COO's policy and Involvement
- Empowerment of people through Policy Management and Daily Routine Management
- Distinct strategies for Products and Markets.



Major TQM Activities

5. Business Development

5.1 Background

Rane NSK Steering Systems Pvt Ltd (RNSS) is one of the prominent players in Steering Column business in India. RNSS manufactures Manual Steering column (MSC) & Electric Power Steering Column (Column-EPS). MSC can be further divided into PV-MSC (Passenger Vehicle) & CV-MSC (Commercial Vehicle) while Column-EPS is for PV only. During initial years, RNSS was focusing on MSC for passenger vehicle (PV) segment for domestic business of Global OEM's, wherein Product Design was provided by NSK, Japan and development done by RNSS.

Over time, RNSS developed capability to design, develop and validate new products in PV-MSC for other OEM's in India. With the introduction of Column-EPS technology, OEMs started migrating from PV-MSC to PV-Column-EPS. This created an opportunity for RNSS to leverage NSK's Column-EPS developed for other regions and apply the same in the domestic market for Japanese OEMs. This migration led to a steep decline in the PV-MSC market for RNSS which necessitated focus on CV-MSC.

This change in market dynamics led RNSS to revisit its Business development process which was earlier reactive and generic and was not tailored for specific requirements of Customers/Models. This necessitated the following major TQM activities.

5.2 Major TQM Activities

(1) Identifying and Securing New Business

① **Creation of Business Strategy Roadmap to secure New Business:** In order to understand factors influencing market dynamics, RNSS followed the Strategic Planning approach as detailed in earlier chapter and determined focus markets and products. As a part of this approach, RNSS identified that PV-Column-EPS, CV-MSC have unique market characteristics.

Considering the above inputs and resource availability, RNSS has drawn Business strategy roadmap for proactive marketing with two pronged strategies as

- a) Sustain (which focuses on existing Customer) and
- b) Grow (Acquiring New Customer).

a) Sustain - Market Share improvement for Served market: As a part of the strategic business planning (SBP) process, RNSS collaborates with NSK Sales to prepare a 5 years sales forecast. Then the forecast is classified into A,B,C and D models. (A-Current business, B-Secured business, yet to commence production, C-High chance and D-Stretch target).

Target QCD levels for C and D models are determined based on iterative interactions with Customers and Business Options are identified to meet such levels. For identified C&D models, RNSS / NSK engage with Customers proactively and communicate RNSS proposals for meeting required targets on various dimensions of technology, weight and cost. These proposals are further fine-tuned, based on inputs received from Customers.

During this process, Customers raise formal Request for Quotation (RFQs) on RNSS and its competitors. RNSS and its competitors submit Techno commercial proposals for such RFQs. This process is an iterative process wherein multiple options are evaluated by Customer Purchasing and Engineering teams over a period of time and business awarded for proposals that meet desired target levels. For awarded business, RNSS follows the NPD procedure to achieve desired targets.

During the period 2013 to 2016 for Column EPS, RNSS identified 6 models in C and 2 in D out of which 4 was secured in C. For MSC, all targeted 26 models were secured. For businesses that RNSS was unable to secure, countermeasures are identified to prevent recurrence.

b) Grow - Market Share improvement for Un-served market:

As a part of the strategic business planning (SBP) process, RNSS does Market analysis, Product analysis, Product-Market analysis, Product Portfolio analysis to identify prospective customers and products in the unserved market. Customer in sighting is done to understand their pain points and techno commercial solutions are offered



leveraging existing product portfolio with minimal engineering changes. To understand the market and the customer position RNSS done the market analysis.

Based on the above analysis RNSS identified 2 target customers and prioritized one of them for Phase 1. For Global market, RNSS interacted with Sales Divisions of Global NSK and identified target Customers and did an in depth Customer in sighting and was able to generate RFQ's. Arising out of the above RNSS was able to secure businesses worth INR 329 Million for Column EPS (I-Shaft) and INR 181 Million for Global Market CV.

Case Example – Initiative on Offering Library Products with minimal Engineering

Outline: RNSS proactively visited Customer A and demonstrated RNSS product profile and understood Customer Pain points. RNSS benchmarked competitor steering column and concluded RNSS had significant advantages over competitor.

Activities: Using CFT approach Through Customer interactions, RNSS identified that customer was affected by lack of cost competitiveness and inadequate local application engineering support. Though RNSS was able to demonstrate its local application engineering capabilities, but on the product front, RNSS could not leverage its existing CEPS product library on account of different specifications.

Hence RNSS CFT team further done deep analysis and identified that by making minimal engineering changes to an existing RNSS I-Shaft (Intermediate Shaft - a part of the Column-EPS) from RNSS Product library, an I-Shaft product that meets Customers requirements can be offered.

Outcome: With the above approach, RNSS was able to secure business for I-Shaft and was able to penetrate into unserved business, which is a breakthrough for Rane NSK.

5.3 Effects:

- Overall Sales improved from INR 5680 to 12987 Millions.
- Column-EPS Sales increased from INR 4553 to 11920 Millions.
- MSC-CV segment Sales increased from INR 412 to 764 Millions.
- Column-EPS – PV segment Market share improved from 14% to 31%.
- MSC – CV segment Market share improved from 24 to 37%.
- MSC NPD Sales increased by 3.8 times and significant column EPS NPD Sales.



6. New Product Development

6.1 Background

RNSS is responsible for two product streams namely, Manual Steering Column (MSC) and Column - Electric Power Steering (Column EPS). Until 2008, RNSS's major business was from MSC for passenger vehicle segment. RNSS had developed product and application engineering capability locally based on NSK technology library. Post 2008, with the rapid shift to EPS, RNSS leveraged NSK's Column EPS global designs to penetrate Indian market. In this situation, RNSS's challenge was to adapt appropriate process design, develop production facilities and provide application engineering support to customer.

To sustain the MSC Business, Commercial Vehicle market penetration through technology development was identified as a Key initiative. RNSS is using TQM approach to meet the above objectives by an improved NPD system which is more proactive.

6.2 Major TQM Activities

(1) Development of Proactive NPD Management for MSC:

Introduction of Technology development: In order to manage the technology development process, the necessary enhancement of the NPD system was done by benchmarking NSK NPD System and two "Advance" (Proactive) phases for technology developments was introduced.

① Technology development process / Roadmap:

In the planning phase, 5 major categories i.e. Safety, Comfort, Light Weight, Low Cost and Service-ability are identified as the broad needs of the vehicle manufacturers based on market assessment. In order to satisfy the above customer needs, a broad roadmap (Refer Table-6.2) was developed for technology development. Customer voice captured are transformed to the product requirements through Quality Function Deployment and concept designs are jointly evaluated with customer to ensure that their expectations are met. A flow chart was developed for the approach followed for the technology development.

Against a plan of 12 features identified as a part of the first technology roadmap, RNSS successfully developed 6 technology features in the identified time period. During the second technology roadmap, RNSS has identified an additional 8 features for development. However, the realization of the new features was slow.

Through deep analysis, RNSS identified that its existing inward looking closed innovation model has not allowed it to effectively enhance its capabilities to realize its technology ideas. In order to enhance its capability levels RNSS adapted "open innovation model" through Knowledge insourcing approach, where customers, JV partners, suppliers, domain experts and Institutions are being used as the sources of knowledge base. This approach helped RNSS, to collaboratively resolve technology challenges and resulted in enhancement of RNSS engineer's knowledge and capability.

Case Example - Light weight

Outline: Indian CV OEMs are focusing on light weight to enhance the fuel efficiency. Enhanced fuel efficiency is one of the factors that results in emission reduction. RNSS followed CFT approach and used a framework which explored alternative material and process technologies and identified 6 ideas.

Activities: RNSS set a breakthrough target of 50% weight reduction in one component, which could not be achieved through conventional means. RNSS team evaluated different materials and collaborated with supplier to identify a solution.

This was rigorously tested using virtual simulations (CAD/CAE). Since this was an innovative and first of its kind development, RNSS collaborated with customer to create vehicle levels specification and identify required validations. RNSS also took inputs from NSK experts through Design Reviews.

Outcome: RNSS was able to develop the component with a new material and achieve targeted weight reduction of 50%. The product was also successfully tested by the customer under various field conditions. Customer has also placed a development order for this product.



(2) Development of NPD management for EPS:

In Column EPS, the technology and volume growth are rapid. To manage this growth and enhance competitiveness, RNSS need to be more agile in NPD process. RNSS follows NSK's NPD system, as the design responsibility is with NSK where the key responsibility at various stages were defined with key focus areas and developments actions were taken.

① Enhance Local Value Add thro structured system improvement activities:

Effective Utilization of Design Review (DR) through CFT approach: The following improvements are driven through DRs in various stages of the development;

- a. **Concept / Detailed Design stages** : Regional team's experiences, suggestions and recommendations on the following aspects are evaluated with NSK Design center for competitiveness enhancement -
 - A) Parts & process standardization are driven to reduce the cost & time,
 - B) Potential part mix-up issues related to quality are evaluated and solutions identified,
 - C) Manufacturing feasibility and supplier feasibility related inputs are given,
 - D) Competitor benchmark information are analyzed & identified for improvement,
 - E) To achieve Customer driven cost targets, effective planning for implementation of process and part localization recommendation is proposed by RNSS.
- b. **Enhance In-house value addition through Process engineering capability**: As a part of the Strategic Planning Process, RNSS had identified Increased Value Add as a strategy to improve competitiveness. RNSS defined and followed the Localization process to Increase Value Add. Based on defined criteria as explained, RNSS identified a roadmap of critical processes that needed to be insourced and determined that internal capability on Process Engineering to be the constraint for this insourcing. RNSS established a People Development Road Map to improve this capability. Totally 15 engineers were trained at Japan in various departments on Process methods, Machine design, Process Quality requirements, Manufacturing management and Process Establishment. This has resulted in RNSS achieving self-sufficiency in Process Engineering. Benefits derived out of this activity are;
 - Effective participation in New Product DRs.
 - Improvement in First Time Through Rate (FTTR) from 78% levels to 98.4% in recent NPD projects.
 - Reduction in Capex yearly buy through increase in Local machine design trend from 10% to 62%
 - Driving more prevention poke yokes than detection to reduce line rejections.
 - Process De-skilling to avoid errors.
- c. **Application support for local customer**: During the initial period of Column EPS growth, RNSS was dependent on NSK for product implementation support at customer; for example, vehicle level testing. For some of the regional problems like noise, RNSS was not able to provide quick service support. It resulted in customer dissatisfaction and high warranty incidents after product implementation in the field. To move from this reactive approach to proactive management, RNSS focused to acquire capability and reduce the lead time for problem resolution – Specific skill identified as Noise Vibration Harness (NVH) issue – Root cause analysis with structured training plan, RNSS has built capability for return part analysis, field measurement, simulation of issue in lab and quicker resolution. RNSS was able to improve its problem solving skills and solved a potential field issue proactively during pilot lot stage of a New Product, thereby improving customer satisfaction and reducing potential field claims.

6.3 Effects

- Number of New Products developed in MSC:60 and Column EPS:11
- Better Profitability improvement in MSC and Column-EPS.
- MSC NPD Sales improved by 3.8 times.
- Significant portion of Column-EPS Sales on account of NPD Sales.
- Consistent achievement of First Time Right in Column-EPS over 98%.

7. Manufacturing Management

7.1 Background

RNSS has three manufacturing locations in India. Manufacturing management at RNSS is focused to meet customer demands on Quality and Delivery by adopting NSK's Advanced Production System (APS) methodology, which focuses on continual improvement in safety, quality, cost, delivery and productivity. The major TQM activities in the above areas are detailed below.

7.2 Major TQM Activities

(1) Safety Improvements

Initially RNSS did not have a robust Safety management system and was managing workplace safety through kaizens and horizontal deployment of key learnings. Based on inputs from NSK, RNSS established a Proactive Safety management system, by forming a plant wise Safety Organization, which is headed by the Plant head. The safety organization follows a structured approach for Safety Development, Training, Communication and Incident Investigation, Actions and Horizontal deployments.

Safety development is ensured through a multi layered audit and Near Miss (Hiyari Hatto) reporting approach, wherein abnormalities are identified by the Safety CFT. The respective departments are then required to submit countermeasures for such abnormalities, which are monitored for implementation and reviewed on periodic basis.

In the training and communication front RNSS conducts Basic Fire & Safety training through the DOJO, which was further strengthened by creating an exclusive Safety DOJO across plants in 2017.

RNSS forms part of Global NSK Safety team and receives updates regarding occurrence of accidents/incidents at Global NSK plants and countermeasures deployed thereon. RNSS implements such countermeasures, wherever applicable. RNSS also conducts KYT (Kiken Yochi) training based on NSK Global Accidents to improve abnormality detection within its employees.

(2) Quality Improvements

Previous and recent customer concerns, NSK's global communication of customer concerns, various Quality audits and current and previous internal Quality concerns are the source of planning Quality improvement projects in all the plants. Improvements are planned through QCC or QIT and through implementation of poka-yokes. QCC is a CFT using QC story approach, higher order improvements are made forming QIT, which uses higher level QC tools.

Using QC story approach 146 QCC projects and 21 QIT projects are completed in all plants, towards quality improvement. Implementation of poka-yoke are focused in all the plants as a preventive action to ensure no defects outflow to the customer, Verification of poka-yoke is done on daily basis at start of shift and audited at monthly intervals by Plant QA. RNSS implemented 935 Nos of poka-yoke across all the plants.

Process upgradation are also planned for Safety critical processes, based on results of QA Network audit. Using this approach, 13 processes were upgraded across all plants. Processes that could impact end user safety (S Processes) and Safety regulation requirements (SR Processes) are allowed to be operated by authorized operators only.

The process of authorization is done by Corporate QA. All the operators are trained either On the Job or in DOJO, where they are exposed to Product and its function, SOP and control chart reading, probable Quality issues, Safety and 5'S'.

(3) Operating Cost improvement

In Manufacturing Management RNSS focuses on Operating Cost reduction as a means to improve Value Add (VA) Productivity.

Towards cost reduction - Consumable cost reduction is planned to reduce the plant operating costs. Monthly requirements are planned based on the volumes to be produced. Control on consumption, improvement in life of tools are activities done to reduce the consumable cost.

Energy cost reduction activities are initiated in all the plants, with a focus to reduce the per unit power consumption through improvement in efficiency of electrical equipment, quality of power, elimination of wastages and leakages, studying usage of alternate energy. Projects are identified and implemented on yearly.

(4) Capacity Development

Delivery Management was done through production planning, only for assembly lines. This led to inefficient manpower utilization, inadequate production planning, even though Customer requirements of deliveries were met and no Capacity enhancement plan to meet future demand. In order to overcome the above, the following improvements were done;

- ① **Demand Planning:** Capacity planning is done based on Yearly projection received from the Customer and reviewed on a monthly basis for a rolling period of 6 months. Capacity enhancements are planned through cycle time improvements or facility up gradation in case of shortfalls. Techniques of Demand Planning is used to plan the production activities of each line on a monthly basis based on Customer forecast. The planning cycle follows three stages: 1) Karigumi, is a mid-month activity wherein based on forecasted projection for next month, resource planning is done, 2) Jikkou Keikaku is held at beginning of last week of current month, wherein the forecast is converted to firm plan, 3) Seisan Taisaku is held during the end of last week, wherein current month line wise plan adherence is reviewed and appropriate countermeasures identified. Based on these measures, productivity targets set are higher than the previous month achievement.
- ② **Line Productivity:** Line productivity is improved by cycle time reduction through optimization of process flow and manpower. Techniques of '3 Standard' activity are used in Plant 2 to reduce cycle time and balance the line. This is a 7-day activity where the CFT works to identify NVAs in the process and eliminate them using 3 'S' documents viz Standard Operating Procedure (SOP), Standardized Work Chart (SWC), Standardized Work Combination Table (SWCT).
- ③ **Line Flexibility:** Line flexibility is an important contingency plan to ensure that the customer dispatches are uninterrupted in case of any exigency. Lines are designed for multi model assembly and where needed, Manufacturing Engineering works on making the required changes to ensure flexibility.
- ④ **Machine maintenance:** Preventive maintenance is carried out as per prescribed norms. Loss analysis, breakdowns are analyzed shift wise to find the root cause. MTTR data for all breakdowns is collated on monthly basis and corrective actions are identified to improve the performance. Activities to improve Safety, Quality, Productivity, ease of maintenance, ease of operation are initiated in the existing machine. Learnings from existing machines are used to improve specifications when new machines are ordered.
- ⑤ **Logistic Management:** Finished goods of each variant, as per defined norms are stocked so as to ensure dispatches as per customer requirement

(5) Skill Development

For Operators, the skills are classified in 4 levels namely Level-1 (needs help), Level-2 (can operate, occasionally needs help), Level-3 (can operate independently) and Level-4 (can train others). The skill matrix is updated on a yearly basis based on the skill acquired with an objective of ensuring that operator gains required skill level for managing the processes and development of multi skilled operators. Based on the above, training schedules are prepared and requisite training done. For new joinees, only On-the Job training was provided. The above approach was not very effective as there was no defined evaluation system to measure the efficacy of the training and also there was a significant increase in new joinees due to higher volume and increase in number of Safety Critical processes. Hence in 2015, RNSS reviewed and revised its training processes. It established DOJO to impart specified training for New joinees and Process Authorization training for Operators of Safety Critical processes. RNSS defined an evaluation system to measure the efficacy of all training and undertook retraining when criteria were not met.

(6) Review

Plants are evaluated on a monthly basis on predetermined rating criteria (APS score) with maximum score of 100% and benchmarked with other NSK plants. Plant identifies actions to improve the rating.

7.3 Effects

- Lost time Accidents reduced from 3 to 0
- In process Rejection reduced from 22859 PPM to 4350 PPM
- Value Added (VA) Productivity 57% improvement in MSC and 59% improvement in Column-EPS.
- Skill level % in L3 & L4 improved from 19% to 73%

8. Quality Assurance

8.1 Background

RNSS manufactures steering column, which is a safety critical product, in which even one functional defect can cause a fatal accident (Categorized as A Rank Defects), which could result in loss of human life. Hence it becomes vital for RNSS to focus on ensuring its products, processes and systems meet defined quality requirements. To achieve this, RNSS bench marked NSK global Quality system and implemented Quality Assurance activities which are broadly classified into: 1) New Product Quality, 2) In-process Quality, 3) Supplier Quality, 4) Customer Quality, 5) Field Quality and 6) Quality review. The major TQM activities in each area are detailed below.

8.2 Major TQM Activities

(1) New Product Quality

RNSS has adopted NSK Global New Product Development System (NPDS) to ensure New Product Quality. For Column EPS, Product Design and Process development are done by NSK Steering Technical Center [STC] and Global Production Development Department [GLPDD] at Japan and for MSC it is done by RNSS R&D team. RNSS CFT participates in each Design Review [DR] stage (from DR1 to DR5) and collaborates with the respective Design and Process Development teams to ensure customer expectations are met as per the following inputs from CFT.

- **DR1:** Product Concept: Learnings from past field quality issues and customer line issues.
- **DR2:** Detailed design: Participation in DFMEA, and providing inputs relating to “product fit and function based on previous experiences”.
- **DR3:** Proto / Off tool Sample built: a) Assuring Process control by implementing Poka-yokes, based on past learning, b) Assure Supplier Process for non-recurrence of past Quality concerns through Technical Review and c) Process Quality gate preparation for in house Processes as well as Supplier Processes.
- **DR4:** Pilot Batch: Process capability study, Measurement System Analysis [MSA] study, Production Preparation Audit by QA to assure control plan adherence.
- **DR5:** Mass Production [Quality Gate]: a) Initial Product flow control for three months with 2 times 100% final inspection. In process inspection with double frequency and double sampling and b) Monitoring of Process capability, In house rejection, Production Line FTTR.

(2) In-process Quality

To assure Product and Process Quality at each stage, RNSS carries out the following activities. The details of In-process Quality activities are as shown below;

- First of Approval Inspection
- Process Audit
- Product Audit
- PFEMA Review and Updation
- Poka-yoke Daily Check and Effectiveness Audit
- Process Authorization Training and Qualifying Test for Operators

(3) Supplier Quality

RNSS uses many different commodity of child parts like Die casting, Forging, Welding, Sheet metal, Tubular, Machining, Rubber, Plastic molding, Heat treatment. RNSS have total 146 suppliers, out of these 31 suppliers are critical suppliers. RNSS uses NSK supplier Quality Management System Manual Q001 to assure child part quality based on incoming inspection results.

RNSS identify Green Channel parts and for balance child parts quality is verified on sampling basis. In case of any non-conformance, RNSS QA works with the supplier to identify root cause with appropriate countermeasures. Suppliers are evaluated with major focus on quality by monthly rating. In case of low “Quality Rating” for



continuous 3 months period, Suppliers are requested to provide an improvement plan with Top management Commitment. Supplier audits are planned on yearly basis, based on previous year Suppliers' quality rating.

(4) Customer Quality

Customer Quality concerns are classified as A, B, C & D. Such concerns are immediately attended by RNSS QA representatives. They share concern details with all departments and initiate immediate corrective and preventive actions and ensure that the same concern does not exist in pipe line inventory and also stream line supply of OK parts to customer.

(5) Field Quality

During the initial period of Column EPS growth, RNSS depended on NSK for providing field service support to customer for some of the regional problems like noise. To resolve this, RNSS focused on improving application engineering capability and reduce lead time for resolving concerns. RNSS also defined SOPs for handling field Quality concerns.

(6) Audits, Reviews and Horizontal Deployment

① **QA Network Audit:** All the plants are audited on Quarterly basis by Corporate Quality with plant CFT, the focus mainly on Safety Critical Processes. Audit Scores are categorized between 1-4, depending on measures available on equipment to prevent and detect occurrence of the defect.

- '1' - fool proof system to prevent occurrence and detection of defect.
- '2' - Semi-fool proof of occurrence and detection.
- '3'- Manual control depend on man for occurrence and detection.
- '4'- prevention of occurrence and detection is based on skill of operator.

Based on occurrence and detection score 1~4, final rank A ~E is decided for each process and efforts are taken to move all critical process to 'A' rank. [A rank means process have fool proof system at least at one place on occurrence or at out flow process].

② **QA Reviews:** Corporate QA reviews all three plants Quality performance with focus on customer concern, Process concern and Supplier concern, root cause analysis and corrective actions, through plant CFT and Monthly Quality Reviews.

③ **Kakotora Elimination:** This activity is to take preventive actions, learning from the concerns of other NSK global plants, and avoid occurrence of a similar concern in RNSS plants. RNSS uses NSK's IT portal to obtain data of these concerns. During 3 years, Global NSK plants reported 238 Customer Quality concerns, out of which 83 are relevant to RNSS. For 70 concerns, RNSS has ensured implementation of appropriate countermeasures and for balance 13 countermeasures are in progress.

8.3 Effects

- Single Digit PPM Customer Line Rejection for MSC and Column-EPS.
- In-process Rejection reduction of 81% in MSC and 37% in Column-EPS.
- Supplier Rejection reduction of 75% in MSC and 60% in Column-EPS.
- Field Rejection in reduction of 81% in MSC and 95% in Column-EPS.

9. Cost Management

9.1 Background

Rane NSK Steering Systems (RNSS) had identified Cost Reduction as a key initiative to improve competitiveness. RNSS cost structure consist of Raw materials, Electronics, Other costs like power, direct labour etc. (Other cost covers variable costs like energy, direct Labour, consumables, royalty & trade mark charges, freight & insurance and other fixed costs) and interest cost.

RNSS identified the need for a structured approach towards Cost management with an objective to reduce product cost (except Electronics) and enhance value to customer. The major TQM activities to achieve the above objective is detailed below.

9.2 Major TQM Activities

(1) Process of Cost Management

① Planning:

As a part of the Strategic Planning process, RNSS prepares a five year sales forecast. Based on this sales forecast, RNSS derives a three-year financial plan which is incorporated in to the Strategic Business Plan (SBP). Subsequently, the Annual Operating Plan (AOP) is prepared in line with directions set out in Strategic Business Plan (SBP).

To achieve its Strategic Initiative of Increased Value, add and to achieve targeted profitability levels in the AOP, RNSS identifies Cost Reduction targets, which are then deployed to the respective functions like Purchasing, Manufacturing and Finance.

- a) **Purchasing cost reduction:** Purchasing identifies its cost reduction initiatives under four categories. They are i) Negotiations, ii) VA/VE and Resourcing, iii) Localization, iv) In-direct materials (Tools and Consumables).
 - i. **Negotiations:** RNSS identifies commodity-wise / supplier-wise annual cost reduction targets leveraging buying value.
 - ii. **VA/VE and Resourcing:** RNSS identifies the options for cost reduction through cross functional team approach and bench marking with other global NSK plants.
 - iii. **Localization:** RNSS generates the possible candidate items for the localization either at in-house or at supplier base.
 - iv. **In-direct materials (Tools and Consumables) :** RNSS identifies supplier-wise / tool-wise annual cost reduction targets leveraging global volumes.
- b) **Operating cost reduction:** Manufacturing identifies its cost reduction initiatives majorly under the categories of 1) Energy cost reduction and 2) Consumables, wherein the areas are identified based on efficiency improvement and waste elimination.
- c) **Finance cost reduction:** Finance identifies interest cost reduction initiatives through effective utilization of funds and exploring alternate borrowing instruments.

② Implementation and Review of Cost reduction initiatives:

Based on the identified opportunities cross functional teams are formed as required and implementation of the initiatives are carried out using defined time plans. Monthly tracking of plan vs actual is done and countermeasures are taken. In addition, detailed reviews are carried out.

9.3 Effects

- Significant Cost reductions were obtained.
- Value Added Productivity improvement of 41% in MSC and 11% in Column EPS.

10. Human Resource Management

10.1 Background

“Human Resource” is a vital function of our organization. RNSS believes in the philosophy of “MONOZUKRI WA HITOZUKURI”. The HR Vision of the company is:

“To stimulate and nurture the intrinsic desire in people to learn, grow and enhance performance to achieve business success and growth”.

The changing market dynamics resulted in steep growth in Column EPS and a sharp decline in PV-MS. In this scenario, RNSS had to improve manufacturing skills and competencies in Column EPS and also acquire engineering competencies in CV-MS, to enhance business growth.

To achieve this, RNSS focuses on people development by strengthening key HR processes, such as Employee Skill & Competency development, Employee Morale & Motivation, Total Employee Involvement and Safety & Health, which necessitated the following major TQM activities.

10.2 Major TQM Activities

(1) Enhancement of Skill and Competency

① Skill Enhancement

a) Skill Mapping & Evaluation: Skill evaluation is conducted for all operators. The skills are classified as 4 generic skills (Quality Management Systems, 5S, Problem Solving using QCC approach and Safety Management) and 9 technical skills, which are position dependent were identified. The evaluation was conducted for all operators on their work area by respective supervisors. The evaluation of each skill is on a 4-point scale and the levels are classified as: Level 1 – Needs help, Level 2 – Can operate and sometimes need help, Level 3 – Can operate independently and Level 4 – Can train others.

b) Skill Development: Annual Training Calendar (ATC) is prepared based on the skill gaps identified during the skill evaluation process. These skill gaps shall be addressed through Class Room Training (CRT) & On the Job Training (OJT). OJT is imparted in the work process by the respective supervisors based on the ATC and skill chart is updated every year.

Apart from regular training, DOJO training is also imparted for knowledge on safety and quality principles to each individual for three days. Under safety module – awareness sessions on Personal Protective Equipment & countermeasures on previous safety incidents are conducted. As part of the quality module, awareness sessions on product and process knowledge, process defects and measuring instruments are organized. To further strengthen the process of imparting Safety Training, RNSS has implemented a separate Safety DOJO at Gemba across all the three plants. The existing DOJO will now impart Quality training and will be a Quality DOJO.

② Competency Enhancement

a) Competency Evaluation:

Competency evaluation is conducted for executives. The competencies are divided into behavioral and functional competencies. There are 12 behavioral competencies and 86 functional competencies identified across all functions. The functional competencies vary from function to function. (Knowledge of Product and Manufacturing Process, Knowledge of SAP, Knowledge of Statistical Tools & Techniques, etc.,).

The competency levels are on a 4-point scale and are classified as: Level 1 – Beginner, Level 2 – Learner, Level 3 – Practitioner and Level 4 – Expert. Competency mapping was initiated for engineering function in 2013 and



extended to all functions in 2016. RNSS identified a people development roadmap with focus on improving competencies in Manufacturing, QA and Engineering and sent people to various plants of NSK.

Over a period of 5 years, 49 Management staff and 25 Operators were trained for duration ranging from 15 days to 3 years, leading to acquiring required skills and competencies.

b) Competency Development:

i) **Training Needs Identification:** Apart from the gaps prevailing in the competency mapping, other inputs through Annual performance appraisal, strategic business plan, customer specific requirements and functional requirements are also taken into consideration for finalizing the "Training Needs Identification process". The training needs are classified into Functional and Behavioral. ATC is prepared with information pertaining to training topics, level of employees, target number of participants, month in which training program is being planned etc.

The identified training is either conducted by internal or external agencies depending upon the nature and need of the program. After completion of six months post training, the participants are evaluated for training effectiveness by their immediate supervisors.

ii) **Developmental programs:** The objective of the developmental programs is to enable participants to take up challenging and higher order roles in the future. Various programs are conducted across levels for Junior Management (JM), Middle Management (MM) and Senior Management (SM) levels.

(2) Employee Morale & Motivation Enhancement

① **Communication:** Employee Communication Meetings (ECM) are conducted every month at all plant locations for all operators, wherein the company performance is shared. Management Communication Meetings (MCM) are conducted on a quarterly basis, wherein the COO address the executives on the company performance.

② **Employee Satisfaction:** Employee Opinion Survey (EOS) was introduced in 2011 which is conducted once in 18 months to understand the perception of employees. The survey is conducted on a 4-point scale and administered through an outside agency. The findings from the survey are communicated to the employees and focus group discussions are organized to discuss the feedback in detail. Action plans are then decided to address the issues raised and these actions are also communicated to the employees.

③ **Grievance Redressal:** Coffee with COO is a grievance addressing forum for all operators and executives which is conducted internally. COO meets the operators and executives randomly at periodic intervals at all locations. Employees and operators are certain that confidentiality is maintained, which enables them to voice out their grievances openly. The grievances are categorized as aspects pertaining to production, quality, cost, delivery, safety and morale. These are then assigned to the appropriate functions for action and resolution. The list of pending actions is reviewed at periodic basis to ensure timely closure.

④ Employee Engagement Activities:

a) **On the Job / Off the Job Initiatives:** Support to employees to upgrade educational qualifications: Employees are encouraged to pursue formal education programs. Every year select employees are sponsored for pursuing part time courses (technical as well as managerial), wherein the course fee is borne by the company.

b) **Awards & Recognition:** Appreciation Tree – Function Head / Plant Head / Colleague / Peer / Subordinate from other functions / same function are encouraged to appreciate when any employee creates Customer Delight. Employees are also appreciated during celebration moments and gifted with certificates and rewards. Smart Cards are displayed in Appreciation Tree which is kept at a common place for recognition.

Spot Award - Operators are motivated and appreciated on any of their noteworthy contributions. Best Suggestion Award is given to operators at communication meeting on monthly basis for motivation and encouragement.

c) **Celebrations:** Socio cultural events are organized to de-stress and foster relationship building, which in turn boosts the employee morale. During celebrations, fun activities are organized and prizes are distributed to the winners.

(3) Enhancing Total Employee Involvement and Safety & Health

RNSS constantly focus on employee involvement activities to drive continuous involvement. The activities related to Safety and Health are given importance and carried out as per defined systems. To improve employee participation, TEI manual is created that acts as a guideline. Operators are encouraged and involved to give Suggestions and participate in Quality Control Circle.

① **Suggestion:** Employees of RNSS are encouraged to provide suggestions related to improvements on PQCDMS. Received suggestions will be evaluated by the “Suggestion Committee” and will be rewarded suitably. To improve employee participation, few initiatives were implemented to motivate the employees by translating the suggestion procedures in vernacular language. Suggestion committee is formed, that enables a swift evaluation process. To motivate the employees, attractive reward systems are put in place, that recognizes highest and best suggestion contributors. The achievers are rewarded during Employee Communication meeting. Apart from this RNSS also receives safety related Near Miss inputs through KYT trainings.

② **Quality Control Circle (QCC):** Operators are encouraged to take part in QCC and take up projects which will have impact on PQCDMS. Internal competitions are conducted and evaluated by the TQM Steering Committee. Top 3 QCC projects from the internal competitions will be rewarded during the Employee communication meeting. They are also encouraged by getting nominated to external competitions.

10.3 Effects

- Competency Index improved from 65 to 69%.
- Skill Index in % of L3 & L4 Skill level improved from 19 to 73.
- Training Man days improved from 5.1 to 6.7 days per employee per annum.
- Attrition rate reduced by 8%.
- Suggestion participation improved by 1.7 times.
- QCC participation improved by 4 times.
- Suggestion per Operator per annum improved from 4 to 16 Numbers.
- Employee Opinion Survey score improved.

11. Utilization of Information Technology

11.1 Background

Information Technology at RNSS focused on transaction management which facilitated;

- 1) Efficient day to day management of various business processes through Enterprise Resource Planning (ERP – SAP Software).
- 2) Effective delivery management to customers by establishing connectivity across all plants & warehouses.
- 3) Enhanced Data Safety, Security and Continuity so as to ensure no data loss.

The above approach led RNSS to successful transaction management in most of the business processes but data analysis and business decision making continued to be challenging due to time consumed in data retrieval and lack of seamless integration across multiple IT tools and business processes. This led RNSS to revisit their IT approach, which necessitated the following major TQM activities.

11.2 Major TQM Activities

(1) Setting of IT policy

There were multiple tools used across the departments such as CAD (Computer Aided Design), FEA (Finite Element Analysis), LABview (Machine Software), MS-Office, HFM (Hyperion Financial Management), ERP-SAP etc. Outputs from one tool used to be the input for another tool, which process was manually managed. Additionally, Data from such tools were utilized for analysis, decision making and communicating across stakeholders., The inherent inefficiencies in this process led RNSS to evaluate possibilities of integrating inputs across these processes. This led RNSS to set the IT policy as

“ Creative use of Information Technology as an enabler for ease of decision making by automation of business processes”.

(2) IT projects

Identification and Prioritization: Business process that are highly man-dependent, repetitive, prone to errors, are identified for IT based solution to improve processes. Major source of inputs for IT projects are Internal Customer Survey Inputs, Customer Complaints, Internal Audit Report, Communication meetings etc.

Typical problems encountered are:

- i) Problems involving manual work, where data is extracted from a software and then categorized to meet end requirements. This would involve repetitive efforts and could be prone to errors,
- ii) Problems where the decision making is made across departments but these are manually followed up and updated in the ERP-SAP individually. There could be potential delays in decision making, duplication of inputs and possibility of errors and
- iii) Problems involving errors, wherein Processes which involve high degree of manual content are erroneously done due to lack of adequate knowledge.

Out of the identified problems, problems that have a high impact on the business are identified to be solved by usage of IT. These problems are mapped on a 2x2 Matrix. In the 2x2 Matrix where -

- A) Low Cost – Low effort, wherein simple spreadsheet automations are developed by user departments (Internal Development)
- B) Low Cost – High effort which typically requires customizing SAP ERP system
- C) High Cost – High Effort which requires External Development [3rd Party software], which needs to be developed considering RNSS requirements.
- D) High Cost - Low Effort- which involves purchase of a ready to use software. The above approach helped RNSS to fulfill its short term Operational IT requirements. However, this approach was not adequate to mitigate holistic issues that impact the business over the midterm. To adequately capture and resolve these kind of issues, RNSS strengthened its Environment analysis as referred in earlier chapter and identified & included IT Strategic Initiatives as a part of Support Strategies in its Strategic Planning processes.

Case Example for B – Process Integration using workflow approach.

Outline: Price Change management is a key activity at RNSS. RNSS purchasing costs and Sales prices are subject to changes on account of fluctuations in commodity prices, foreign exchange and conversion costs. Prices in ERP-SAP system were changed only after obtaining approval from the respective Function Head and Head of Finance. This process was time consuming and lead to errors in price updation leading to losses. Additionally, there was no process to ensure that prices were changed only after obtaining requisite approvals.

Activities: RNSS explored implementation of a Work Flow Software which was a very costly investment and called for significant development efforts. RNSS CFT brainstormed with IT team and implemented solutions with the same result but at no extra cost in the phases.

Phase-I: Restrict price updation in ERP-SAP by Purchase/Marketing and allow price update only by Finance users based on documentary approval, thereby avoiding potential losses.

Phase-II: Integrate SAP-ERP and Email solutions to create a workflow process for Purchase & Sales price updation. This system allowed the user to enter the request for price change along with the reason thereof. An email was triggered based on the approval hierarchy. On final approval by the Head of Finance, price was automatically updated in ERP-SAP.

Outcome: RNSS was able to ensure Zero errors on account of price changes. Additionally, the time involved for changing prices in SAP-ERP was significantly reduced from 10 hours to 1 hour.

(3) Review & Standardization

Status of all IT projects identified are tracked and reviewed on a regular basis. IT Projects belonging to category B and Category C are reviewed jointly with Rane Data Centre on a monthly basis. The successfully implemented projects are standardized through SOP's. SOP's are created with the step by step procedure to assist the user.

11.3 Effects

- P - 2% improvement in productivity through IT.
- Q – Achieved zero Customer concerns using Barcode and other IT systems.
- C - Improved cost price lag recovery from 95% to 100%.
- D - 10% improvement in NPDS lead time.
- M - Kiosk implemented for Operators for Attendance and other key information
- S - Visitor management system implemented to track people movement within premises.

Outstanding Activity

12. Open Innovation through Collaborative Approach

(1) Background:

Initially RNSS followed a licensee approach with NSK, wherein by engaging with NSK, RNSS absorbed technologies for entry level products and customer services. This initiative helped RNSS to secure market penetration / market expansion / customer service activities in both Passenger Vehicle (PV) and Commercial Vehicle (CV) segments. Over a period of time, RNSS migrated to a co-development approach, wherein RNSS was able to develop basic product capability and was reliant on NSK to solve problems / develop technologies, which RNSS could not solve. However, this approach could not fully meet the technology needs of RNSS/ Indian Market, as NSK had resource limitation to support development for region specific needs. Additionally, ability of RNSS engineers in core engineering was also not sufficient to meet these needs. Hence, RNSS decided to focus on developing internal capability to solve higher order engineering problems and meet technology developmental needs.

(2) Approach:

In the initial period, RNSS followed “Closed innovation” model, where-in it faced the challenges of enhancing quicker knowledge acquisition and reduction of problem resolution lead time. Despite its focus on enhancing R&D’s technical knowledge to handle these challenges, RNSS was not successful in completely addressing the regional specific customer issues and technological needs. RNSS tried adopting the common “Open innovation” approaches like “Outsourcing” or “Insourcing” for the technology related problems. RNSS was unable to deploy these practices in technology areas, despite being successful in adapting this approach for other business processes. This was due to limited domain knowledge in the consulting companies. Also it was not feasible for RNSS to recruit specific domain experts in all technology areas due to long term sustainability. To overcome the above constraints, RNSS mapped available knowledge sources versus various technology requirements as explained in Figure-12.1 and derived a new management method by adopting a collaborative approach combining various knowledge sources so as to imbibe knowledge, acquire capability and thereby develop technologies. By augmenting these knowledge sources, RNSS was able to expand its innovation boundary when compared to smaller boundary it had during the closed innovation model.



Figure-12.1 : Mapping of Knowledge Criteria vs Technology sourcing options

This approach facilitated RNSS to collaborate with various sources concurrently depending on the nature of challenge and issues and create value to the Customer. The following figure-12.2 depicts the before and after processes for better explanation.

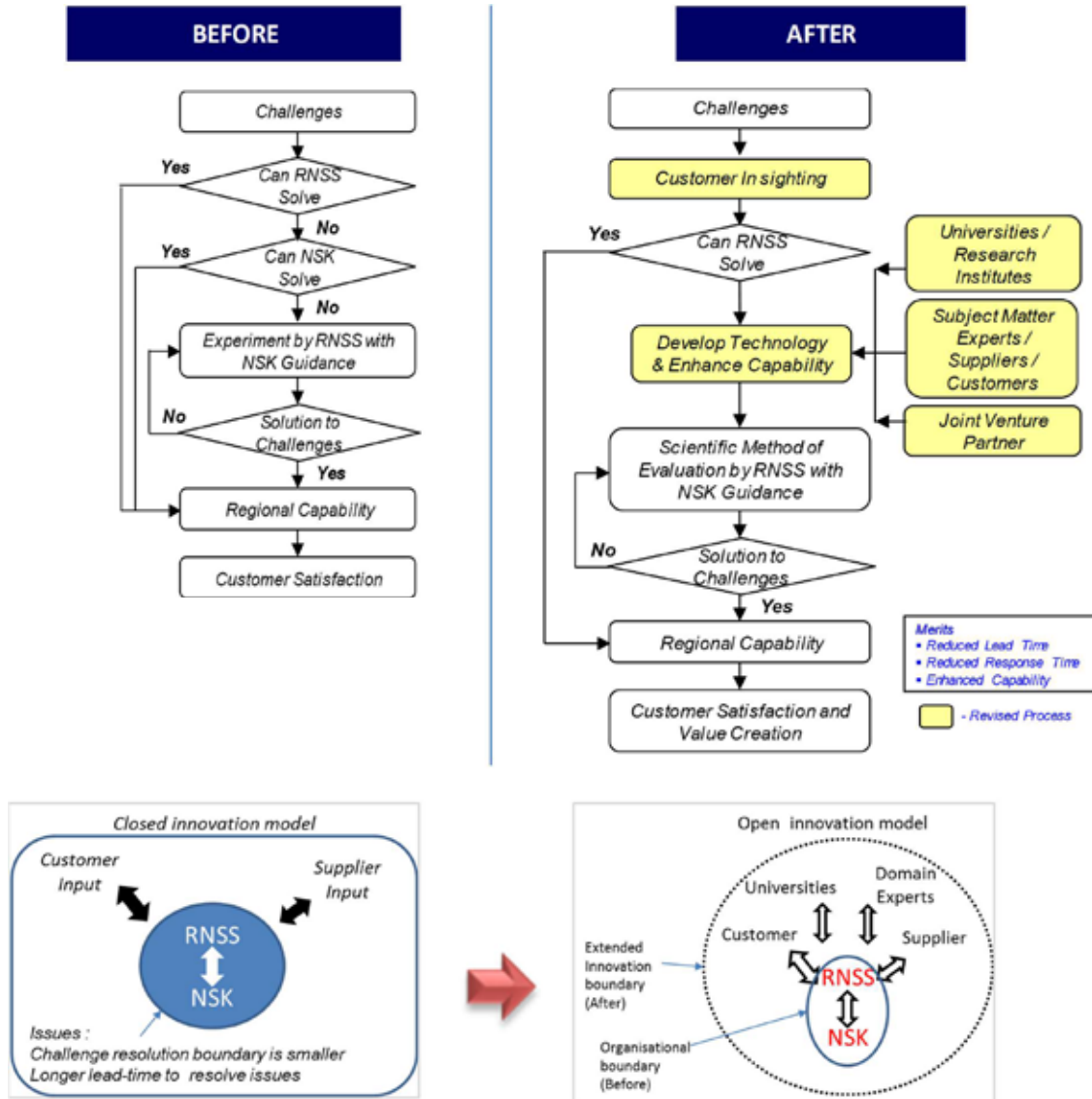


Figure-12.2 : Open Innovation Approach – Before vs After

(3) Effects

- Extension of Innovation boundary beyond Organizational boundary
- 8 advanced technologies developed and 4 advanced technologies under development.
- Problem resolution lead time reduced from 2 years to 2 months.

13. Effects

□ Quality

- Single Digit Customer Line Rejection for MSC and Column EPS.
- In-process Rejection reduction of 81% in MSC and 37% in Column EPS.

□ Productivity

- Value Added Productivity improvement of 41% in MSC and 11% in Column EPS.

□ TEI (Total Employee Involvement)

- Suggestion Participation improved by 1.7 times.
- QCC Participation improved by 8.6 times.
- Number of Suggestions per Operator per Annum improved by 4 times.

□ Business

- Advanced Production Score (APS) improved by 30%.
- Market share of MSC - CV improved from 24% to 37%
- Market share of Column EPS - PV improved from 14% to 31%
- MSC NPD Sales increased by 3.8 times and Significant Column EPS NPD Sales
- Overall PBIT Ratio increased by 68%.
- MSC Business Turnaround.

□ Acquired Application Engineering Capability in Column EPS.

□ Strengthened

- Process Engineering in Column EPS.
- Manufacturing Capability in Column EPS.
- Product & Process Engineering in MSC.



14. Future Plans

- Increase Column EPS customer base.
- Target CV-MSK global customers.
- Acquire Pre-Sales Engineering capability for Column EPS.

15. Conclusion

- TQM way of working helped us
 - Overcome the rapid challenges
 - MSC business turnaround
 - Establish World class testing facilities
 - Acquire Application Engineering capabilities
- Winning Deming Prize is an important milestone in our pursuit of Excellence
- Our TQM journey continues

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