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Cost reduction in Low-cost Emerging Economies for Sustainable Growth - Principles, Processes, Tools & Techniques

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Abstract

Cost-reduction and cost competitiveness have emerged as major strategic tools to an enterprise and are being used all over the world to fight for survival as well as maintain sustainable growth. Maximization of value-creation by enriching the planet, people and the economy should be the key drivers leading to cost-reduction strategies in any business.

The main objectives of this paper are to explain the Processes and Principles of Cost-reduction in technology-transfer to low-cost emerging economies to achieve sustainable cost-reduction and create a culture of cost-consciousness throughout an organization.

DivgiWarner has not only designed and developed but has also been practicing unique processes of cost-reduction utilizing various tools as,

1. Value Analysis and Value Engineering
2. Cost-reduction through productivity improvement
3. Supply Chain Management (SCM)
4. Lean Manufacturing
5. Total Quality Management (TQM)
6. Control over fixed Costs
7. Working Capital and Fund-Flow Management
8. Inventory Management
9. Employee involvement through Kaizen, Suggestion schemes and 5-S

Cost-reduction is planned, measured and reported with the following three indicators being constantly kept in perspective:

1. Profit achieved through cost-reduction activity
2. Cost-reduction as % to total Sales
3. Cost-reduction as % to Material Costs

Cost-reduction achieved for sustainable growth without compromising on the quality of products, and keeping the customer and supplier-base intact and an increase in the top-line on a yearly basis in line with increase in markets and economies.

For it to be achieved, cost-reduction has to be considered as a strategic and not just a tactical approach to overall cost-reduction efforts.

Key Words

Principles of Cost-reduction, Sustainable growth, Innovation

Introduction

Cost-reduction and cost-competitiveness have emerged as major strategic tools to an enterprise used to fight for survival as well as maintain sustainable growth. Maximization of value-creation through enriching the planet, people and the economy should be the key drivers for implementing cost-reduction strategies in any business.

“Cost-reduction is to be understood as the achievement of real and permanent reduction in the unit cost of goods manufactured or services rendered without compromising on the suitability of use for which it is intended.” - Definition by ICWA - London

Cost-reduction is a process of looking for finding and removing unwarranted expenses from a business to increase profit without having a negative impact on product quality.

Cost-reduction for sustainability development may involve additional costs, mainly recognition of the environmental and social costs. One should not look upon risks negatively but rather as opportunities to be leveraged.

With population having increased from 2 billion in 1950 to 6 billion today, conservation of extremely limited natural resources and ensuring inclusive and sustainable growth is a real challenge facing

the global economy. Cost-reduction through innovative ideas and strategic implementation will definitely help achieve sustainable growth by protecting multiple-lines profiting.

The emergence of the two Asian giants - India and China- is transforming the global economy. These two countries have made inroads into every possible industry. With the liberalization of the Indian economy in the last 25 years, India has emerged as a preferred country to invest in and is today considered a low-cost country and almost all the big players in automobiles viz. GM, Ford, Toyota, and Nissan etc. have invested in India.

This paper explains in detail various cost-reduction techniques used by DivgiWarner, a leading brand in India in the production of Automotive Powertrain Technology. This manufacturing unit, as a joint venture, was established twenty years ago in 1995, with BorgWarner, USA which has a 100 plus year-history of revolutionary inventions and innovations in Automotive Powertrain components and systems. Being an ISO /TS 16949 company, DivgiWarner has continuously strived to provide customer satisfaction, quality products, and constant improvement through in-depth manufacturing knowledge and expert solutions, enhanced engineering skills and global supply management; DivgiWarner has been conducting business with the US, China, Korea and other countries. DivgiWarner has a global presence in imports and exports.

The theme for this paper is “Creating and Sustaining a Culture of Cost-reduction through innovation with involvement of all functions across an organization and protecting the interest of all stakeholders”

Innovation in Cost-reduction means

- Sustainable Cost-reduction through conservation of natural resources like basic metal, energy, water and protection of the environment.
- No compromise on quality and the best ultimate value to the customer.
- Creating a culture of cost-reduction throughout the organization.
- Cost-reduction must result in a desirable increase in the triple bottom line: Economic Profit, Social Profit and Environmental Profit.

Continuous Cost-reduction has to be used as a strategic tool to improve the bottom line. Cost-reduction is planned, measured and achieved keeping the following three indicators in proper perspective:

1. Profit achieved through cost-reduction activities
2. Cost-reduction as % to total Sales
3. Cost-reduction as % to Material Costs

The Process of Cost-reduction: 5 Degrees of Implementation (DI) - An Innovative Approach to Cost-reduction

The success of a cost-reduction process depends on the commitment of an organization. It has to be considered as a strategic rather than tactical approach to overall efforts. Effective communication, cross-functional involvement and continuous monitoring are the key drivers for cost-reduction process.

The most important stage in cost-reduction is to set a target.

Target Setting

The process of cost-reduction starts with a target while undergoing finalization of LRP (Long range Planning) for the next 5 years and the budget for the year. While setting a target, the following key factors must be considered

- Customer needs and expectations (AIFs - Annual Improvement Factors),
- Product mix - Product lines having low margins are given the highest priority
- Product volumes - To get maximum cost-reduction, products having the highest sale volumes are given the highest priority,
- Availability of Technological support (cost-reduction should be feasible),
- Investment required - should meet the IRR or ROI norms,
- Long-term sustainability - Environment: Conservation of natural resources (i.e. air, water, wood, oil, iron etc), and sometime cost-reduction may not meet ROI requirements. Nonetheless, a cost-reduction project has to be encouraged for community betterment.

Cost-reduction targets are set at the apex level committee comprising core management teams across all kinds of functions. Cost-reduction targets are set as a % Sales and they are monitored through balance score-cards for Product Engineering, Finance and SCM (Supply Chain Management).

Cost-Reduction Process - 5DI Approach

The 5 DI approach is a systematic and powerful tool. It is used for cost-reduction processes. Its key features are explained as below:

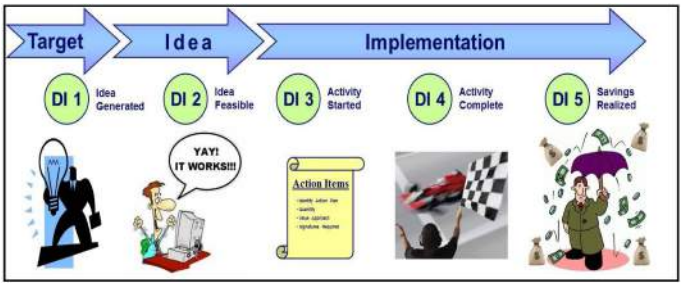

Figure 1. 5-DI- An innovative approach to Cost-reduction

Step I. DI 1: Idea Generation

As soon as a target is set, it is communicated across the organization through various forums like employee meet, cross functional workshops and apex-level management meetings. Cost-reduction ideas are also generated through,

- Employees participation in Suggestion Scheme, Kaizen, 5-S,
- Value stream mapping and analysis,
- FMEA (Failure mode effect analysis) reviews and actions,
- Need to develop local sources as substitutions to hold costs.
- Need to develop multiple sources instead of relying on a single source etc.

All generated ideas are clubbed together, analyzed and categorized in 3 different categories as, Design, Supplier and Productivity. These ideas are then forwarded to the next level for a feasibility study.

Step II. DI 2: Idea Feasibility Study

Out of the various ideas generated, the next step is to do a feasibility study considering resources required, quality standards, design feasibility, functionality of the components in the full system, and safety and environmental requirements. There has to be a relationship between investments required to achieve cost- reduction, and expected cost-reduction. Selected ideas are identified for actual implementation. In a feasibility study, expected cost-reduction is estimated with detailed activity charts (route-sheets) and a line of action is finalized. Action leaders are nominated with due dates being stipulated.

(Refer annexure 2 for recommended form)

Step III. DI 3: Activity Started

The third important step in cost-reduction processes is to create a necessary setup to start cost-reduction activities. The important activities that need to be completed are:

- Ensure that all prerequisites identified, are made available in a progressive manner as per requirements,
- Action plan with milestones is drawn up and due dates clearly indicated,
- Commitment by the team involved in the activity in the form of a signed document,
- Detailed evaluation of a potential using a quantitative / value approach,
- Reviews in weekly Cost-reduction meetings and corrective actions in case of delays in implementation,
- Set due dates for milestones for actual implementation

Step IV. DI 4: Activity Completed

This is the most important stage in Cost-reduction. At this stage it is ensured that Cost-reduction is as per pre-estimates. Off-tool sample-testing and validation and PPAP approvals are critical points that need to be observed before declaring that cost-reduction has been achieved. Change in source, change in bill of material, process-flow change activities are initiated. In some cases; customer approval is also essential; depending upon the nature of the product and criticality of the component. After successful completion of these activities, the product or process is handed over to an operation-group for actual implementation in the manufacturing.

Step V. DI 5: Savings realized - evaluation and reporting

In a process of cost-reduction it is very important that the Cost-reduction activity is completed as per the activity chart designed in DI-3 and has become sustainable. Cost-reduction is measured and reported through:

1. Profit achieved through cost-reduction activity
2. Cost-reduction as % to total Sales
3. Cost-reduction as % to Material Costs, in addition to a conventional approach of reporting cost-reduction in absolute value, may not give the assurance of long-term sustainability and its correlation with business volumes and operations.

(Refer annexure 3 for recommended form)

Actual cost-reduction achieved is monitored and reported in apex meetings and is compared to targets set earlier.

Cost-reduction is also monitored and reported at a source level, i.e. cost-reduction through Design, Supplier and Productivity improvement as a % to total cost-reduction.

Cost-reduction achieved through design and productivity improvement will give greater sustainability as compared to cost-reduction through a supplier. Design and productivity are both related to each other in an internal environment whereas cost-reduction related to a supplier, depends upon external economic and business environments.

Refer annexure 1 for detailed process flow of 5 DI implementation process

Cost-reduction process - 5DI approach: Case Study

Brief Background

Due to the Indian rupee's depreciation, thinking of cost-reduction through import-substitution became compelling. The component ‘A’ was vital to our manufacturing-process and was procured from a single particular source. The component was steel and it was manufactured by forging with heat treatment. The component is highly technical with tremendous precision-accuracy. Annual requirement was in the range of 24,000 to 30,000 units. The 5 DI technique used to solve the problem is explained as below:

Idea Generation

In a weekly Cost-reduction meeting compromising CFT of SCM (Supply Chain Management), Finance, Product Engineering and Manufacturing Engineering, the SCM head expressed concern over the increased demand of price from the single source supplier and the increase in cost due to depreciation of the rupee and increase in the logistics cost. The cost of the single component increased by 25% (15% due to price-rise and 10% due to depreciation of the rupee)

Feasibility Study

1. Task committee comprising Head, Product Engineering, Supply Chain Management and Manufacturing Engineering formed.
2. Task given to find out an alternate source, preferably local.
3. Product Engineering department studied the basic metallurgical features and availability of basic steel in India
4. Manufacturing engineers studied the entire process-flow and machining and forging capacity with required precision and accuracy.
5. SCM identified probable forgers who could support this activity.
6. Report submitted by task committee with expected cost-reduction of 10% in its first phase which could go up to 20% with increased volume, process modification and re-engineering of few technical features.

7. Task committee expressed the view that this activity could be completed in a time span of 6 months.

Activity Started

1. Identified 3 probable sources of forgers and component-drawing shared with them and requested to submit RFQ
2. After detailed study of quotes, a supplier was shortlisted and further discussion and negotiations started with him
3. Visit to the supplier's manufacturing unit to access basic facilities, quality systems and technical competency
4. Negotiations on price with specific requirements of investment in tooling and in other facilities. Volume-based price was negotiated for 5 years. A separate price was negotiated for the initial off-tool sample batch of 300 numbers for testing and validation
5. A detailed activity-chart was prepared, discussed and signed by the supplier and the customer
6. Intimation was given to the customer for his approval of new source

Activity Completed

1. Receipt of off-tool parts, testing, validation and clearance to PPAP
2. Submission of PPAP quantity and approval
3. Calculated actual costs and compared with the target set. It is observed that actual Cost-reduction is more than the initial estimate.
4. Intimation was given to the existing source with estimated date of termination and schedules for next 6 months were adjusted (it was decided that for an initial period of 6 months, we would procure the required material from both sources).
5. The final purchase order was placed with volume requirements for the next 5 years, AIF linked with volumes and a commitment of the next 6 months' supply

Saving realized - evaluation and reporting

A weekly cost-reduction meeting of CFT is scheduled on every Monday at 11:00 am, where the implementation of cost-reduction status is discussed. The agenda for the meeting is to review cost-reduction activity and cost-reduction achieved. The analysis and scrutiny of any major deviation in Cost-reduction targeted, and actual) achieved. The cost-reduction is evaluated, and reported in MIS and Balance scorecards.

1. Head SCM presented a detailed report on the actual cost-reduction achieved in initial PPAP quantity. The cost-reduction statement was signed by the Head Finance.
2. The Head of Operations expressed few concerns relating to additional machining facilities and expressed the need to invest in additional tooling when the volume would cross 1000 units per month.
3. It was agreed that actual cost-reduction should be reported in weekly cost-reduction meetings for the next 1 year with specific references to actual quantity procured, quality norms and QRDR ratings of the new vendor.

Please refer annexures 2 cost-reduction Approval Format and which is used for better evaluations and analysis.

Tools of Cost Reduction

1. Value Analysis and Value Engineering (VAVE)

VAVE is described as a systematic approach to analyze and improve the value of a product. This is a systematic process used by a multidisciplinary team, directed at analyzing the functions of the project, product, process, design or service for the purpose of *achieving the essential functions at the lowest life cycle cost, consistent with required performance, reliability, availability, quality and safety.* This process is generally used for reducing costs in a development stage but it can also be conducted as a continuous process depending upon customer needs and performance improvement. This process is completed by assessing materials, processes and or products and offering alternatives. The outcome should result in savings, without compromising the intent of the design *i.e. by maintaining or improving performance and quality requirements of the product*. Projects that use VAVE in early development stages are more successful due to a common realization of objectives, deliverables and requirements. An important aspect of this technique lies in its ability to respond keeping timeliness, flexibility and creativity. It can be used for existing or new programs, in all phases of a project as well as for organizational processes.

To achieve cost-reduction, VAVE can be used,

1. To manufacture a component from Powder Metal route to forging or vice versa
2. Change in material with change in heat treatment processes (Carburizing to Induction hardening)
3. In a casting manufacturing process from Gravity Die Casting (GDC) to High Pressure Die Casting (HPDC)
4. Gear-teeth shaping process to the Hobbing process
5. Plastic Material substitution to Aluminum material (Ex: Shift Fork)

Case Study: VAVE from PM route to forging route for a Gear

Gear is a component used in torque transmission. The approach to a real life problem and the methodology followed by DWPL to reduce material costs and process costs is demonstrated through the following example:

Background and Problem Statement

Due to pressure on the bottom line of the product line business, DWPL has a need for resourcing of the component. The main problem was that monthly production required was just 2000 units. Before VAVE, this component was developed through the powder metallurgy (PM) route. Due to low volumes and no demand from the Customer, and huge investment in PM dies, the cost per piece production of sprockets was on a higher side.

Challenges

- PM technology is cost effective only with high volumes and the challenge is to control the cost when volumes are low

- For any other route, increase in machining steps and the capital investment is required
- Production lead time and inventory control is a must
- Quality issues - close tolerances of the component must be monitored

Value Engineering

VE for sprocket done with the following steps:

- Material:
  - Existing: MPIF - FN0205
  - Suggested: 20MnCr5
- Manufacturing process for a forging route is defined as,
  - Forging
  - Blanking
  - Hobbing
  - Shaping
  - Deburring
  - Heat Treatment - Case Carburizing
- Feasibility of each option is evaluated
- Challenge for shaping process is addressed by the introduction of a radial groove
- Strength of a sprocket is verified
- Then the process is frozen

Results

- Finally DWPL successfully developed the component utilizing the forging route and bare minimum manufacturing steps. The cost-reduction achieved through the forging and machining route was 22% with substantial improvement in quality.
- MOQ reduced from 5,000 to 2,200 which resulted in reduction of inventory levels and inventory carrying costs; improvement in working capital was also achieved.

2. Cost-reduction through productivity improvement

Productivity improvement is a never ending journey for an organization. Many people never take the first step because they cannot see the end of the road. Productivity improvement initiatives are often perceived as expensive, when one is not aware of the benefits that can be achieved when executed with due diligence. If a productivity improvement journey is carefully planned and executed, the painstaking investment in the initial costs, efforts, and people can definitely be rewarded by overwhelming results. Cost-reduction through productivity improvement is an internal process. It has a high potential for sustainability. Productivity improvement means reduction in process-time, control over rejection and ultimately cost-reduction leads to energy, cost saving and reduction in material costs due to reduced rejections.

Case Study 1: Rear Output Flange Cylindrical Grinding Operation moved from a manual machine to CNC

In daily FRM meetings of operation, one of the suggestions received by the shop supervisor was to change the process of grinding operations to reduce cycle-time, improve quality and achieve cost-reduction. After detailed study, the implemented proposal was as given below:

Table 1. Grinding operation - comparison before & after situation

SN	Details	Before	After
1	Machine Used	Manual Grinding	CNC Grinding
2	Cutting Time	75 Seconds	34 Seconds
3	Surface finish	Not maintained	Easily maintained
4	Dressing of Grinding wheel	Manual	Built in dresser
5	Length resetting	Required after each dressing	No resetting required

Figure 2. Before: Grinding operation on Manual Grinding Machine

Figure 3. After: Grinding operation on CNC Grinding Machine

Results

- Process Capability > 3
- Productivity increased - from 215 to 300 units i.e. by 39%
- Auto dressing CNC program after 40 units

- One manual grinding machine out of two could be sent for reconditioning and retrofitting.

Case Study number 2: Reuse of Inserts for Bore operation by using different Boring Bar

In the manufacturing industry, inserts are always used for cutting or machining operations. The cost per piece of inserts is substantial. Considering the annual consumption of inserts, management set a target to the operations team to reduce insert consumption. The operations team accepted the challenge, and analyzed all insert consumption, process-wise and analyzed worn-out inserts - it resulted in a pragmatic view of how inserts are used (or abused) and what measures could be taken to realize cost-reduction. The operations department was able to reduce the yearly consumption of inserts by 7.3%. One of the observations was to use unused corners of an insert and the same is given as,

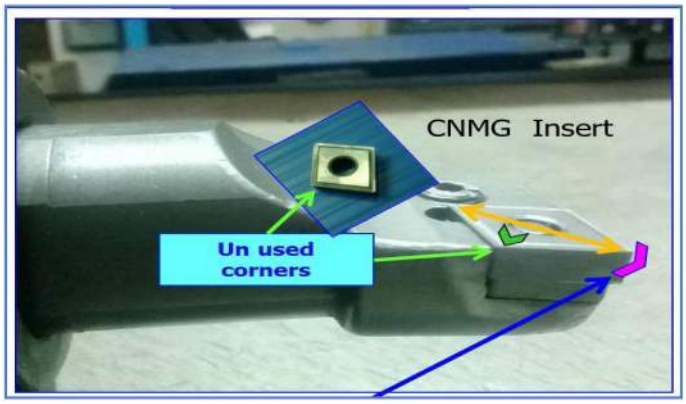

Figure 4. Before: Used insert with un-used corners

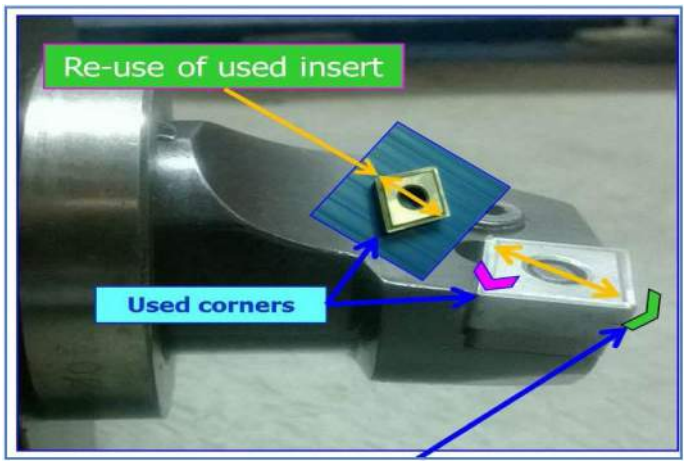

Figure 5. After: Boring bar changed; Re-use of used insert by using un-used corners

Results

- Process Capability > 3
- Tool life increased by 20 parts per insert
- 100% tool-cost saving of bore turning operation

3. Supply Chain Management (SCM)

Supply chain management is the management of the upstream and downstream value-added flow of material, final goods, and related information among suppliers, a company, resellers', and the final consumer.

The intent of supply-chain management is to utilize systems and processes to develop, monitor and control suppliers' quality and delivery standards. Cost-reductions in SCM are difficult to achieve without the active involvement of and effective communications with suppliers.

Initiatives of DivgiWarner to improve communication with suppliers:

- Yearly supplier meet organized with recognition of top 3 suppliers based on their ratings
- Best practices followed at DivgiWarner are communicated to suppliers through handbooks and videos
- Time to time trainings to suppliers on engineering change management
- Environmental initiatives shared with suppliers
- Supplier quality improvement group is being engaged in improving a suppliers' quality and capability
- Monitoring of monthly process capability for significant characteristics
- DivgiWarner supplier manual shared with all suppliers to align with our requirements

Figure 6. Annual Supplier Conference - Medium used for effective communication

The benefits achieved are,

- Better communications from suppliers improved on-time deliveries and reduced delays, ultimately improving productivity

- First time right quality supply, resulted in reduced inward inspection
- Cost-reduction ideas were received from suppliers
- Increase in direct on-line suppliers base to eliminate in transit inventory and inventory at supply levels.

Figure 7. Best Supplier Award Distribution to encourage suppliers

Logistics Cost -An important element in SCM

In an engineering industry, where material costs are always in the range of 50% to 70%, cost-reduction can be achieved by efficiently handling the entire flow of material (Supplier to end user). The task becomes complicated when we have to depend upon import of required material. The following steps can be taken to control inbound and outbound logistics cost:

- Eliminate or reduce unnecessary movement of material
- Select the logistics provider, with a global presence
- Control the premium freight (balance between Inventory carrying costs and freight inward cost)
- Ensure that material handling is with optimum weight and quantity, depending upon the nature of the material
- Improve supply-chain communication (speed/timelines, accuracy of information, information sharing)

Please refer to the case-study outlined below for the actual cost-reduction implemented.

Case-Study: Cost-reduction in Import Freight through the effective use of Logistics Service Providers

Five years earlier, the challenge faced by DivgiWarner was how to manage import supply chain and control import freight-cost through cost-reduction. In 2011, the import freight-cost was 5% of the total import consignment-cost. When the situation was analyzed, the key points observed were,

- The number of components imported was more than 20
- Out of the total material-cost, a majority of the components were imported
- Global imports were from more than 5 countries
- The number of overseas suppliers was 17
- The total dependency on 5 logistics service-providers was 2 for by air and 3 for by sea;

The following initiatives were taken to reduce costs:

- The entire logistic related to the material was studied
- A route-wise efficient and cost effective logistics service-provider was introduced
- The consignments were consolidated region-wise
- Considering the lead time, MOQ, and transit time, we changed the mode of transport from by air to by sea for a large number of high-value components.

Results

The result achieved through effective management of service-providers was as:

- Increase in logistic service providers from 5 to 17
- At least two service providers for any one route
- Maximum imports through the by sea mode
- Cost-reduction achieved on an average Rs 0.57 Mn per year
- Import freight costs per Kg reduced by 15.34%

Table 2. Cost-reduction in import freight; Costs calculations showing trend year on year

SN	Particulars	2011	2012	2013	2014
1	Number of logistics service providers by air	2	4	6	9
2	Number of logistics service providers by sea	3	5	7	8
3	Import freight cost to value of consignment in %	4.96	3.57	3.97	3.12
4	Import freight cost per Kg	24.30	21.61	21.05	20.57
5	% reduction in import freight cost per Kg wrt last year		-11.06	-2.59	-12.48

4. Lean Manufacturing

Lean manufacturing is also an important tool leading to cost-reduction in all type of industries. The ultimate goal of lean manufacturing is to reduce non-value added activities and also to reduce or eliminate waste. Each activity consuming a reduced number of resources, ultimately results in cost-reduction.

Efforts required for implementing operative cost-reductions are minimized when correct and proper systems are in place. Lean-manufacturing focuses on improving a company's operation and making it more competitive by implementing different lean manufacturing tools and techniques to eliminate waste through continuous improvement. The six tactical elements (i.e. Single-piece flow production, in-process Inventory Management, Pull-Systems, Standardized work, Total Productive-Maintenance and 5-S) help in the effective maintenance of lean manufacturing. When these six are

implemented in a synergetic manner, the end result is that waste is eliminated. Waste means non-value-added activity and can be easily identified as,

a. Excess Production compared to customer demand
b. Delays in providing required resources to machining center
c. Unwanted material movement
d. Storage of material in excess to that what is required
e. Doing redundant work on parts as needed i.e. inspection, rework etc
f. Defective production
g. Unutilized human intellect

The above identified waste can be eliminated with the use of an ideal tool, VSM (Value-stream Mapping) which is an enterprise movement-tool to assist in visualizing the entire production process, (representing both material and information flow) and Kaizen for improvement.

The advantages of using VSM are,

- **Operational Advantages:** Reduction in lead time, cycle time, increase in productivity, Reduced WIP stock, Quality improvement and effective space utilization
- **Administrative advantages:** Minimum order processing errors, streamlining in customer service functions, reduced paper-work, reduced staffing demand,
- **Strategic Improvements:** Opportunity for new marketing campaigns through reduced costs, improved quality; thus gaining greater market share from competitors;

Benefits accruing through an effective Lean-production system are as,

- Reduction in internal PPM from 2996 to 306, resulted in productivity improvement and reduced material costs.
- Reduction in Work-in-process, Inventory and improvement in inventory-turnover ratio from 4.8 to 10.53 in the last 10 years this has reduced working capital
- Material movement in the plant reduced by 68%, and resulted in an increase in manpower utilization, reduction in material movement damages, effective 5-S and optimum space utilization
- Overall Equipment Effectiveness increased from 41% to 85%
- Overall setup time got reduced by 66%
- 100% on-time delivery to domestic as well as international customers resulted in increased customer satisfaction and no customer-line stoppages.

For more details regarding Lean-implementation refer SAE technical paper, cited: Abhijeet Pingale, Deepak Vani, “Implementation of Lean Manufacturing to Improve Competitiveness”, SAE Technical Paper 2010-01-2025, dated 10/05/2010

5. Total Quality Management (TQM)

Total quality management's objective is to meet consumers' requirements and is based on the principle of continuous improvements with overall participation of all employees. The word ‘Total’ denotes the idea that all employees, over every function and level in the organization, strive to achieve quality; word ‘Quality’ suggests excellence in every aspect of an organization; the word ‘Management’ shows that quality is to be looked for as the effect of quality management process.

TQM is successfully implemented when the following steps are undertaken:

- Concentration on meeting Customers' requirements related to Quality, Delivery etc
- Concentration on manufacturing processes and their continuous improvement through Poka yoke, 5-S, Kaizens, Standardization etc
- Value-chain management and its improvement through reduction in transit-inventory, lead time, supplier defects and in reduced transit damages
- The emphasis is on prevention control, than on inspection at the end of the Product Manufacturing Process through BorgWarner Production Systems (BWPS), and Quality System Basics (QSB)
- The monthly quality and delivery-rating of suppliers is monitored and a monthly scorecard along with a defect-tracking sheet is issued to the supplier. The supplier-performance matrix is rated as: Quality: 40%, Delivery 40% and Value improvement program 20%.
- Every employee is to be engaged in quality improvement and hold himself/herself responsible for the quality of his/her work through 5-S, Suggestion schemes, CFT meetings related to APQP, ECR (Engineering Changes Review). Operators are encouraged to maintain their own equipment, and detect, record, and solve their own problems through effective supervision
- Decision-making based on accurate and relevant information related to Supplier PPM, Quality rating, Delivery Ratings, Internal PPM, Process Capability Index etc
- Encourage and support suppliers particularly those who are able to ascertain qualitative inputs

Results: With the effective implementation of TQM, the results achieved indirectly add to cost-reduction and cannot be measured in absolute INR terms are as:

- Reduction in Supplier PPM from 5022 to 1462
- Reduction in internal PPM from 2996 to 306
- Overall Customer PPM improved from 122 to 0
- Overall on-time delivery to Customer improved from 98.5% to 100%, which translates into an improvement in coordination in the whole supply chain
- Reduction in Work in process Inventory and improvement in inventory-turnover ratio from 4.8 to 10.53 in the last 10 years

- Increase in actual run-at-rate and product-quality which in turn enhanced the OEE (Overall Equipment Efficiency) from 41% to 84%.
- Improved lead-time and quality
- 'Zero' safety incident - Reducing the cost of worker injuries
- Quick response to any problem and proactive risk reduction

6. Control over fixed cost

The concept of cost-reduction is not restricted just to the difference between cost-before cost reduction activity and cost after cost-reduction. This philosophy is not applicable to fixed costs. It is assumed that fixed cost remain constant irrespective of the volume of production. In a developing economy such as India, where inflation is always above 5%, maintaining a fixed cost level at constant and wherever possible, to reduce the cost even though there is increase in activity, is a great challenge to an organization. Setting targets, effective use of Budgetary Control System, identifying cost drivers, and monthly reporting at an apex level are key steps in a cost-reduction activity for achieving cost-reduction. The main intent of cost-reduction activity is to hold the cost at a particular level in absolute value and to take corrective actions concurrently if there is a tendency towards increasing it. Employee costs in administrative functions, Travelling and Conveyance, books and periodicals, rent, depreciation, insurance etc. are few examples of Fixed Cost that can be controlled at a given volume. As an example, case study on cost-reduction in insurance cost discussed below.

Case Study: Cost-reduction in Insurance Cost

Following case study explains the cost reduction achieved in marine inland insurance through better negotiations in a cost competitive environment. Risk assessment & risk management is a greater challenge to any organization. Most of the organizations use insurance as an important tool for risk management. In total fixed cost, insurance cost has a special significance from risk viewpoint. Organizations cannot afford to be uninsured.

Scope of insurance covers following,

- Marine-inland insurance
- Marine-import insurance
- Marine-export insurance
- Fire Insurance
- Personal Accident Insurance
- Vehicle Insurance

In India, insurance sector had been opened for foreign equity investment in insurance companies and today there are many public as well as private players. This has given an opportunity to reduce insurance cost through better negotiations. Cost-reduction in insurance premium cost has been achieved by taking advantage of competitive market environment through hard negotiations with insurance companies for price and risk coverage without any compromise.

Below table shows the cost-reduction achieved in last 5 years in insurance premium cost:

Table 3. Cost-reduction in insurance cost: Cost calculations shows trend year on year (All amounts are in Rs Mn)

Sr No	Policy Type	2011-12	2012-13	2013-14	2014-15	2015-16
1	Marine Inland	308.10	950.00	1,200.00	2,000.00	2,200.00
2	Marine Import	150.00	250.00	300.00	170.00	120.00
3	Marine Export	20.00	250.00	225.00	250.00	300.00
4	Marine Duty	30.00	75.00	45.00	50.00	50.00
5	**Total Sum Insured**	**508.10**	**1,525.00**	**1,770.00**	**2,470.00**	**2,670.00**
6	Premium Paid	0.83	1.09	1.04	0.62	0.38
7	**% of Premium with Sum Insured**	**0.16**	**0.07**	**0.059**	**0.025**	**0.014**

The case study shows that, through better negotiations the % of insurance premium with sum insured has been reduced from 0.16% to 0.014%.

Result

As a continuous effort the fixed cost level in the organization has been maintained over last 5 years without substantial increase, and the graph below shows fixed cost levels with corresponding sales revenue for the said period,

Figure 8. Graph showing Fixed Cost Level with respect to Operational Sales

7. Working Capital and Funds Flow Management

Cost-reduction in Working Capital is achieved in two ways:

a. Maintain optimum levels of the working capital
b. Make funds available at the best competitive rates in the market.

Maintaining the optimum level of Working Capital is challenging and requires cross functional team work. More specifically, Inventory Control and Receivable Control are key drivers. The second aspect of Cost-reduction i.e. making the fund available at the best competitive rate is the role primarily of a finance function. This aspect has relevance in India where the cost of finance is in the range of 14 to 18%. Selection of the right source of finance and negotiating rates is a skill required in a Finance Controller.

When the economy is in the downturn, companies can face major challenges in funding business operations, particularly when there is reduced access to short-term credit. There are options available to increase working capital and do not require access to credit or other funding activities. Companies should take a closer look at how they are managing their working capital to determine where they can achieve greater efficiency. Cost-reduction through working capital means increasing the Working Capital turnover-ratio and its effective utilization. To achieve cost-reduction, thorough optimum utilization of working capital can be done by following the actions outlined hereunder:

- Preparation and close monitoring of Cash-flows and Fund-flow (Daily, Weekly and Monthly reports). Refer annexure 5 and 6 for format of daily and monthly cash-flows.
- Prepare policy documents for Investment strategy including a dividend policy
- Advance payments to suppliers for raw materials and capital purchases should be minimized and if possible, avoided
- The efficient mechanism must be setup for collection from customers through receivables ageing and punitive actions on overdue receivables (more than 90 days) through weekly meetings with the sales department
- Defining inventory levels correctly and making adjustments in inventory levels based on reliable and leading indicators from customers and from the market
- Quick decisions on selling of old assets which are technologically obsolete or assets no longer required
- Performance monitoring of key suppliers and awareness of their financial conditions
- If needed, renegotiation of payment terms with suppliers
- Review in finance sourcing strategy to reduce financing cost (Financial leveraging or effective Capital gearing)
- Finance discipline - strict compliance with a travel policy, cash payment policy as defined in the business manual of the company.

8. Inventory management

In an engineering industry involved with import material content and global sourcing, cost-reduction through inventory-control is always a challenge as well as and an opportunity. Inventory is nothing but blocking of funds. This has got a very specific reference to India, where the cost of borrowing is mostly in the range of 14 to 18%. Of the funds required, investment in inventory is in the range of INR 130 to 150 Mn, out of which more than Rs 23 Mn is always on the high seas. Investment in inventory constitutes almost more than 20%.

Inventory ties up cash, takes up space, requires handling and an additional risk of obsolescence. Good inventory management frees cash that the company can use to invest in future growth opportunities. Effective inventory-management leads to cost-reduction in terms of inventory-carrying costs, working capital-requirement, etc. A cost-reduction team comprising the Head Operations, Controller Finance and the Head Commercial has the target set in order to control the inventory and ultimately achieve cost-reduction through savings in cost of borrowing. For effective Inventory Management and Control, the following process has been followed,

- Fairly accurate sales targets are set monthly, quarterly and yearly considering market watch, customer requirements etc.
- The inventory targets are set in terms of Inventory as a % to Quarterly Sales, importing of material and indigenous material inventory levels at product level. Inventory targets are also set at the stage of inventory types i.e. raw material, work in process and finished goods.
- Inventory has been defined as a KRA for all key functions like Operations, Finance and Commercial, and is monitored through Balance Scorecards on a monthly, quarterly and yearly basis. Refer annexure 3 for departmental KRA evaluation.
- Inventory levels have been monitored and analyzed at part level, through weekly and quarterly meetings by CFT and corrective actions are taken considering the following:
  - Value stream mapping (VSM) is done for high value items produced in-house to reduce work-in-process inventory
  - Effective 5S system implementation takes place through employee participation
  - Reduced supplier lead-time is achieved
  - Reduced surplus /obsolete inventory - policy is defined for nonmoving stocks
  - MOQ's and price quantity breaks are challenged
  - Corrections in suppliers' schedules when any program is nearing its end is confirmed
  - Analysis of the risk in program volumes communicated by a customer and corrections in inventory levels is done.
  - Material from overseas suppliers mostly through by sea is lifted to avoid premium freight charges
  - Analysis is done of air freight and inventory carrying costs for lifting the material arrived by air instead by sea, for overseas suppliers and where payment terms are FOB.
- All key suppliers are involved through training programs, QR-DR rating and improved communication for quality requirements and process control, are put in place.

(Refer annexure 5 for process flow of Inventory Management)

Result

We could hold inventory at target levels in most of the last 5 years; with the following graph showing the trend.

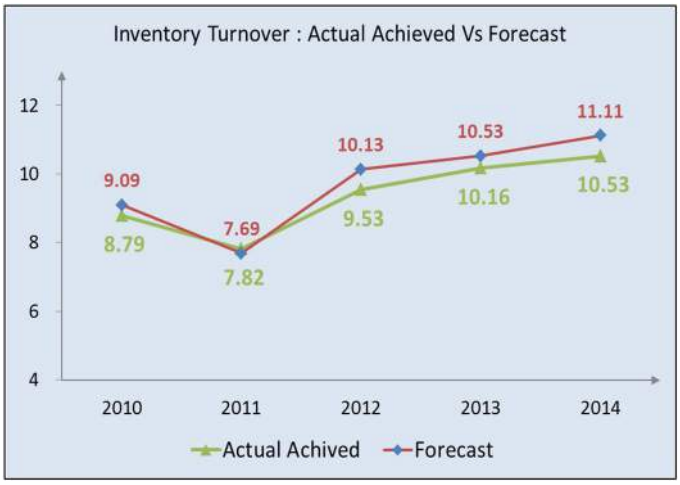

Figure 9. Graph showing Actual achievement of Inventory turnover with respect to forecast

9. Employee involvement through Kaizen, Suggestion Scheme and 5-S

In the 21st century, there is a basic change in business philosophy and concepts of stake-holders. Along with owners, customers and suppliers, an employee is also considered to be a key stake-holder. Cost-reduction processes also consider an employee as a contributor. With change in technology, and advanced manufacturing processes, nowadays most employees are skilled and the HR department tries to improve skill sets not only in operational areas but also in other areas such as innovative solutions, problem-solving techniques and effective communication skills. An employee's involvement in cost-reduction is encouraged through various initiatives such as Kaizen, Suggestion schemes and 5-S. While considering employees' participation in cost-reduction, importance is given to their qualitative involvement rather than quantitative results. It is always a down-up approach rather than a top-down approach. Employees suggest ideas for cost-reduction through various steps outlined earlier. The same, if and approved by the management, the necessary support is provided to employees to implement the same.

Kaizen

Kaizen is a system in which new ideas are created to achieve continuous improvements through small, but significant changes.

Kaizen involves each and every employee in making a change, in many cases, small, incremental changes. Kaizen focuses on identifying problems at source; solving them at the source, and changing standards to ensure the problem does not recur. These small changes and improvements add up to major benefits. They result in improved productivity, improved quality, better safety, faster delivery, lower costs, and greater customer satisfaction. In addition to these benefits that the company gets through Kaizen, employees working in a Kaizen-based environment generally find work to be easy and enjoyable. This results in higher morale and job satisfaction, with lower employee turn-over.

The Kaizen implementation process is as follows:

- Employees put their suggestions related to Kaizen into suggestion box.
- These suggestions are reviewed and analyzed in a fast-response meeting.
- Approval of investments if any, is sought from Finance department.
- All the accepted suggestions are adopted by the Kaizen team for implementation.
- Status of the implementation is communicated to the team and the person who made the suggestion/s in every day FRM
- The implemented Kaizen actions are reported to management in monthly management meetings

The table given below shows the number of suggestions received in different categories and the number of suggestions implemented,

Table 4. Table showing the number of suggestions received in last 5 years category-wise and actual implementation

SN	Particulars	Year				
		2010	2011	2012	2013	2014
A	**Received suggestions category-wise**					
1	Productivity	132	149	101	136	139
2	Saftey	161	157	203	103	165
3	Quality	63	70	66	41	66
4	Cost reduction	13	33	15	20	37
5	5-S	182	190	212	108	152
6	Morale & Motivation	959	863	896	568	1,731
	Subtotal (1 to 6):	**1,520**	**1,462**	**1,493**	**976**	**2,290**
B	**Suggestions actually Implemented:**	**478**	**693**	**512**	**291**	**728**

Issues and concerns: Since Kaizen - related actions are mostly connected with production and manufacturing, we encourage employees from other divisions viz. Finance, Admin etc also to participate in suggesting Kaizen related activities and implement them in their day to day working activities.

Management Encouragement: The management encourages employees to participate and provide more and more suggestions related to Kaizen. Every month, the management appreciates the best Kaizen-related activity implemented in the organization in cash or kind.

A number of kaizen related activities implemented over the years are given in the table below:

Table 5. Table showing number of Kaizen related activities implemented in Bhosari & Sirsi Plant in last 5 years

Year	Bhosari Plant	Sirsi Plant	Total
2010	47	59	**106**
2011	61	91	**152**
2012	79	102	**181**
2013	69	75	**144**
2014	51	62	**113**

Case Study: Cost-reduction through Kaizen - Ring Gear Cleaning Operation

The following example gives an idea as to how an effective Kaizen system is implemented through minor changes. For one of the important export parts like the Ring Gear, before its final inspection, the process undertaken was a manual cleaning operation. This operation was performed with an air-gun as shown in the picture.

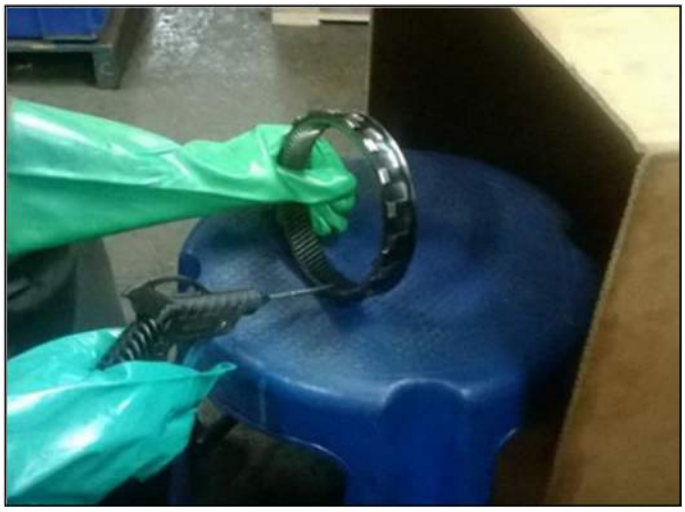

Figure 10. Before: Manual cleaning operation on Ring Gear using compressed air

The time required for the operation was definitely longer as compared to the other sequential operations. Once, a suggestion was received from one of the operators undertaking the same operation. The suggestion involved improvement incorporating Kaizen actions. When the kaizen related suggestion was studied and analyzed, the investment required was only eleven thousand five hundred rupees and the annual cost-saving was a whopping Rs 215,999.

The following picture shows the simple mechanism used for this small but drastic improvement.

Figure 11. After: Ring Gear cleaning using compressed air using simple mechanism

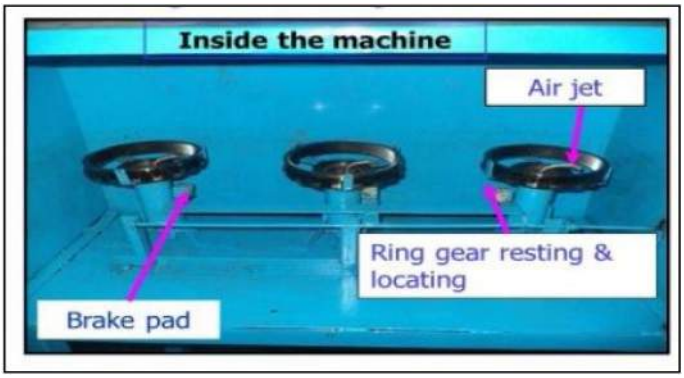

Figure 12. After: Ring Gear cleaning operation - Internal arrangement for better understanding

Results

- Cycle Time reduced by 40 seconds (Total 120 seconds for 3 jobs)
- Increase in production from 337 units to 674 units
- Energy saving - Effective use of compressed air
- Safe work-environment for the operator
- Annual saving - Rs 215,999/–

Case Study: “Suggestions Scheme - All Ideas Matter”

The judicious use of BWPS (Borg Warner Production Systems) is an important pillar in the DivgiWarner growth story. The goal of BWPS is to have robust manufacturing systems to deliver flawless quality products at the lowest possible cost and render hassle-free customer experiences. Employee-development is one of the important elements of BWPS and employee empowerment comes under employee-development. For employee empowerment, Suggestion-Scheme is a very important and popular feature embedded within our organization. To empower our employees and to improve employees' participation, our organization introduced a Suggestion-Scheme program in 2007. Initially, the response of the employees was poor because of a lack of interest and awareness among them. Efforts were made by the top management to boost their confidence-level and morale with regard to this scheme. Suggestions received were acknowledged independently and categorized under Productivity, 5S, Safety, Quality, Direct Cost-reduction and others (Moral and

motivational) as shown in chart number 3. After categorization, the individual acknowledged suggestion was reviewed and analyzed and the responsibility was assigned to the concerned personnel for its implementation. The implementation progress was reviewed in daily FRM (Fast response meetings).

The Suggestion Implementation Process

- Employees drop their suggestions in the suggestion box. A number of such boxes are kept at various locations in the organization's premises.
- The suggestions are collected and reviewed every month
- All suggestions were reviewed again at the end of the month by the team and after evaluation; the best three suggestions were awarded.
- The trend of suggestions received and implemented was reviewed in monthly management review meetings.

At the end of every month, suggestions were reviewed by a kaizen team and a 'Monthly Suggestion Awards' ceremony was organized and all these activities regularly continue even today.

Figure 13. Monthly suggestion award for employee encouragement

Figure 14. Monthly Man of the Month award for employee motivation

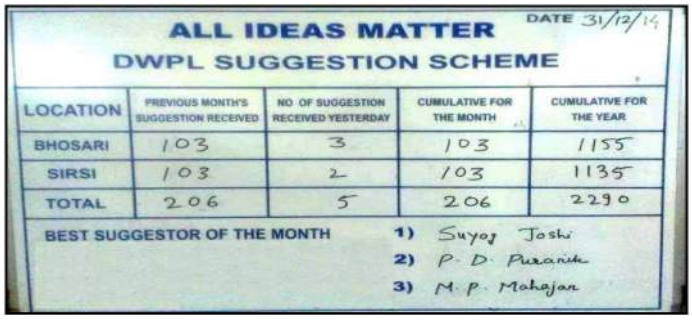

Figure 15. DivgiWarner Suggestions Board

Track records of the number of suggestions implemented through Implementation Schemes are analyzed. This helps in monitoring implementation processes.

Our experience in using this tool has been quite encouraging. The following key figures clearly illustrate the improvement:

1. Number of suggestion received on an average - 1700 per year
2. Number of employees participation in Suggestion-Scheme - approximately 54%
3. Number of Kaizen related activities implemented on an average130 per year and cost-reduction achieved is approximately Rs 1 to 1.5 Mn against the amount distributed for the best suggestion award being Rs 0.05 Mn

5-S: Process of effective 5-S is implemented in all the functions of the company by giving classroom as well as on-the-job training. The important Japanese word to define 5-S i.e Seiri, Seiton, Seiso, Seiketsu and Shitsuke are interpreted as Sort, Set in order, Shine, Standardize and Sustain for each and every employee to remember easily and understand better.

To implement 5-S effectively, every month with suggestion awards, 5-S award is also given to the department which has managed a sustained-5-S throughout the month. The picture below shows the situations before 5-S implementation and after:

Figure 16. Situation before 5-S implementation

Figure 17. Situation after 5-S implementation

Results

Effective 5S implementation leads to: (a) Cost-saving by the effective use of space and improved safety- eliminating worker injuries. (b) It also eliminates scrap, thereby reducing production costs. (c) Savings through reduced inventory results (d) reducing handling damages, improves morale of the employees (e) productivity improvement.

Conclusion

In an era of globalization and competitive economies, cost-reduction is a key to survival. Since we have limited natural resources and unlimited wants that are increasing every day with an increase in population, any cost-reduction activity in an innovative manner is a must for long-term sustainability.

In the 21st century, dramatic business changes in business philosophies, philosophy should not be focused on a single P i.e. economic profit but on a number of issues associated with profit of different kinds i.e. economic, social and environmental profit. Bottom lines, leading to different kinds of profits can be achieved only through cost-reduction. In the last 25 years, Indian and Chinese economies are considered to have become cost-competitive and cost-effective. Cost-reduction through innovative ideas and the strategic implementations of these ideas will definitely help in achieving sustainable growth by protecting different kinds of profit.

Critical success factors for sustainable cost-reduction mechanisms are,

- Setting up of cost-reduction targets
- Involvement of all teams engaged in cross sections of functions from top management levels to employees on the shop floor
- Balanced Score card approach
- 5-DI process approach for implementation
- Effective use of various tools and techniques

These cost-reduction processes & practices can be referred as benchmark for developing new products and processes.

Future Direction

Based on our analytical study it is observed that, during the last 10 years, all developing economies are concentrating on cost reduction with specific reference to improving economic profit. Cost-reduction mechanisms having permeated grass-root levels are delivering desirable results and have created a culture of cost-reduction throughout the entire organization. There is a need to focus on cost-reduction for long-term sustainability through,

1. Conservation of natural resources
2. Use of non-conventional energy
3. Eco-friendly product design and development
4. Audit certification of Sustainability Reporting (GRI)

There is a tremendous opportunity to use these innovative cost-reduction techniques to contribute to augmenting different kinds of profits. Going further, organizations may have to think beyond ROI and economic profit while investing in any cost reduction activity to achieve sustainability. The focus of this study and paper is restricted to few limited techniques and manufacturing organizations in the automobile sector. The service sector is also playing an important role in our economy. These tools and techniques can also be horizontally deployed in other manufacturing and service sectors.

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Last but not least; the authors would also like to thank Mr. Vinay Sete, Mr Deepak Wani, Mr Abhijeet Pingale for their valuable inputs and support in organizing all these ideas, helping to put them together in a substantial order.

Abbreviations

5-S - Sort, Set in Order, Shine, Standardize, Sustain

AIF - Annual Improvement factors

DI - Degree of Implementation

FOB - Free on Board

FRM - Fast response Meeting

GRI - Global Reporting Initiative

MOQ - Minimum Order Quantity

PM - Powder Metallurgy

PPM - Parts per Million

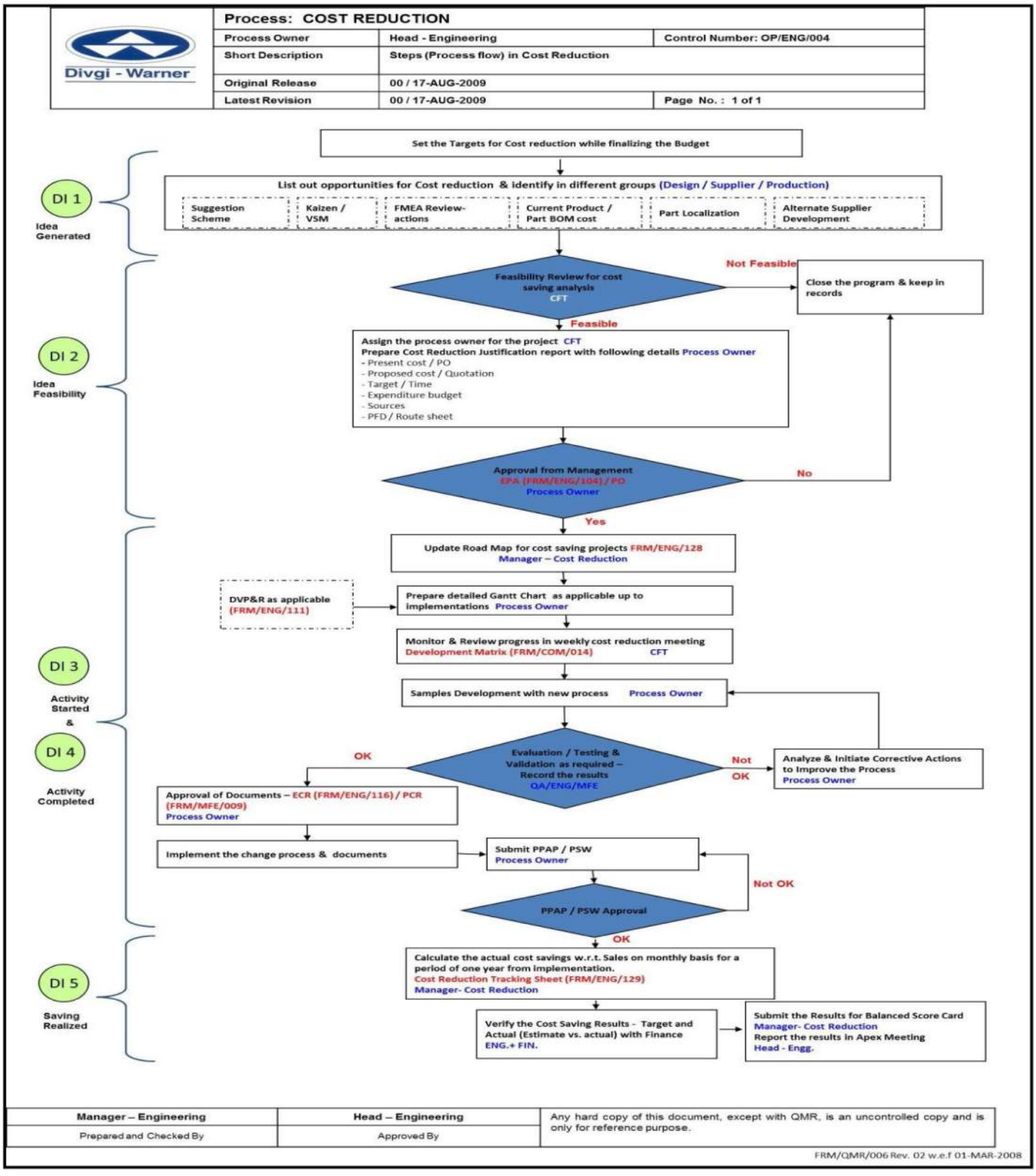
SCM - Supply Chain Management

TQM - Total Quality management

VAVE - Value Analysis and Value Engineering

APPENDIX

ANNEXURE 1: COST-REDUCTION PROCEDURE IN DETAIL



ANNEXURES 2. COST REDUCTION APPROVAL FORMAT

Cost-reduction Approval Format

Information required:

		Form No:
		Rev No:
		CR Project No:
		Date:

1 Component Number: _____

2 Component Description: _____

Existing Supplier: _____

3 Source for Cost reduction Idea: _____

4 Cost Reduction Strategy: _____

(Brief description) _____

(If required attach annexure) _____

5 Cost per piece: _____

Present Cost _____

Target Cost _____

Expected cost-reduction: _____

6 Annual Volume in Nos: _____

7 Total Estimated Cost reduction: _____

8 Probable Investment required:

Plant & machinery	
Tooling	
Others	
Sub Total:	

(Please attach annexure if required for the details of the investment)

9 ROI for the investment: _____

10 Engineering Changes required: _____

(If required attach annexure) _____

_____

11 Cross Function Team Identified:

	Name	Department	Signature
1.			
2.			
3.			
4.			

12 Team Leader: _____ _____ _____

13 **Expected Time Lines:**

Start date: _____

Completion date: _____

Cost-reduction Realization date: _____

Approvals:

Indentor: **Head Commercial** **Head Finance** **Managing director**

ANNEXURE 3: COST-REDUCTION EVALUATION & REPORTING FORMAT

Cost-reduction Evaluation & Realization

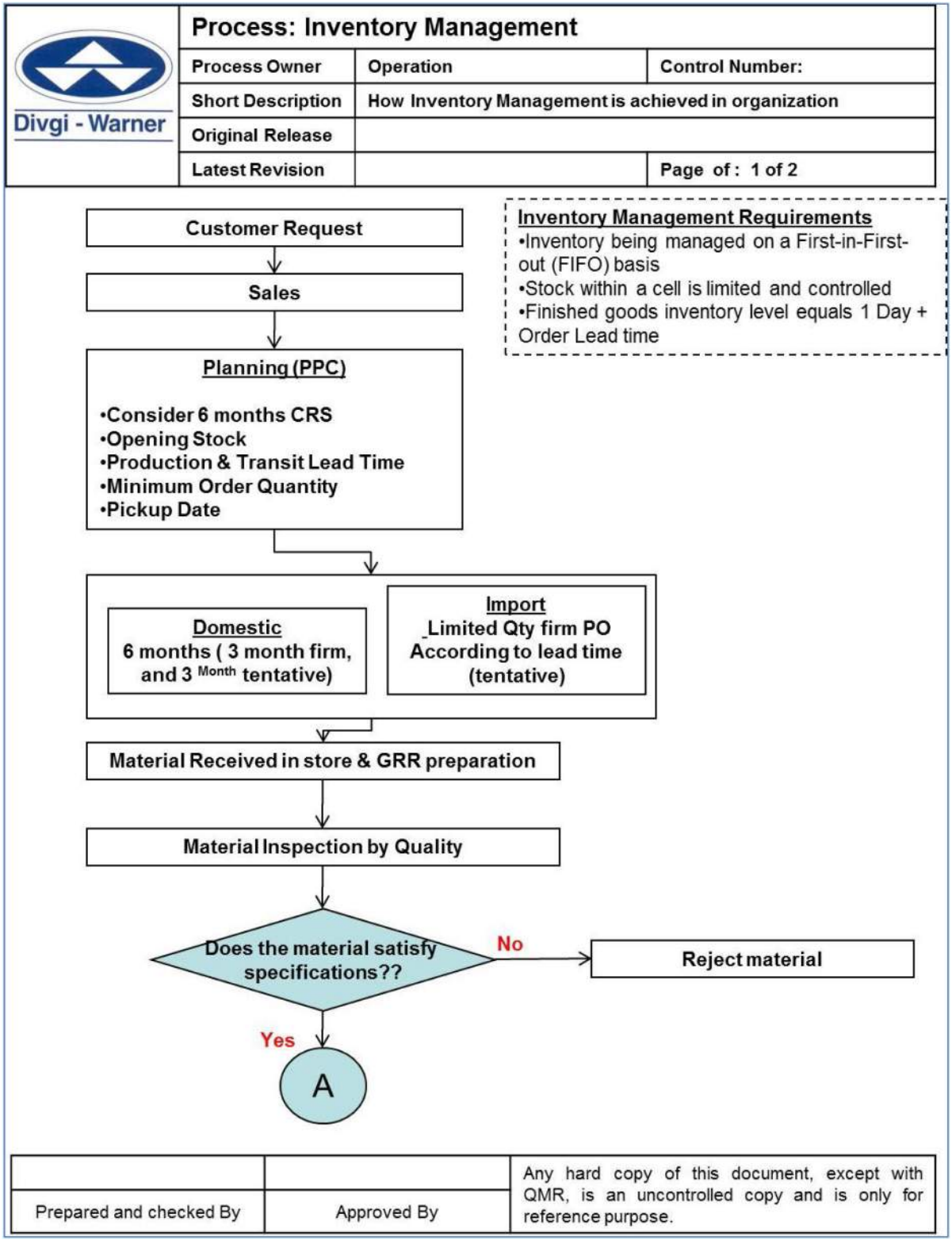
	Information required:			**Form No:**
				Rev No:
1	Component Number:			CR Project No:
2	Component Description:			Date:
3	Existing Supplier:			
4	New Identified Supplier (if any):			
5	Source for Cost reduction Idea:			
6	Cross Functional Team:	Name	Department	
		1.		
		2.		
		3.		
		4.		
7	Team Leader:			
8	**Evaluation**	**Target**	**Actual**	**Variance**
a	**Cost reduction achieved in INR:**			
	Cost per piece:			
	Annual Cost reduction Acieved:			
b	**Time Lines:**			
	Project Start Date:			
	Project Completion Date:			
	Cost-reduction Implementation date:			
c	**Investment in INR:**			
	Plant & machinery			
	Tooling			
	Others			
	Sub Total:			
d	**Return on Investment:**			
9	Justification for deviation:			
10	Actions Identified for future Corrections:			

(Please atttach copy of cost reduction approval sheet)

Evaluation BY:

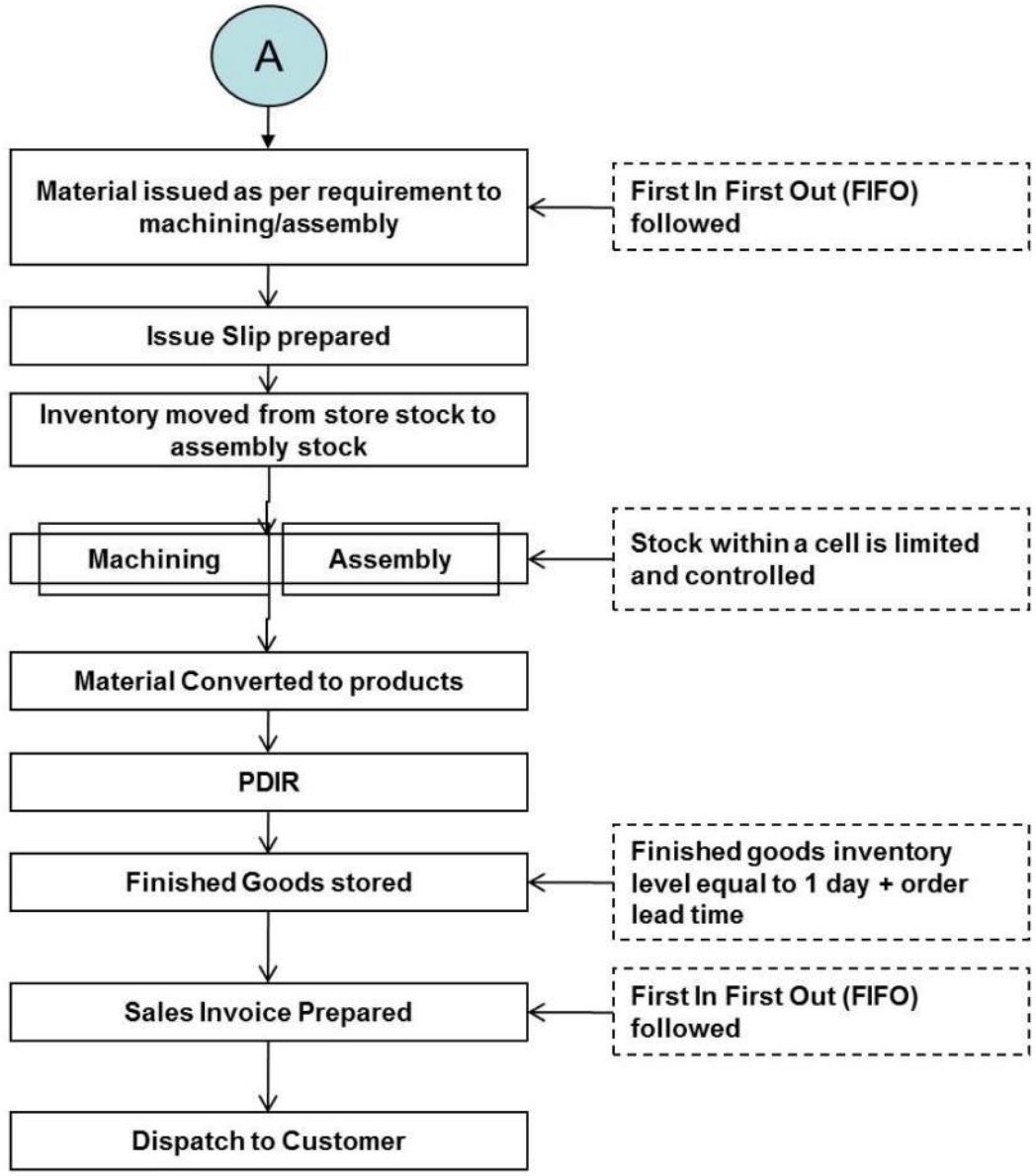
Indentor: **Head Commercial** **Head Finance** **Managing director**

ANNEXURE 4: INVENTORY MANAGEMENT PROCESS



Divgi - Warner

Process: Inventory Management		
Process Owner	Operation	Control Number:
Short Description	How Inventory Management is achieved in organization	
Original Release		
Latest Revision		Page of : 2 of 2



Prepared and checked By	Approved By	Any hard copy of this document, except with QMR, is an uncontrolled copy and is only for reference purpose.

ANNEXURE 5: FORMAT - DAILY CASH FLOW STATEMENT

DivgiWarner Pvt Ltd, Pune

Daily Cash Flow Management — **Month: June 2015**

A	Bank 1: Saraswat Bank	1-Jun-15	2-Jun-15	3-Jun-15	4-Jun-15	5-Jun-15	Remark
	Bank balance available (Opening balance):						
	Expected In flow from:						
	a) Other Bank Funds transfer						
	b) Fixed deposit Maturity credit						
	c) Debtors Receipt for value date						
	Total Funds available after receipt:					-	
	Expected out flow:						
	a) Cheques already dispatched						
	b) Unsigned cheques in hand as of date						
	c) Funds required for LC margin Fixed Deposit						
	d) Funds transfer to other bank						
	Total Funds requirement:					-	
	Urgent & Critical cheques					-	
	Total Balance to be provided if we don't use CC:					-	
	Total Cash credit Limit available						
	Cash credit limit lien mark for Letter of credit						
	Cash Credit limit earmarked agaisnt Packing Credit facility						
	Cash credit limit available as on date:						
	Available Cash Credit limit in respect of cheques to be dispatched as on date						
B	**Bank 2: HDFC Bank**						
	Bank balance available (Opening balance):						
	Expected Inflow from:						
	a) Other Bank Funds transfer						
	b) Fixed Deposit Maturity						
	c) Debtors Receipts						
	d) Others receipts						
	Total Funds available after receipts:						
	Expected outflow:						
	a) Cheques already dispatched:						
	b) Signed cheques in hand:						
	c) Funds kept for PLI Payment:						
	d) Funds transfer to other bank:						
	Total Funds requirement:						
	Balance available with bank as on date:						

Prepared By: Officer - Finance

Checked By: Officer - Finance

Approved By: Officer - Finance

ANNEXURE 6: FORMAT - MONTHLY CASH FLOW STATEMENT (FORECAST VS ACTUALS)

Divgi Warner Pvt Ltd,

Monthly cash flow Forecast summery statement. **Month: June 2015**

			Opening Balance (31 May 2015)	1st Week	2nd Week	3rd Week	4th Week	Forecast Total	Actual Total	Difference	Remarks
A) Inflow Summery											
	1	**Opening Balance**									
	a)	In Bank account									
	b)	In Fixed deposit with banks									
	c)	EEFC amount in foreign Currency converted to Rupee									
	d)	Cash Credit Limit used									
		Total OP Balance	-	-	-	-	-	-	-	-	
	2	**Debtors Recovery**									
	a)	Domestic Debtors Receipts						-		-	
	b)	Debtors - Export						-		-	
		Sub-Total of receipt during the month	-	-	-	-	-	-	-	-	
		Grand total of Inflow Funds	-	-	-	-	-	-	-	-	
B) Outflow Summery											
	1	Employee related payments						-		-	
	2	Sub-Contractors payments						-		-	
	3	Consultants payments						-		-	
	4	Statutory payments						-		-	
	5	**Suppliers payments**									
	a)	Local Suppliers payments									
	b)	Import Creditors payment									
	6	Other Payment (Telephone,MSEB, Transporters, Vehicle Fuel etc)						-		-	
	7	Term Loan & Vehicle Loan						-		-	
	8	Customs Duty payment						-		-	
	9	Dividend Payment with Tax						-		-	
	10	Advance Tax & Self Assesment Tax for FY 15-16						-		-	
	11	Royalty, R & D Cess payment						-		-	
	12	Employee Incentive Payment (Half yearly)				-		-		-	
		Sub-Total of outflow funds	-	-	-	-	-	-	-	-	
		Closing Balance	-	-	-	-	-	-	-	-	

Prepared By: Officer - Finance

Checked By: Manager - Finance

Approved By: Head - Finance

Note: Comparison of cash flow (forecast Vs actuals) is done on weekly basis.

The Engineering Meetings Board has approved this paper for publication. It has successfully completed SAE's peer review process under the supervision of the session organizer. The process requires a minimum of three (3) reviews by industry experts.

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