

ACMA

ACMA Centre for Technology (ACT)

IMPACT

INDIAN MANUFACTURING PRACTICES ACMA CENTRE FOR TECHNOLOGY

Vol. 11 | No. 2

August 2018



ACT CASE STUDY
COMPETITION

ACT 5TH CASE STUDY COMPETITION, 2018



SAKSHAM
ACMA CENTRE OF EXCELLENCE

International Programs



ACMA-CARDIFF
Executive Education
Program, UK



**Innovative Business
Model For India**
Giz Munich, Germany



ACMA-AOTS
Program On
Production Management,
Japan

Innovations **ZERO DEFECT** New **PRODUCT DESIGN & DEVELOPMENT...an ACT Approach**

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Academic Partners



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One Complimentary copy of "IMPACT" is sent to each member of ACMA. Additional copies are available at Rs. 150/- for each copy. This cost is including service Tax & postage charges.



Chairman's Message

Skilling and Mentoring

Dear Reader,

This issue of IMPACT presents winning case studies from a total of 108 presentations which were well-attended in ACMA event. The ACT 5th Case Study Competition held on 18th June 2018 at Pune, covering various streams such as Productivity, Quality, Cost Reduction, Safety and Environment, Automation and Innovation.

I believe participation in such events is of utmost importance as it provides a platform to our employees to exhibit their knowledge in solving complex problems & showcase innovations in our manufacturing world for boosting their moral. It is a learning junction for all as many years of experience is presented through the case studies offering great and easy solutions or methods to many of the problems most of us may be facing.

It would be wise for a company to encourage and support participation of its employees in such competitions as it brings out the hidden talent of the employees and improves the culture and environment of working.

I am glad to share that ACMA Centre of Excellence (ACoE) has been set up at IIT Campus in Sonapat, Haryana and we have announced the 1st Course on topic 'Developing Low Cost Automation Capabilities' scheduled from 4th to 6th September 2018. I look forward to members active participation for its forthcoming programs.

Also, I request you all to block your diaries for attending the "ACMA Technology Summit and Expo 2019", the 4th in the series, on Theme 'Managing Technological Disruptions as Opportunity' scheduled for the 29th and 30th January, 2019 at Pune. This is a mega Two-Day event that comprises of Panel Discussions, Interviews of successful business leaders, Key Note Addresses and ACMA Awards Presentation.

May I now request members who are yet to register and submit their applications online for participating in this year's ACMA Awards 2017-18. I hope you will not miss this opportunity in competing for the most coveted Award in the Auto Component Industry.

This volume of IMPACT also shares detailed report with outcomes from the various Study Tours made delegates from the industry and the ACMA team. These Study Tours were held at Cardiff University UK, GIZ Germany, VDA Germany and AOTS, Japan.

I am sure you will appreciate the contents of Vol. 11 Issue 2 of "IMPACT" shared through this issue and I look forward to your valuable feedback, not only to improve but also for augmenting the gamut of services from the ACT.

Best wishes
F R Singhvi



WINNERS OF ACT 5TH CASE STUDY COMPETITION, 2018.

Date : 18th June, 2018 Venue : Hotel Aurora Towers, Pune.

Productivity

Group B Company Group Turnover > 250 Crore

Company Name	Plant Address	Project Name	Trophy
IP Rings Ltd. (OCF Divi)	D11/12, Industrial Estate, Maraimalai Nagar, Chennai-603209	Productivity Improvement of JL Camring	Gold
Wheels India Ltd. (CV)	MTH Road, Padi, Chennai-600050	Auto deburring of wire electrode in submerged arc welding	Silver

Group A Company Group Turnover < 250 Crore

Company Name	Plant Address	Project Name	Trophy
Neel Auto Private Limited	Bherampur Industrial area, Begampur khatola, Gurgaon-122001	Productivity with Quality	Gold
KCTR Varsha Automotive Pvt. Ltd.	No. 161, Markal-Alandi Road, Markal, Tal-Khed, Dist. Pune-412 105	Growth of Suspension Division in 2 yrs	Bronze

Quality

Group B Company Group Turnover > 250 Crore

Company Name	Plant Address	Project Name	Trophy
Yazaki India Pvt. Ltd.	C13, Kamaraj Salai, Maraimalai Nagar Industrial Estate, Kancheepuram, Tamilnadu, 603209	Reduce DPM in Base IP line	Gold
Sundaram Clayton Limited	Padi Chennai. 600 050	Rejection reduction in APDA Purge body	Silver
WIL Car Wheels India Ltd.	Plot No. 11-18 Sector -7, HSIIDC, Bawal Rewari-123401 (Haryana)	To reduce cut mark rework at paint plant	Bronze

Group A Company Group Turnover < 250 Crore

Company Name	Plant Address	Project Name	Trophy
Hema Automotive Pvt. Ltd.	Sp 17 A, RIICO Industrial Area, Neemrana, 301705	Elimination of Customer Line losses by reducing Frame body defect	Gold
WIL Car Wheels India Ltd.	Plot No. 11-18 Sector -7, HSIIDC, Bawal Rewari-123401 (Haryana)	To reduce cut mark rework at paint plant	Presentation
Force Motors Limited	Plot no.3, Sector no.1, Pithampur (Dist.Dhar) 454 775 Madhya Pradesh	Controlling variation in Rubber Buffer location for Long Member	Presentation
Nicks Auto Industries Pvt. Ltd.	E- 320-321 & 307, Phase-IV, Focal Point, Ludhiana-141010	Achievers	Presentation

Cost Reduction

Group B Company Group Turnover > 250 Crore

Company Name	Plant Address	Project Name	Trophy
Menon and Menon limited	Vikramnagar Kolhapur-416 005	Moulding sand temperature control system through provision of effective Sprinklers instead of cooling system	Gold
Lucas TVS Ltd.	Lucas - TVS Ltd, Padi, Chennai-600050	Material Cost reduction in armature manufacturing	Silver
Paranjape Auto Cast Pvt. Ltd.	J15/16 Additional M.I.D.C. Satara-415004	Cylinder Block Tooling cost reduction	Bronze
IP Rings Ltd.	D11/12, Industrial Estate, Maraimalai Nagar, Chennai-603209	Cost Reduction in Top Rings by Process Elimination	Presentation

Group A Company Group Turnover < 250 Crore

Company Name	Plant Address	Project Name	Trophy
Neel Auto Private Limited	Bherampur Industrial area, Begampur khatola, Gurgaon-122001	Transportation cost reduction for Hero Bike frame	Gold
Helical Springs, (Unit of T.K. Precision Pvt. Ltd.)	Plot No. 104, Sector 8, IMT Manesar, Gurgaon-122050	To Improve cost in Rear springs	Presentation

Safety & Environment

Group B Company Group Turnover > 250 Crore

Company Name	Plant Address	Project Name	Trophy
Cummins Technologies India Private Limited	Phaltan High horsepower Plant, Cummins Technologies India Private Limited, Plot no.-B3-1, SEZ Unit, Village Survadi, Nandal, Taluka Phaltan, Satara-415523, Maharashtra	Elimination of Safety & Ergonomic risks involved in Cam and Crank bore alignment checking at QSK 23 Cylinder Block line	Gold
Wheels India Ltd.	22Km, Rampur-Tanda Road, P.O. Tanda Badli, Rampur (U.P.)-244925	To Improve Plant Safety	Silver
Wheels India Ltd.	Plot No. C-1, MIDC Ranjangaon, Pune-412220	Improvement of Safety on 800 T Press	Bronze

Automation

Group B Company Group Turnover > 250 Crore

Company Name	Plant Address	Project Name	Trophy
Kores (India) Ltd.; hakan Foundry Division	Chakan (Pune), Gat No. 149, Chakan-Talegaon Road, Mahalunge Village, Chakan, Pune-410 501	Sand metal separator machine	Gold
Sanjeev Auto - Parts Manufactueres Pvt. Ltd.	Plot No. F-104 M.I.D.C., Walunj, Aurangabad-431136	JD fork automation (Robotic Cell)	Silver

Group A Company Group Turnover < 250 Crore

Company Name	Plant Address	Project Name	Trophy
Alfa Cotec Industries	Binola Industrial Area, Delhi-Jaipur Highway, Gurugram, Haryana-122413	Automation (Low Cost / High Cost)	Gold

Innovation

Group B Company Group Turnover > 250 Crore

Company Name	Plant Address	Project Name	Trophy
JK Fenner India Ltd.	F-21 & 22 SIPCOT Industrial Estate, Sriperumbudur-602105, Chennai	Speaking Machine	Gold
JK.Fenner (India) Ltd.	Plot No: 4 & 22, Phase IV, IDA, Patancheru-502319, Hyderabad	Productivity Improvement by using the Manufacturing Experience effectively to fulfil the growing customers demand	Silver
Cummins India Ltd.	Kothrud, Pune Maharashtra-411038	In-house manufacturing of Imported Arbortech steady rest pad at time of emergency	Bronze

Group A Company Group Turnover < 250 Crore

Company Name	Plant Address	Project Name	Trophy
Nipman Fastener Industries Pvt. Ltd.	M/s Nipman Fastener Ind. Pvt. Ltd., Plot no.-9, IP-II, Phase-I, Village: Salempur Mehdood, Tehsil & Distt. Haridwar- 249403, Uttrakhand, India	To Eliminate out side process in Bolt "A" and "B" Cylindrical Stud	Gold

ACMA CENTRE FOR TECHNOLOGY (Programs & Services)

"ACT"
means
"IMPACT"



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- Zero Defect Quality
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- New Product Design
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- Supply Chain Excellence
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ACMA

Automotive Component Manufacturers Association of India

ACT 5th Case Study Competition Glimpses

108 Case studies presented in ACT 5th Case Study Competition in Pune on 18th June 2018. The Chief Guest for the competition was Ms. Sowmya Chaturvedi - Purchase Leader - Cummins India. Presentations in Case study competition included areas of Productivity Improvement, Safety and Environment, Quality Improvement, Cost Reduction, Automation and Innovation.



Lamp lighting by the Chief Guest



Group photo with participant



IP Rings Ltd. (OCF - Division) Chennai

Category - Productivity

Turnover - > 250 Crore

Title of Case Study

PRODUCTIVITY IMPROVEMENT IN JL 291- CAMRING

ACT Case Study Competition- Stream

Stream 1: Productivity Improvement / Cost Reduction

Presented By _____



M. S. Karthick



S. Kamala kannan

Productivity Improvement in JL Camring

Problem Statement :

- Unable to meet the customer demand.
- Frequent Dispatch Delay and Premium Delivery mode.
- Higher Lead Time, Low Productivity.
- Higher Cost due to "Slot Milling Process".

Goal :

- To achieve 100% Adherence and to Eliminate delay in Delivery and Premium mode of freight.

Linkage of Project with objective of Business

COMPANIES GOALS / OBJECTIVES

1. Achieve Sales Turnover as per OCF sales Plan.
2. 100% Total Employee Involvement.
3. Achieve Zero Customer Complaints.
4. Achieve Rejection Reduction from 6% to 4% in OCF.
- 5. Achieve 100% On-time delivery.**
- 6. Reduce the Premium freight.**
7. Achieve the Targets of ACMA - Engineering / NPD cluster Performance.
- 8. Achieve cost Reduction by 10%.**

Project Objective

Reducing the Production Lead time by changing Manufacturing method for “Slot Milling” process thereby increasing “Overall Adherence and Achieving On-time Delivery”.

Improve volume adherence and Reduce Premium Freight.

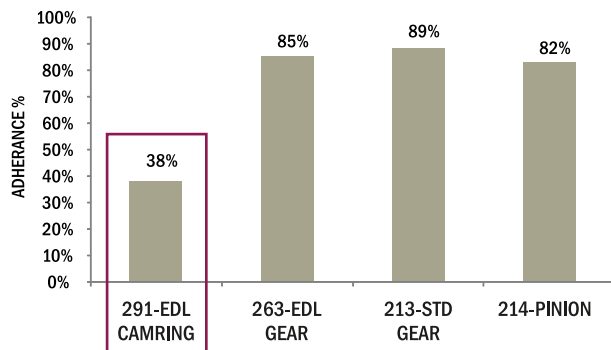
Benchmarking for Target Setting

- Achieve 100% Production Adherence.
- Reduce Lead time from 13 Days to 10 Days.
- Reduce Delayed Delivery and Premium freight to “Zero”.

Past Trend of the Problem

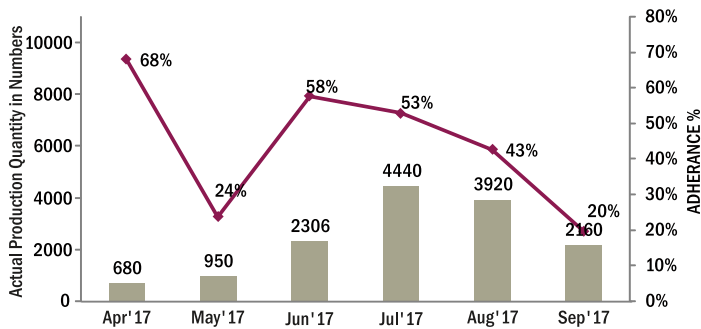
Choosing Model

PRODUCTION ADHERENCE FOR JL EDL PARTS FROM APR' 17 TO SEP' 17



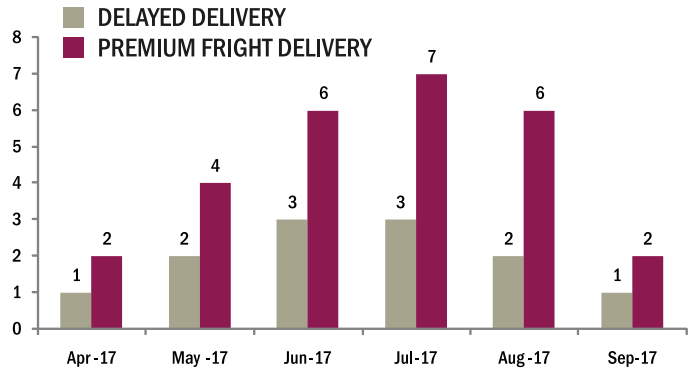
We have chosen JL 291-Camring for this project because of Low Production adherence

Production Schedule Adherence – JL Camring FROM APR' 17 TO SEP' 17



Average Production Adherence is 38%

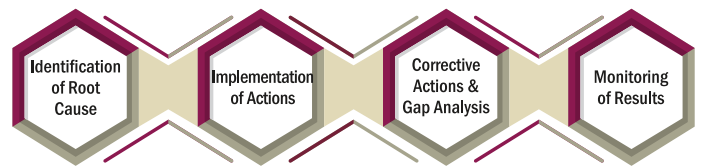
Delayed / Premium freight shipment Trend – JL Camring SHIPMENT DETAILS OF JL 291 - CAMRING FROM APR' 17 TO SEP' 17



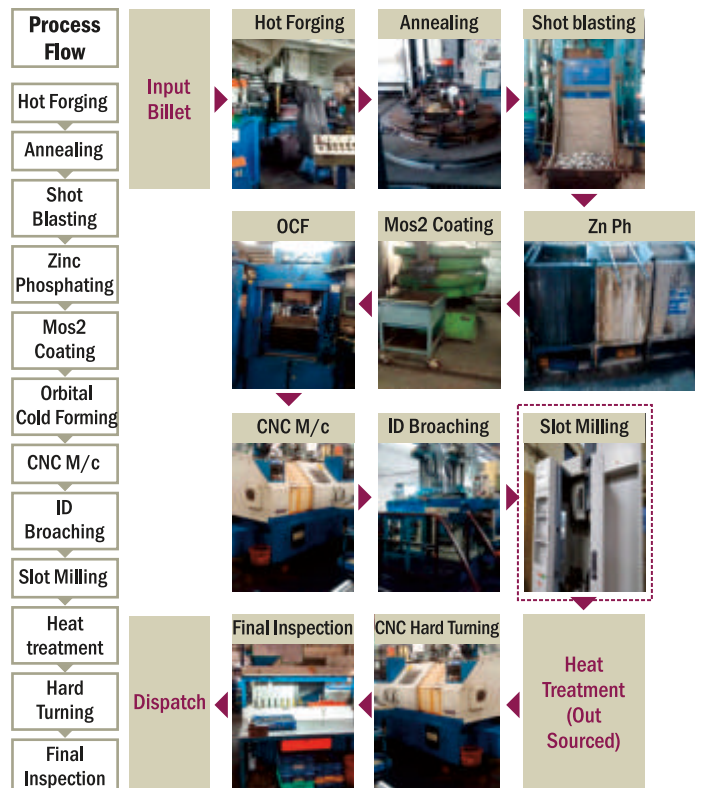
- Delayed Delivery hinders Supplier-Customer Relationship
- Premium Delivery hits hard on Profit Margin

Analysis to find Root Cause

Methodology



Current Process Flow Chart



Why-Why Analysis

Customer Dissatisfaction | **WHY?**

Delay in delivery and Premium freight | **WHY?**

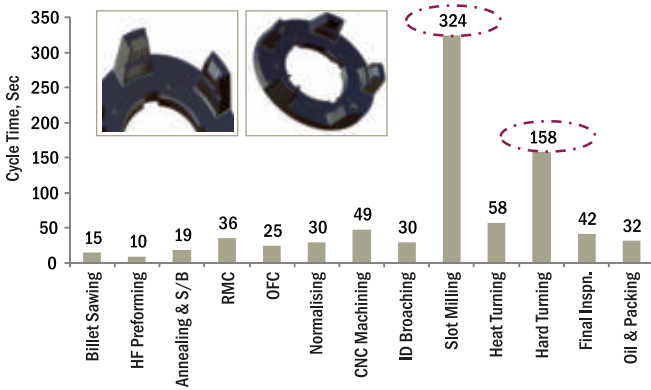
Delay of Camring from Production Line | **WHY?**

Cannot able to meet production schedule on time | **WHY?**

Higher Process Lead Time.

Cycle Time Study

CYCLE TIME DETAILS OF JL 291 - CAMRING PROCESS



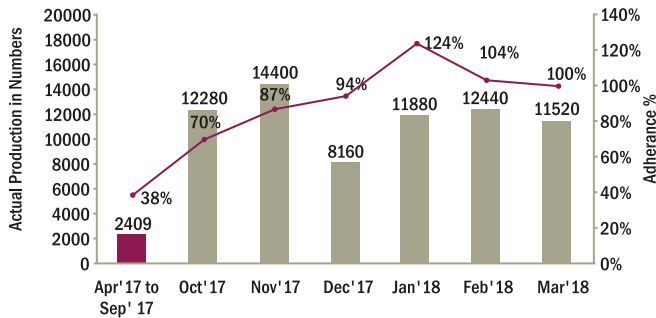
Arriving at Root Cause

S.No	Process Name	Cycle Time (Sec.)	Is it possible to Reduce/Alter/Eliminate	Explanation / Action	Valid or Invalid
1.	Hard Turning	158	Yes	Hard turn process cycle time can be reduced by changing of Insert material from Ceramic to CBN.	Valid
2.	Heat Treatment	58	No	Final carburizing, hardened & tempered requirements meet at this process.	Invalid
3.	Slot Milling	324	Yes	Process Method for mfg. of Slot on camring Lugs can be changed.	Valid

Monitoring of Results

Results Monitoring

PRODUCTION ADHERENCE FOR JL 291 - CAMRING FROM OCT' 17 TO MAR' 18



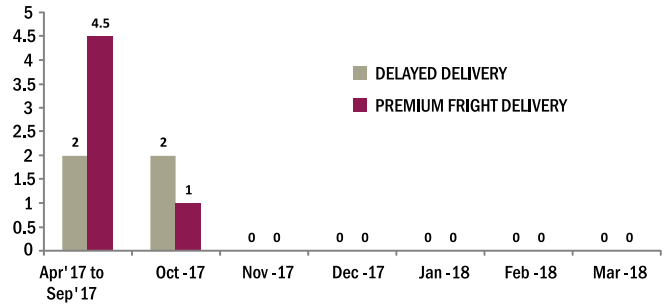
Before

Avg. Production schedule adherence from **Apr'17 to Sep'17** was **38%**

After

Avg. Production schedule adherence from **Oct'17 to Mar'18** → **93%**

SHIPMENT DETAILS OF JL 291 - CAMRING FROM OCT' 17 TO MAR' 18



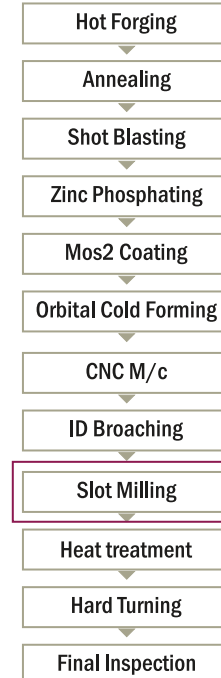
Average Delayed & Premium Delivery Occurrence Reduced from 3.25/month to 0.25/month

LEAD TIME TREND - JL 291 CAMRING

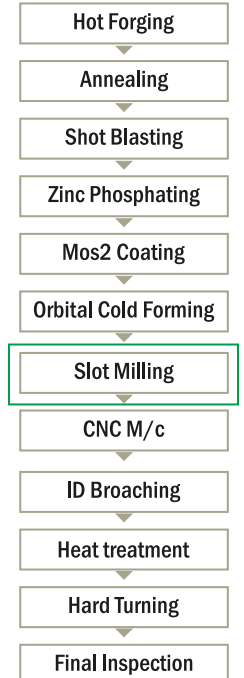


Seq. No.	Description	Date	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
1	RM - Inspection															
2	Billet Sawing															
3	Hot Forging															
4	Annealing & Shot Blasting															
5	Zinc & Mos2															
6	Orbital Cold Forming															
7	Normalising															
8	CNC Machining															
9	Slot Forming															
10	Heat Treatment															
11	Hard Turning															
12	Inspection & Despatch															

Before



After



Process Changed from Slot Milling to Slot Forming

Lead time Reduced from 13 days to 10.5 days

Benefits of the Project

Tangible Benefits (Quantitative)

Productivity Improvements

- Slot Mfg. Process cycle time reduced from **324sec.** to **45sec.**
- Hard Turning Cycle Reduced from **158sec.** to **88sec.**
- Production Lead time Reduced from **13Days** to **10.5Days.**
- Delayed Delivery & Premium freight Occurrence Reduced from **3.25/month** to **0.25/month.**

Cost Savings

Sr. No.	Description	Before	After	Cost Saving/Part (Rs.)
1	Process	Slot Milling	Slot Forming	
	Cost in Rs.	102.00	10.50	91.50
2	Process	Hard Turning		
		Ceramic Insert	CBN Insert	
	Cost in Rs.	4.83	3.48	1.35
Total Cost Saving / Part in Rs.				92.85

- **Total Cost Saving from the Month of Oct'17 to Mar'18 - 65.626 Lakhs.**
- **Expected Saving for the year of 2018-19 - 128.355 Lakhs.**

Intangible Benefits (Qualitative)

- Customer – Supplier Relationship.
- New similar RFQ from Customer.
- Improved operator Morale.
- Updatations of Design Guidelines.
- Reduced Operator Fatigue.

Learnings from the project

- New Approach to Change the Process.
- Possibility in Designing of Slot Forming Tools In-House.
- Systematic Problem solving techniques.

NEW CLUSTERS LAUNCHED

Following new clusters were launched

ACT Foundation Cluster 12 & 13

ACT Advance Cluster 11 & 12

ACT Engineering Excellence Cluster 4 & 5

ACT Zero Defect & Zero Effect Cluster 3 & 4

LAUNCHING SHORTLY

ACT 1st Automation Cluster

ACT 1st Supply Chain Logistics Cluster

Contact: [sangeeta.sharma @ acma.in](mailto:sangeeta.sharma@acma.in) | m: 8802848888

Neel Auto Private Limited (JBM Group)

Gurugram

Category - Productivity

Turnover - < 250 Crore

Title of Case Study

PRODUCTIVITY WITH QUALITY

ACT Case Study Competition- Stream

Stream : Productivity Improvement

Presented By _____



Satender Yadav



Sumit Kumar

Innovation – SPEAKING MACHINE

Problem Statement :

Low productivity for AAYD model- 34.8 meter weld length/ mandays resulting delivery adherence 91% only

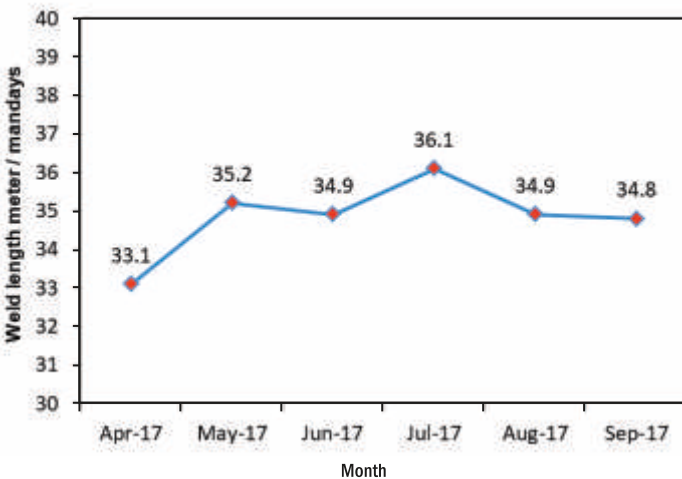
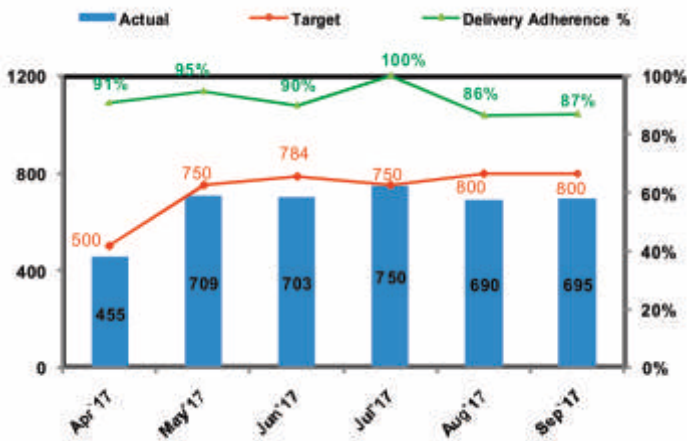
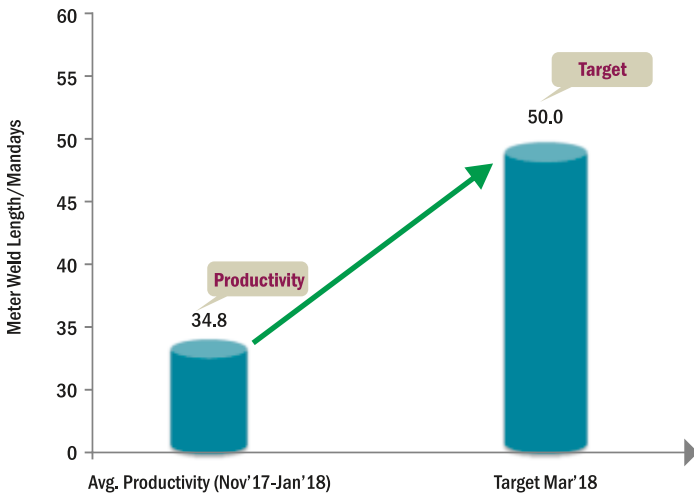
Linkage of Project with objective of Business

COMPANIES GOALS / OBJECTIVES

- Improve Productivity from 34.8 Mtr. WL/Mandays to 50.0 Mtr. WL/Mandays.
- 100% Compliance of Delivery adherence.
- Increase Automation from 19% to 52%.

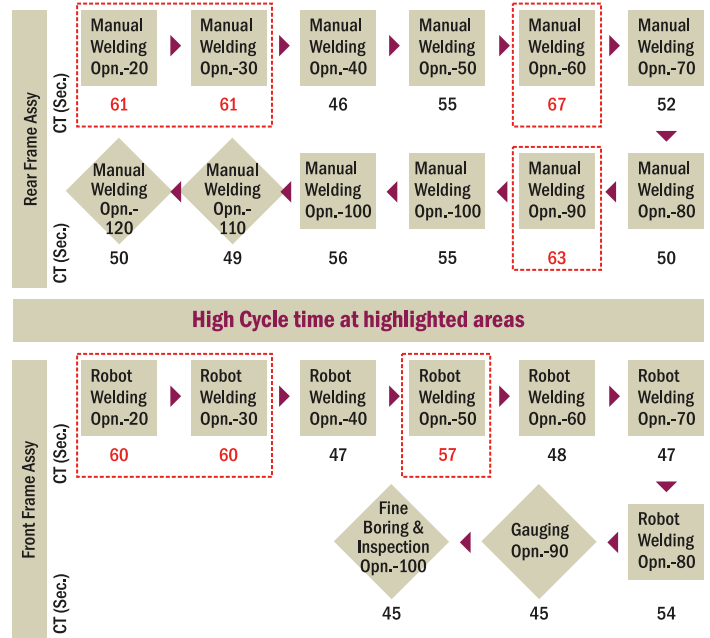
Project Objective

- 100% Compliance of Delivery adherence.
- Improve Productivity from 34.8 Mtr. WL/Mandays to 50.0 Mtr. WL/Mandays.
- Increase Automation from 19% to 52%.

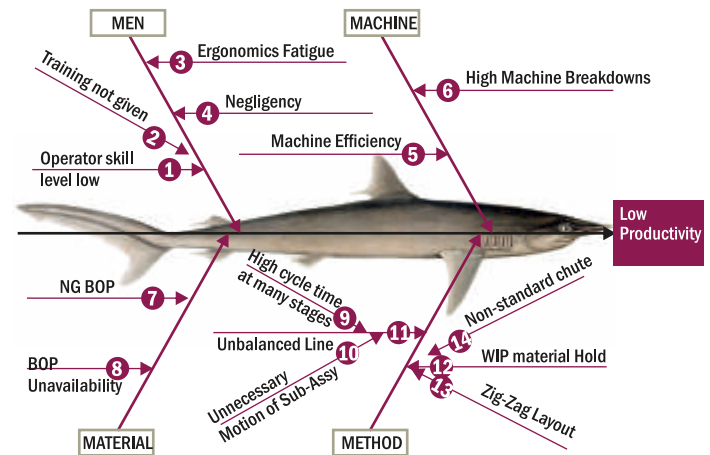


Theme : To Improve Productivity of AAYD Frame Assembly from 34.8 to 50.0 Mtr. Weld Length/ Mandays through Line Balancing & Automation.

Root Cause analysis – Flow Chart



Analysis to find Root Cause



Men

Root Cause	Verification Method	Result
1 Operator Skill Level low	Verbal Questions & Skill Matrix	✓
2 Ergonomics Fatigue	Work activities view	✗
3 Training Not given	Training record & Training matrix	✓
4 Negligency	Poison Test, Process parameter verification & SPR	✗

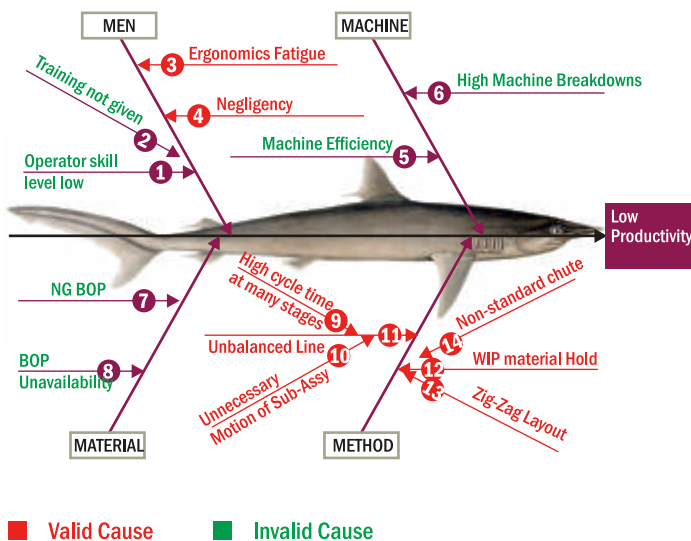
Additional Findings:
 Ergonomic fatigue observed at few stations due to unorganized space.
 Process parameter found out of spec. parameter was disturbed by welder. Welding Quality was very low, welding defect rate very high only 60% SPR observed.

Machine

5	Machine Efficiency	<table border="1"> <tr><th>Verification Method</th><th>Result</th></tr> <tr><td>Machine Cycle time, working condition & calibration record</td><td>✓</td></tr> </table> <p>All machines calibration on time so working perfectly</p>	Verification Method	Result	Machine Cycle time, working condition & calibration record	✓	6	NG BOP	<table border="1"> <tr><th>Verification Method</th><th>Result</th></tr> <tr><td>BOP inspection record & Line complaint record</td><td>✓</td></tr> </table> <p>After verification of BOP inspection & line complaint record there is no major & regular problems observed at line</p>	Verification Method	Result	BOP inspection record & Line complaint record	✓
Verification Method	Result												
Machine Cycle time, working condition & calibration record	✓												
Verification Method	Result												
BOP inspection record & Line complaint record	✓												
7	High Breakdowns	<table border="1"> <tr><th>Verification Method</th><th>Result</th></tr> <tr><td>Machine breakdown data</td><td>✓</td></tr> </table> <p>Machine breakdowns very less, No Major breakdowns impacting productivity & Quality</p>	Verification Method	Result	Machine breakdown data	✓	8	BOP Unavailability	<table border="1"> <tr><th>Verification Method</th><th>Result</th></tr> <tr><td>Line Stoppage due to BOP unavailability</td><td>✓</td></tr> </table> <p>No line stoppage due to BOP unavailability</p>	Verification Method	Result	Line Stoppage due to BOP unavailability	✓
Verification Method	Result												
Machine breakdown data	✓												
Verification Method	Result												
Line Stoppage due to BOP unavailability	✓												

Method

9	Non Standard Chutes	<table border="1"> <tr><th>Verification Method</th><th>Result</th></tr> <tr><td>Gemba observation</td><td>✓</td></tr> </table> <p>Sizes of chutes very large & no standardization</p>	Verification Method	Result	Gemba observation	✓	10	Zig-Zag layout	<table border="1"> <tr><th>Verification Method</th><th>Result</th></tr> <tr><td>Gemba observation</td><td>✓</td></tr> </table> <p>Complexity observed in Layout, stages observed Zig-Zag type</p>	Verification Method	Result	Gemba observation	✓
Verification Method	Result												
Gemba observation	✓												
Verification Method	Result												
Gemba observation	✓												
11	High Cycle time at few Stages	<table border="1"> <tr><th>Verification Method</th><th>Result</th></tr> <tr><td>Cycle time study sheet</td><td>✓</td></tr> </table> <p>Cycle time observed high at some stations</p>	Verification Method	Result	Cycle time study sheet	✓	12	Unorganized Space	<table border="1"> <tr><th>Verification Method</th><th>Result</th></tr> <tr><td>Gemba observation</td><td>✓</td></tr> </table> <p>Congested space observed in Stations & booths, BOP kept in unorganized way</p>	Verification Method	Result	Gemba observation	✓
Verification Method	Result												
Cycle time study sheet	✓												
Verification Method	Result												
Gemba observation	✓												
13	WIP Material Hold	<table border="1"> <tr><th>Verification Method</th><th>Result</th></tr> <tr><td>Gemba observation</td><td>✓</td></tr> </table> <p>WIP material observed hold at many operations</p>	Verification Method	Result	Gemba observation	✓	14	Un-necessary Motion of Sub-Assy	<table border="1"> <tr><th>Verification Method</th><th>Result</th></tr> <tr><td>Gemba observation</td><td>✓</td></tr> </table> <p>Piper R Station observed at far location from the line creating un-necessary motion</p>	Verification Method	Result	Gemba observation	✓
Verification Method	Result												
Gemba observation	✓												
Verification Method	Result												
Gemba observation	✓												



Validation of Root Cause & Action

3 Problem Description - Ergonomics fatigue

Validation-1

To validate this cause we have checked the working of Operators in this it is observed that the movement of frame body from booth to chute and chute to booth, Movement of operator in Zig-Zag With 14 Kg of Frame Body which is creating Ergonomics fatigue.



Result: Excess & Zig-Zag movement of operator with 14 Kg Frame Body.

Conclusion: If Excess & Zig-Zag movement of operator with 14 Kg Frame Body Ergonomics fatigue will generate.

Validation-2

To validate this cause we have checked the loading of part in trolley after final inspection, it is observed that the excess movement (i.e. 6 meter) of Inspector with 14 Kg Frame from inspection stage to Part loading stage creating Ergonomics fatigue.



6 Meter travel distance
Final Inspection → Loading Area

Result: Observed 6 Meter movement from Final Inspection to loading stage with 14 kg Frame body

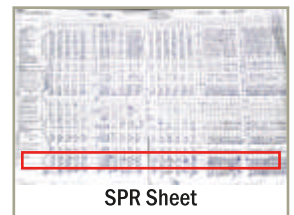
Conclusion: Excess movement with 14Kg frame body Creating Ergonomics fatigue.

WHY-WHY ANALYSIS

Why-1	Why-2	Why-3	Why-4	Why-5
Ergonomics Fatigue	Excess movement of welder	Zig-Zag flow (Booth to chute & chute to booth) with 14 kg frame body Final Inspection to loading stage 6 meter distance	Unbalanced line condition	Unbalanced line condition

4 Problem Description - Negligency

To validate this cause we have checked the process parameters which observed very high against specification as well as the defect rate of Manual Mig welding observed very high i.e. only 60% To achieve the high production rate welders interrupt welding parameters accordingly this benefit is due to no interlocking.



SPR Sheet

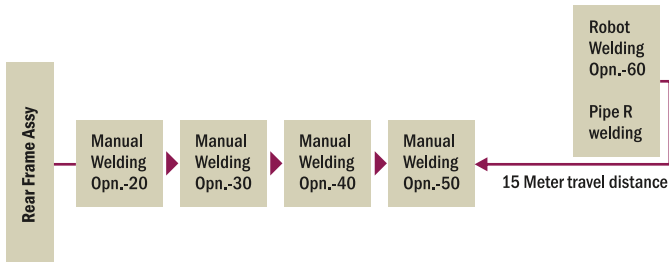
Result: Negligency to manufacture quality part & in adherence of process parameter observed.

Conclusion: Manpower dependency or no system to control process parameter resulting Negligency.

WHY-WHY ANALYSIS

Why-1	Why-2	Why-3	Why-4
Operator Negligency	Process parameter changed	Process Parameter not interlocked	Process Parameter not interlocked
	Defect generation very high	Manpower dependency	No automation for critical stations

10 Problem Description - Un-necessary motion of Sub Assy.



To validate this cause we have checked the traveling distance of components station to station then it is observed that Rear Frame Assy Robot welding (Opn-60) traveling distance is 15 meter against normal 1~3 meter distance.

Result: 15 meter travel distance of Pipe R.

Conclusion: 15 meter travel distance of Pipe R creating Un-necessary motion & weak layout design.

WHY-WHY ANALYSIS

Why-1	Why-2	Why-3	Why-4
Un-necessary motion of Sub Assy.	Travel distance of Sub Assy. Very high	Layout was not designed good	Weak layout design

11 Problem Description - High cycle time at many stages

To validate this cause we have done cycle time study for the whole line at specified process parameters in which it is observed that cycle time of many stages higher than the normal cycle time i.e 55sec. (Normal cycle time defined as per customer requirement) during development the line was run with no verification of cycle time due low production.

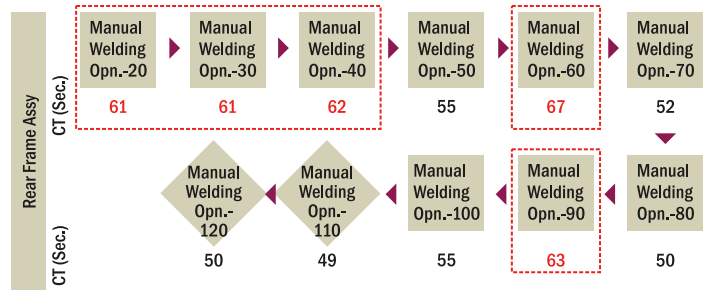
The bottle Neck operations are 8 Nos with Sub Assy which are contributing low production

Result: Cycle time upto 67 sec. against normal cycle time 55sec. at 8 stations

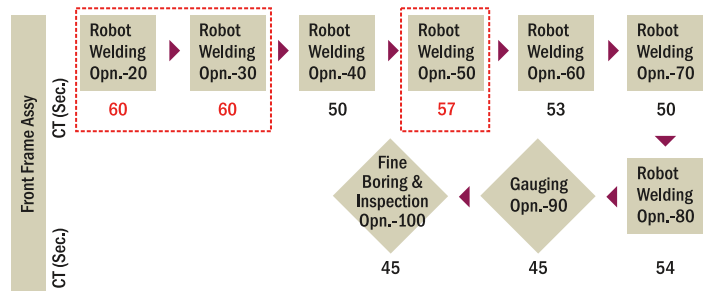
Conclusion: If cycle time is very high at some station than line not balanced it will contribute to WIP hold, low productivity etc.

WHY-WHY ANALYSIS

Why-1	Why-2	Why-3	Why-4
High cycle time at many stages	No Verification done for Cycle time study at development stage	Low production requirement from customer	Verification of cycle time & actions were not taken at development stage



High Cycle time at highlighted areas



12 13 Problem Description - WIP Material Hold/ Zig-Zag layout

To validate this cause we have checked Single piece flow condition, in this it is observed that stations have large sizes of chutes to keep material at station resulting WIP hold.



It is also observed that flow of material in Zig-Zag way at many stations due to Excess chutes at stations.

Result: Excess chutes & Zig-Zag layout at stations.

Conclusion: If excess & large size of chutes available at stations in Zig-Zag way will create WIP material Hold.

WHY-WHY ANALYSIS

Why-1	Why-2	Why-3	Root Cause
WIP Material Hold	Excess material kept at stations	Large size of chutes at stations in Zig-Zag way to keep material	Large size of chutes in Zig-Zag way at stations

14 Problem Description - Non-Standard Chutes

To validate this cause we have checked chute design & Effect of chutes to single piece flow movement which observed very poor, Chute sizes observed very large & no contribution in single piece flow movement.



WHY-WHY ANALYSIS

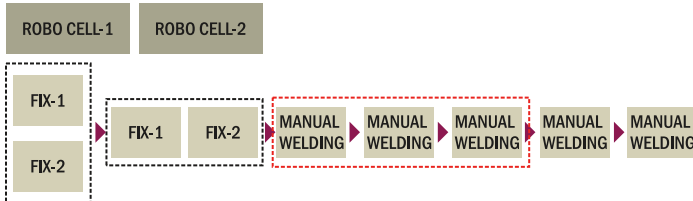
Why-1	Why-2	Why-3	Root Cause
Non Standard chutes	Chute size very large in w.r.t. station	Not designed as per station capacity & flow	Chutes Not designed as per station capacity & flow

Corrective Measures

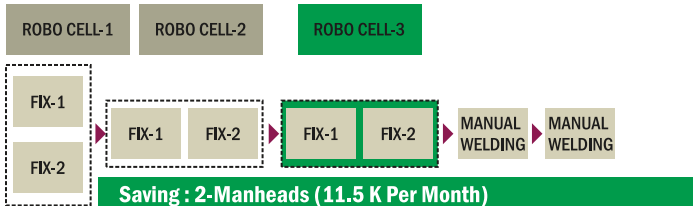
Issue/Defect	Identified Causes	Countermeasures	Resp.	Target Date	Status
Less Productivity / Poor delivery adherence	Process parameter out of specification/ interrupted by operators	Process parameter interlocked	Surender Singh	15.02.18	Closed
	Defect rate very high, low straight pass at PDI	Automation done, existing 19% automation increased by 55%	Sajjan Singh	20.03.18	Closed
	WIP materials holds at various operations due to unorganized layout (Zig-Zag) and unbalanced line	Ensured single piece flow on the line by proper line balancing and eliminated MUDA's at various stages and improved line layout.	Sajjan Singh	20.03.18	Closed
	Un-necessary Motion of Sub-Assembly	Pipe R welding operation shifted from AAWD to AAYD line	Sajjan Singh	20.03.18	Closed
	High cycle time at few stages	Cycle time balancing done by component distribution & trials	C. Senapati	15.03.18	Closed
	Ergonomics Fatigue	Excess movement eliminated at final inspection stage & Chutes removed from stations which creating ergonomics fatigue	Sajjan Singh	26.02.18	Closed
	Non-standard chute	Chute designed as per convenient of operator & single piece flow	C. Senapati	22.02.18	Closed

Scaling of Front Assembly From Manual to Robotic

Before

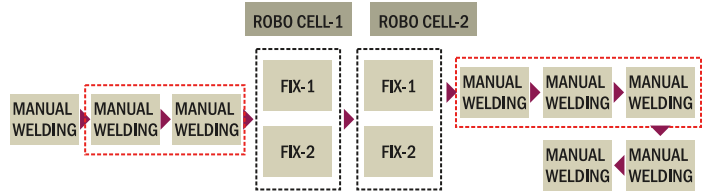


After

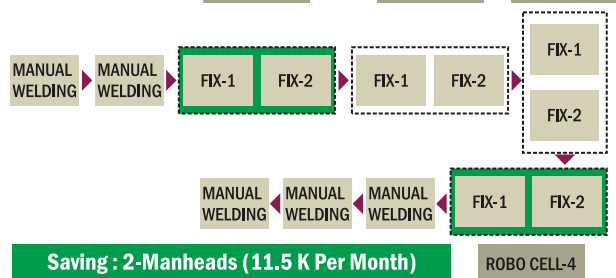


Scaling of Rear Assembly From Manual to Robotic

Before

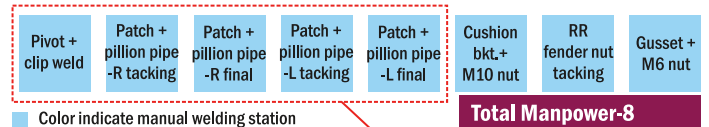


After

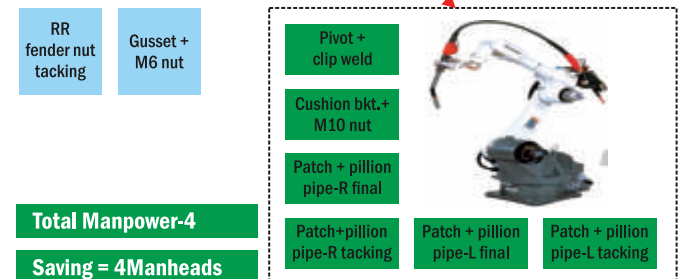


Scaling of Sub-Assembly From Manual to Robotic

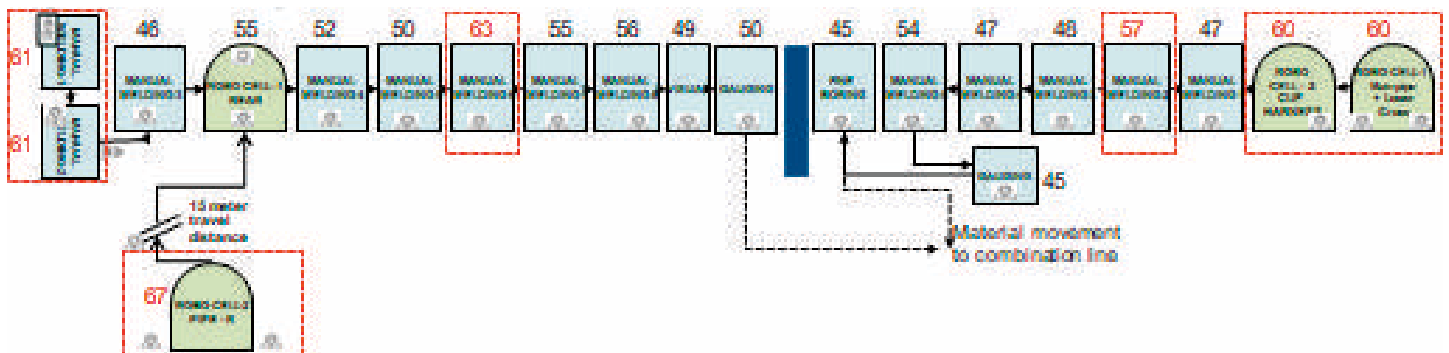
Before



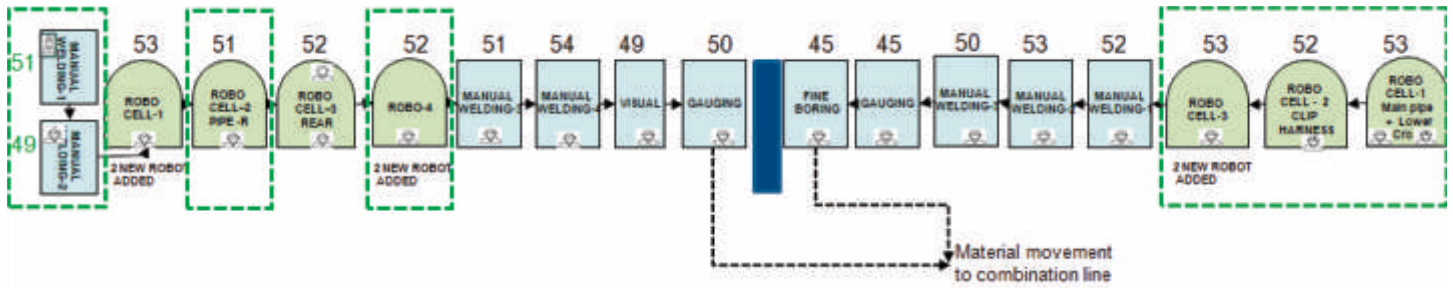
After



Layout Before Improvement



Layout After Improvement



Kaizens to eliminate Ergonomics Fatigue

Ergonomics Improvement

Before

Zig-Zag flow i.e. booth to chute & chute to next booth with 14 kg frame creating ergonomic fatigue

After

Removed unwanted chutes to ensure single piece flow within the booth & to reduce ergonomic fatigue

Benefits : Easiness to operator to move part at booth

Kaizens to Improve chute design

Chute Design Improvement

Before

Material mixing problem in between the successive operations due to single chute in between the 3-Welders

After

Changed the design of the chute and ensured separate hanger for every operator Capacity-6 Nos

Benefits: Mix-Up problem in successive process eliminated, Single piece flow

Ergonomics Improvement

Before

High travel distance with 14 kg frame i.e 6 Meter from Final Inspection to Frame loading area

After

Loading area made near final inspection to reduce ergonomics fatigue

Benefits : Easiness to operator to move part from final to loading stage.

Chute Design Improvement

Before

Non Standard Hangers at line with High storage capacity

After


Hanger type chute made for ensuring single piece flow

Benefits: Mix-Up problem in successive process eliminated, Single piece flow

During line balancing/ merging we have done Kaizens to eliminate Quality issues

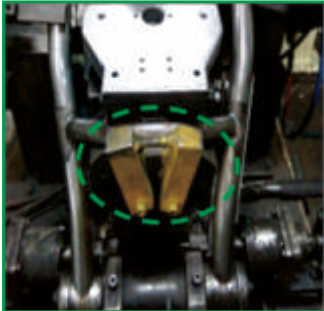
Quality Improvement In Rear Assy. Welding Fixture

Before



AAWD Center Cross weld in AAYD Welding Fixture

After




POKA-YOKE implemented in Fixture to avoid & detect AAWD Center Cross w.r.t. AAYD

Benefits : Center cross of AAWD can't be weld in AAYD Welding Fixture

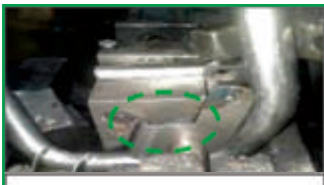
Quality Improvement In Fixing Bracket @ AAYD Line

Before



Profile guiding block is not available to locate the fixing bracket in fixture

After



Month	Parts
Sep'17	38
Oct'17	98
Nov'17	88
Dec'17	15
Jan'18	0

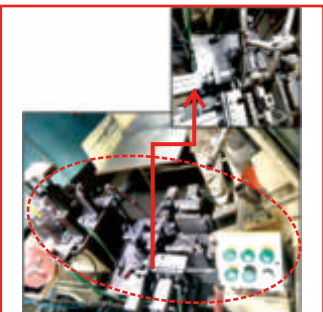
Provided new modified profile locating block in 2nd combination fixture

Benefits : In-house rejection reduced

During line balancing, we have done Kaizens to eliminate Quality issues

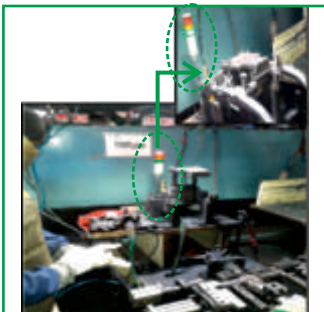
Quality Improvement In Combination Fixture

Before



On Combination Fixture Without guiding of reference pin part welded

After




Installed ANDON based POKA-YOKE & ensured configuration of welding torch with clamping

Benefits : Welding torch can't operate incase of bypassing the loading sequence of clamping

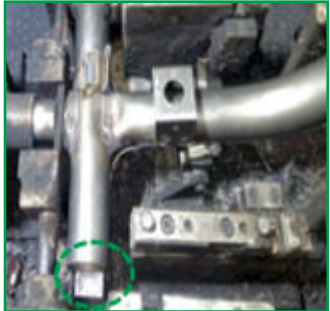
Quality Improvement In Combination Fixture

Before



No provision of locator to prevent movement of lower cross in X-Directions

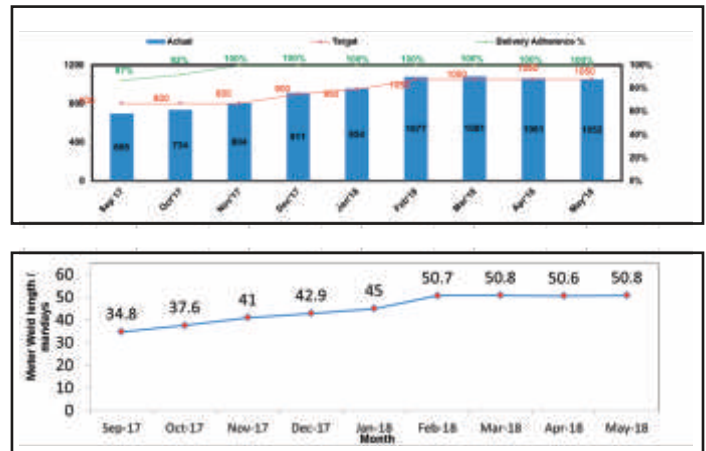
After



L-Shaped stopper provided in Combi. Fix. To prevent movement of lower cross in X-direction

Benefits : Customer Complain vanished & Customer return reduced

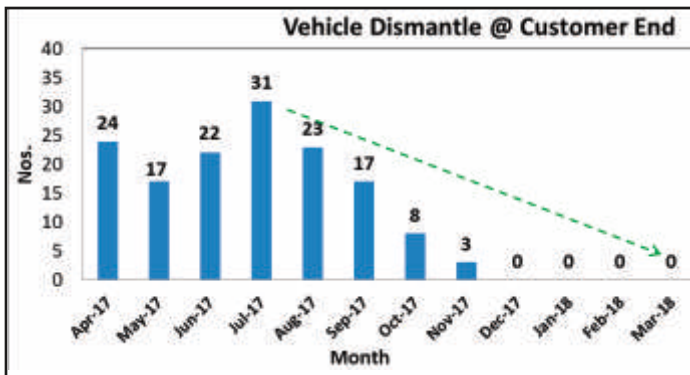
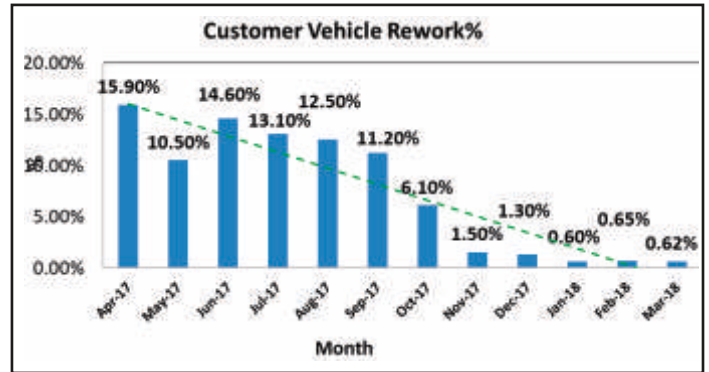
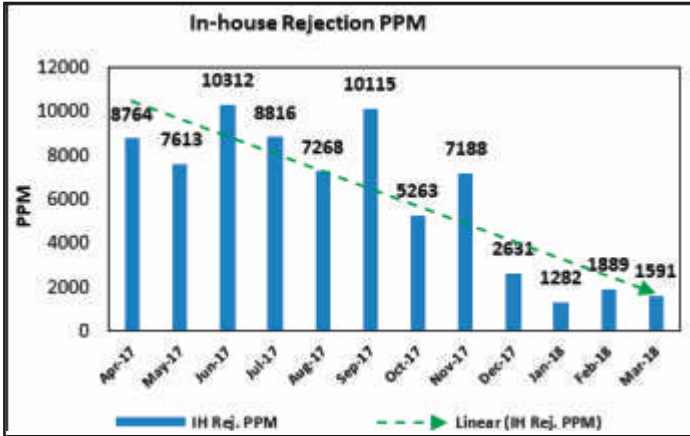
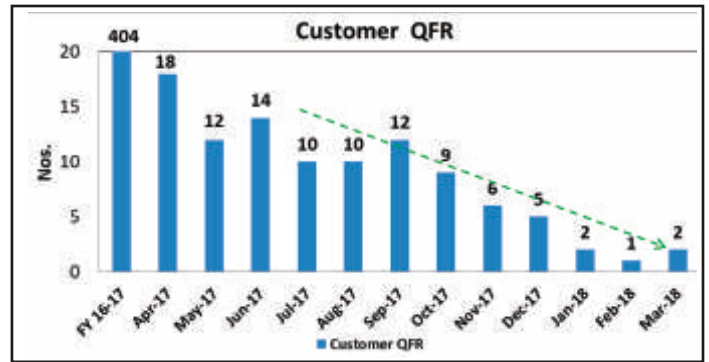
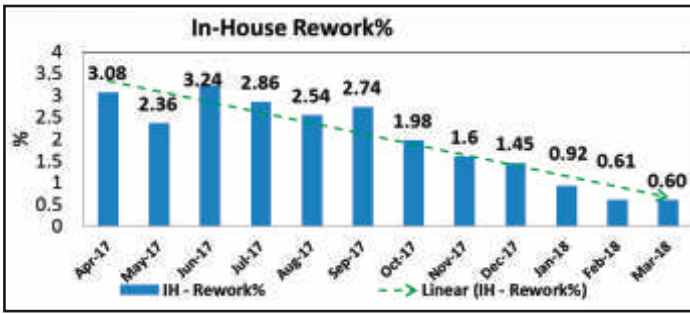
Monitoring of Results



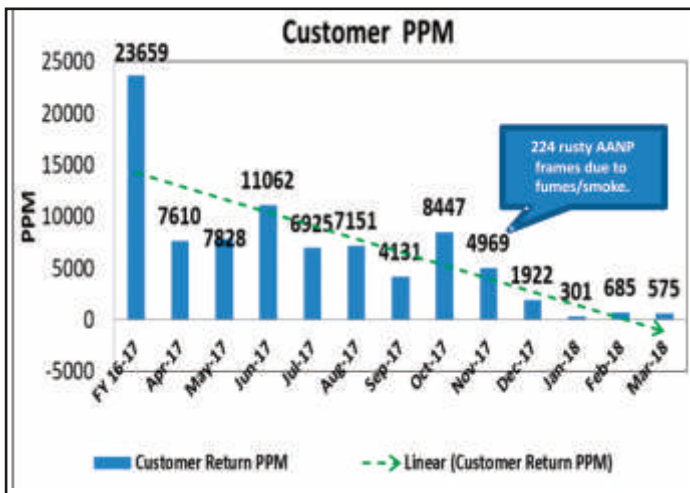
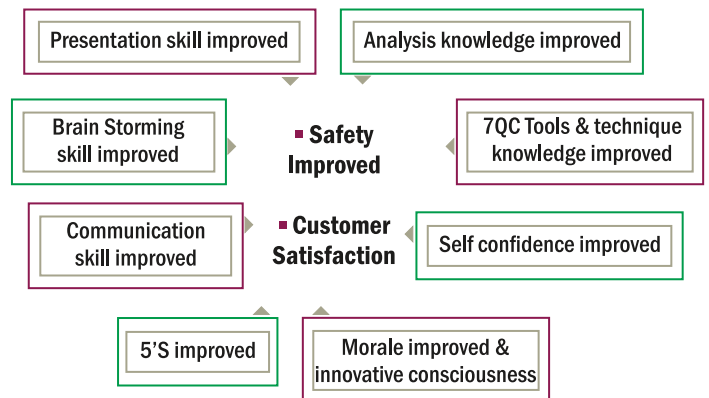
Benefits of the project

Tangible Benefits (Quantitative)

Productivity	Productivity Improved from 34.8 to 50.8 mtr. WL/ Mandays
Quality	Customer complaint reduced from 18 to 2
	In-house Rework % reduced from 3.24 to 0.61
	Customer Rejection PPM reduced from 11062 to 301
	In-house Rejection PPM reduced from 10312 to 1282
	Customer Vehicle dismantle reduced from 31 to 0 Nos.
Cost	Customer Vehicle rework reduced from 15.9% to 0.6%
	Saving = 44.27 Lakh/Yr.
Delivery	Delivery adherence improved from 91% to 100%
Safety	UV light issue for eyes reduced from 20% to 10%
Morale	Attrition rate decreases from 8.9% to 0.9%



Intangible Benefits (Qualitative)



Yazaki India Pvt. Ltd.

Tamilnadu

Category - Quality

Turnover - > 250 Crore

Title of Case Study

PROJECT NAME- DPM REDUCTION 39458 TO 5000 (JOURNEY TOWARDS “0” DEFECTS)

ACT Case Study Competition- Stream
Stream :Quality Improvement

Team Name: Eliminators

Presented By _____



Sivasakthivel.S



Vimalraj.K

Case Study Theme / Project Title

Problem Statement :

DPM Not Achieved in Base IP line.

WHAT?

To Reduce DPM In Base IP line.

WHEN?

March' 2018

HOW MUCH?

From 39458 to 5000

HOW?

QC Story Method

Linkage of Project with objective of Business

Companies Goals / Objectives

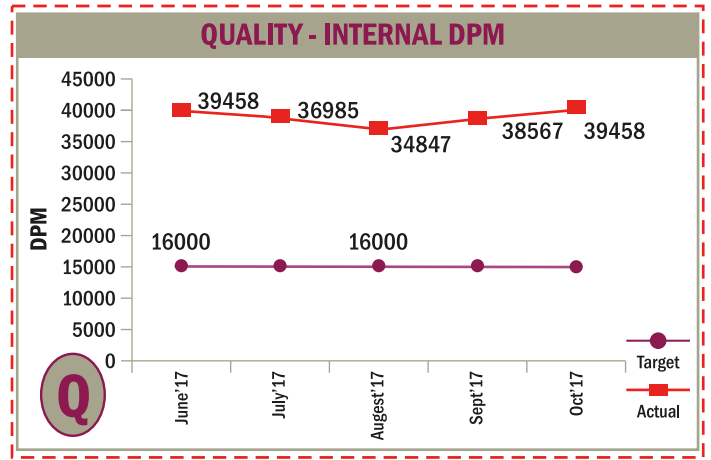
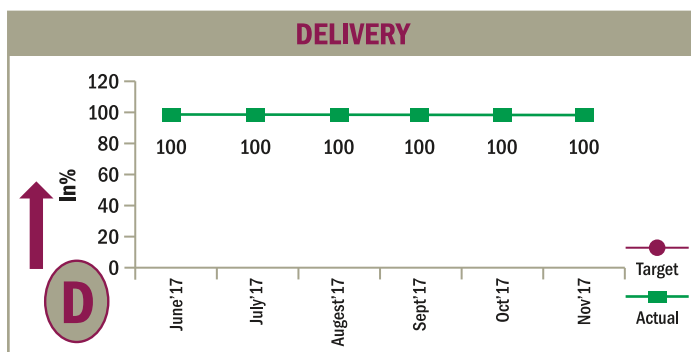
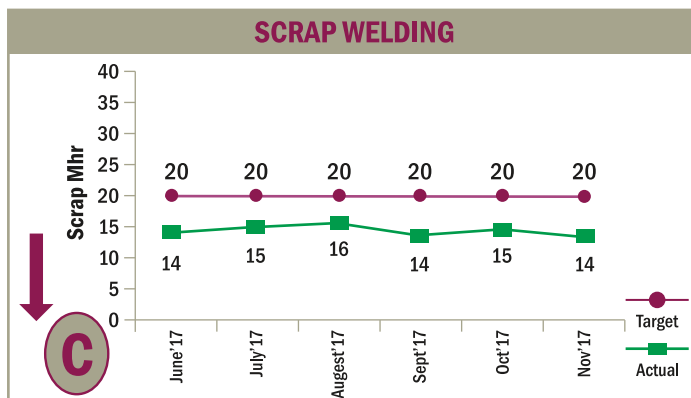
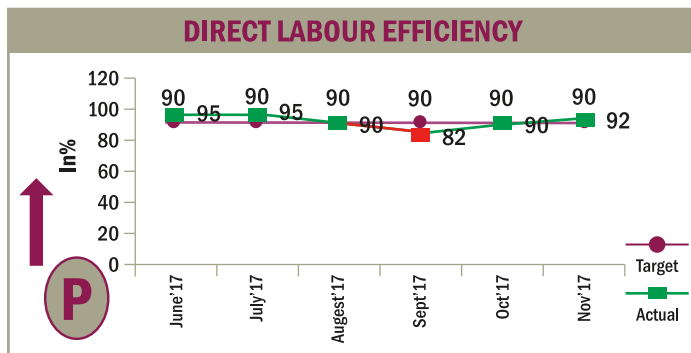
- Achieve "0"PPM
- First Time Pass Through 100%

VISION	Mission
Be The Customer's First Choice By Offering Innovative Solutions at Competitive Cost, There By Embedding Yazaki Content In Every Third Vechile In India By 2020.	Achieve Customers Delight and Associates Pride and One of the Largest, Fastest Growing and Exciting Market

Quality month theme as "ZERO AGP"
(Accept Generate Pass Zero defect)

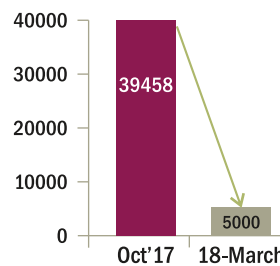
Project Objective

Target Selection



Objective & Goal

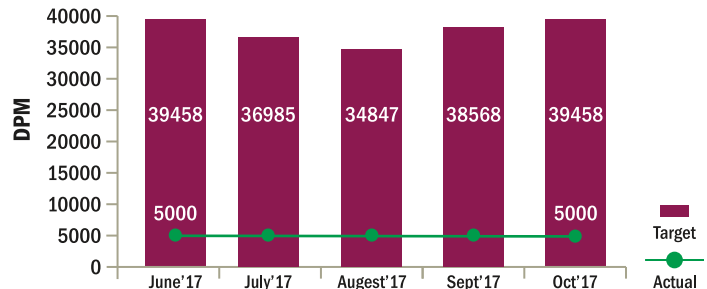
DPM Reduction in Base IP line



- Zero customer Complaint
- Internal Defects Elimination
- Wrong part usage Elimination
- Achieve 100% First Time pass Through

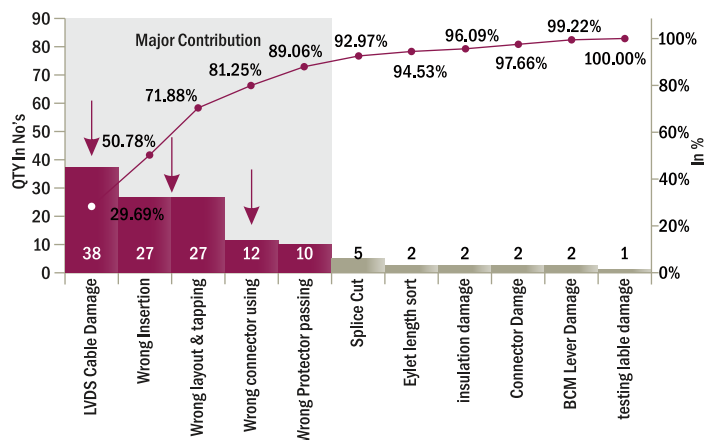
Past Trend of the Problem

Base IP Line DPM Trend



Theme: To improve Quality (DPM Reduction 39458 to 5000)

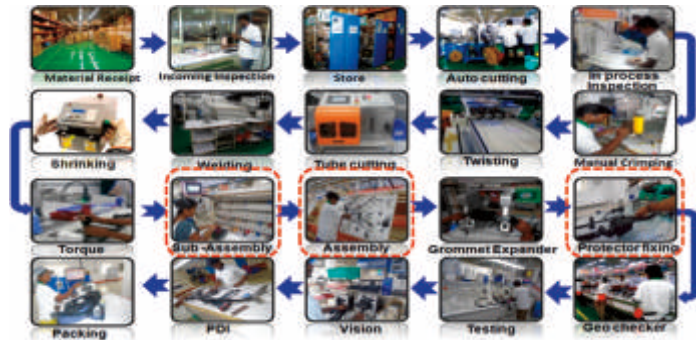
Defects Details



Theme : To improve Quality (DPM Reduction 39458 to 5000)

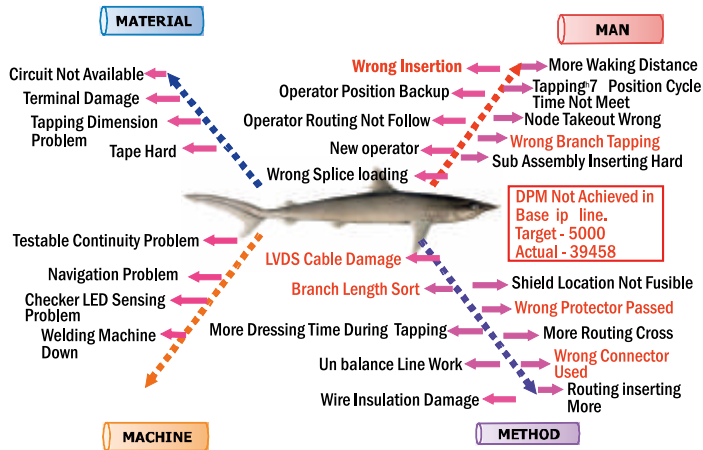
Analysis to find Root Cause

Process Flow Chart



Brain Storming

1. New manpower.
2. More routing Cross
3. Unwanted motion time in sub assy.
4. Low skilled manpower used.
5. Manpower allotted different position.
6. Manpower absenteeism.
7. Operator Wrong Insertion
8. Terminal deform.
9. Pdi inspection delay.
10. Line stop due to TPO delay.
11. Testing continuity problem.
12. Testing system hanging problem.
13. Defect occurrence in testing .
14. End off line more defect part.
15. Sub assembly takt time high.
16. Same terminal welding.
17. Welding splice delay.
19. Routing position backup.
20. Twisted length sort problem.
21. Number of variant high.
22. Tapping position problem.
23. LVDS cable damage.
24. Shield Location Not Fusible
25. Wrong splice used by operator .
26. Terminal damage.
27. Wire insulation damage
28. Wrong protector passed
29. Link Failure problem
30. Tapping dressing time high
31. Wrong branch tapping
32. Branch length sort
33. Terminal Damage
34. Wrong Splice Loading
35. Tapping Node takeout Wrong
36. Wrong Connector Used
37. Fork size problem

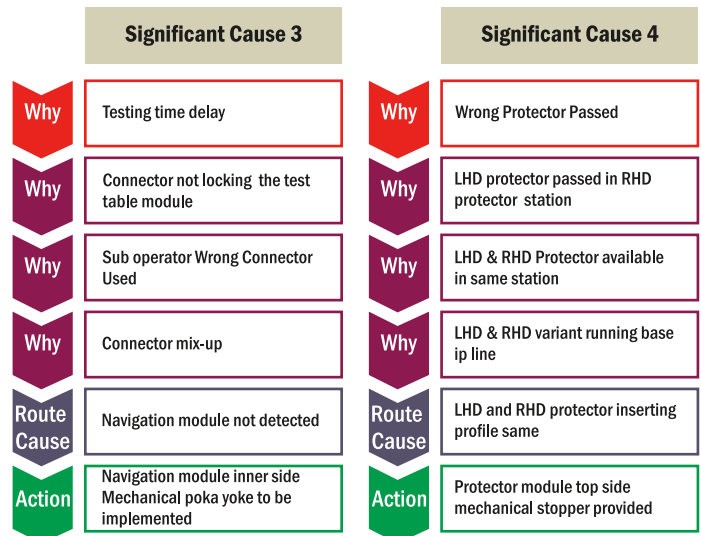
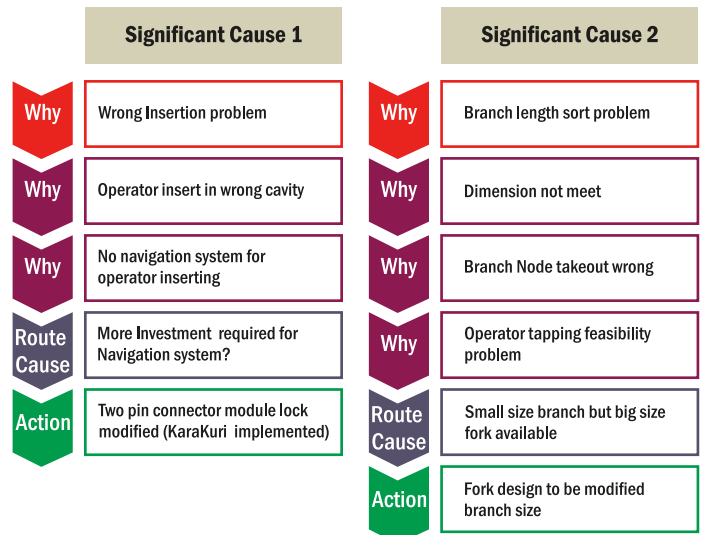


Validation of Root Cause

Possible Cause	Observation	Evidence	Result	Significant Cause	
				Yes ✓	No x
Man	Wrong Insertion problem	Two pin connector wrong instruction is possible	Not ok	✓	(significant)
Method	Branch length sort	Small size branch but big size fork available	Not ok	✓	(significant)
Method	Wrong Connector Used	Navigation module accept two type of connectors	Not ok	✓	(significant)

Possible Cause	Observation	Evidence	Result	Significant Cause	
				Yes ✓	No x
Method	LVDS Cable Connector Damage	LVDS Cable Connector hitting on Module Edge	Not ok	✓	(significant)
Method	Wrong protector passed	LHD & RHD protector easy to fixing RHD protector module	Not ok	✓	(significant)
Method	Wrong Branch Layout & tapping	Two Same profile Connector module Available in LHD Assembly Board	Not ok	✓	(significant)

Analysis to find Root Cause



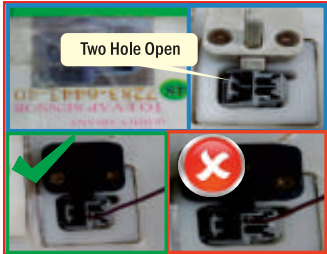
Significant Cause 5		Significant Cause 6	
Why	Rework & Scrap cost high	Why	Dimension problem
Why	LVDS Cable Connector damage	Why	Branch length sort
Why	LVDS Cable hitting on module edge	Why	Branch interchanged tapping
Why	LVDS Cable inserting horizontal direction	Route Cause	Two Same profile connector available in assembly board Module profile modified vertical to Horizontal
Route Cause	Module week Design	Action	Module profile modified vertical to Horizontal
Action	LVDS Cable Module Design Modified horizontal to vertical Direction		

Validation of Root Cause & Action Plan

S. No.	WHAT (ACTIVITY)	WHY (NECESSITY)	HOW (METHOD)	WHERE (LOCATION)	WHO (RESP)	WHEN (TARGET)
1	More investment Required for navigation system	Two pin connector is possible	Two pin connector module lock modified	Sub assembly	Raja	23.12.17
2	Small size branch but big size fork Available	Big size fork used in small size branch	Fork design modified	Assembly Board	Sivasakthivel	30.01.17
3	RHD & LHD protector inserting profile same	Detection not available protector module	Poka Yoke to be provided protector module	Protector Station	Vimalraj	28.01.18
4	Navigation module not detected	Two similar connector	Navigation module inner side mechanical stopper to be provided	Sub Assembly	Ganaselvan	27.02.18
5	Module week design	LVDS cable hitting module	LVDS Cable module design modified	Assembly board	Raja	23.03.18
6	Two same connector profile available in assembly board	Two similar connector	Module profile modified vertical to horizontal	Assembly board	Sivasakthivel	24.3.18

Corrective Measures-1


Before



Two Hole Open

- Two hole open condition so operator inserting wrong cavity
- New operator working time more defects part produced

After



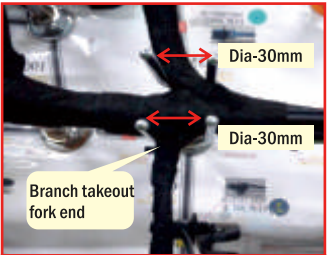
Connector Lock closed one Hole

- Operator connector Inserting time automatically pin No.2 closed. So pin No 1 only open operator inserting this cavity only
- New operator easy to working

Result: Wrong insertion eliminated

Corrective Measures-2

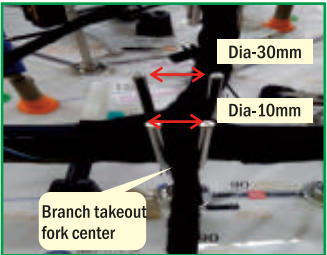
Before



Branch takeout fork end

- Two different size branch available in the harness top side branch 25 mm bottom side branch 7mm but fork size both side 30mm dia so node takeout wrong.
- Bottom branch length sort or Excess problem.

After



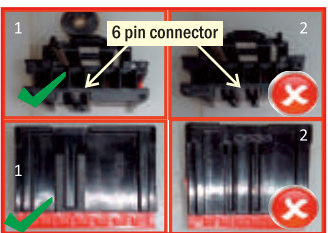
Branch takeout fork center

- We have reduced bottom side fork dia 30mm to 10 mm so node take out center of fork. Branch excess and short problem eliminated.

Result: Rework Eliminated 12 to 0 no

Corrective Measures-3

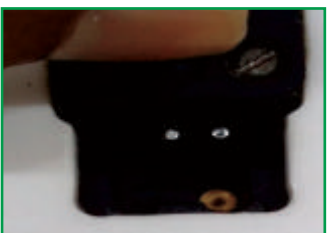
Before



6 pin connector

- Two type of similar connector available in plant one is base IP line another one is FNA ip line. both connector inserting base ip line connector module so wrong connector passed.

After

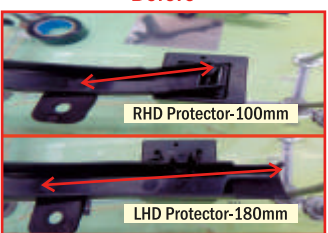


- We have two mechanical stopper provided in module inner side. So Module accepted base ip line connector only.
- Wrong connector usage eliminated

Result: Rework Eliminated 12 /month

Corrective Measures-4


Before



RHD Protector-100mm
LHD Protector-180mm

- LHD and RHD protector Available same station
- LHD & RHD Protector inserting profile same
- LHD Protector easy to accept RHD protector module

After

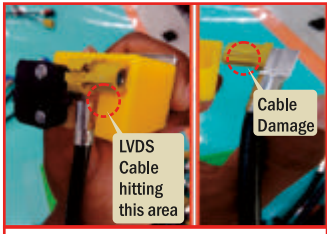


- Mechanical Stopper provided RHD Module top side
- Module accepted RHD Protector only
- Wrong protector passed eliminated

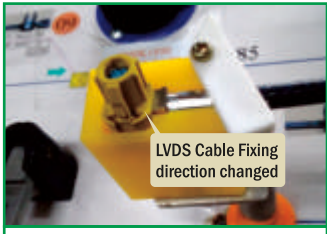
Result: Rework Eliminated 10 no's/Month

Corrective Measures-5

Before



After

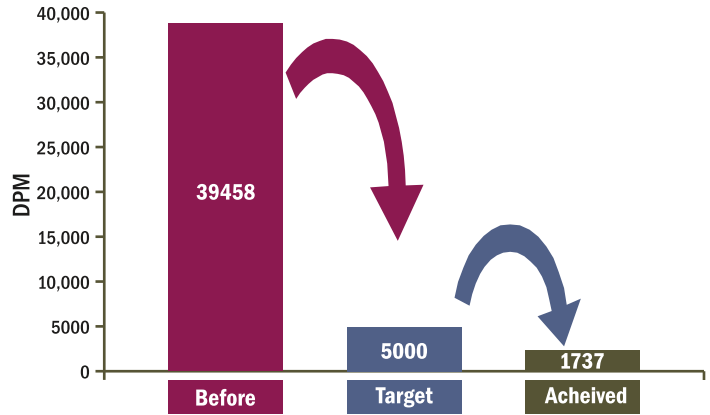


- LVDS Cable inserting horizontal position. LVDS Cable fixing and removing time cable hitting module edge so cable was damaged.
- LVDS Cost high 364rs, daily 3 to 4 no's damage.

- LVDS cable inserting direction modified horizontal to vertical so module don't disturbed the cable. Cable damage elimination.
- Cost Saving 165984 Rs.


Result: LVDS Cable Rework Eliminated 38no's to 0 no.

Our Initial DPM 39458, Our Target DPM 5000, But We Achieved 1737 DPM

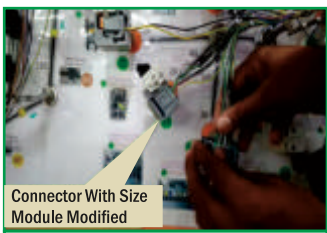


Corrective Measures-6

Before



After

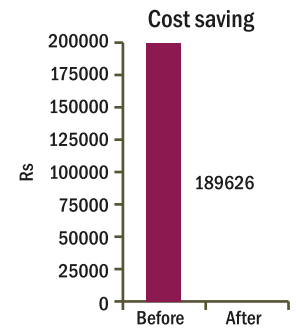
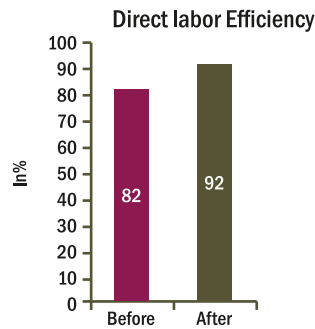
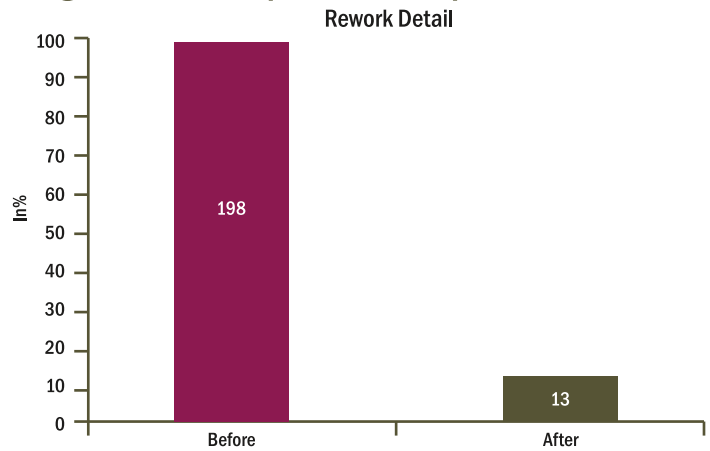


- Two similar connector available assembly board same profile different size so two connector inserting both module operator wrongly layout and tapping process done. Length sort and excess problem Daily 2 to 3 no's rework.

- Connector module modified from profile size to width size so big connector not inserting small size connector module, small size connector loose condition in big size connector module. Rework eliminated.

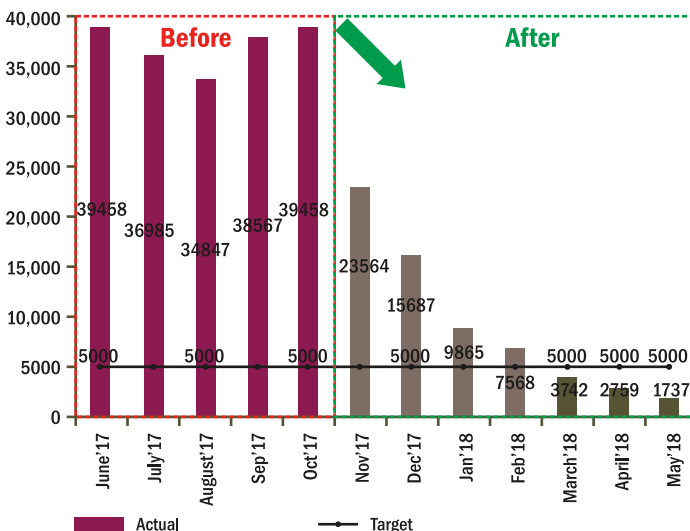
Rework Eliminated 27nos/Month

Benefits of the Project Tangible Benefits (Quantitative)

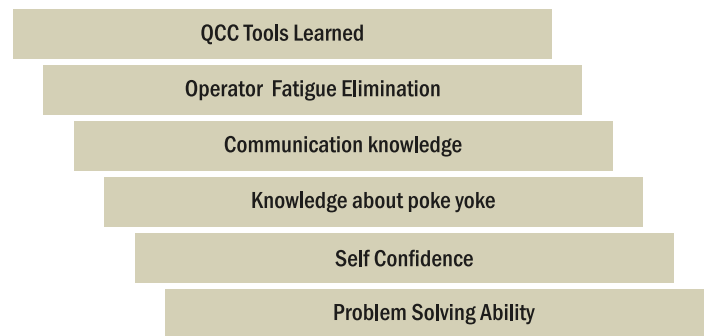


Monitoring of Results

DPM (Target Vs Actual)



Tangible Benefits (Qualitative)



Hema Automotive Pvt. Ltd.

Neemrana

Category - Quality

Turnover - < 250 Crore

Title of Case Study

ELIMINATION OF CUSTOMER LINE LOSSES BY REDUCING FRAME BODY DEFECT

ACT Case Study Competition- Stream

Stream : Quality Improvement

Presented By _____

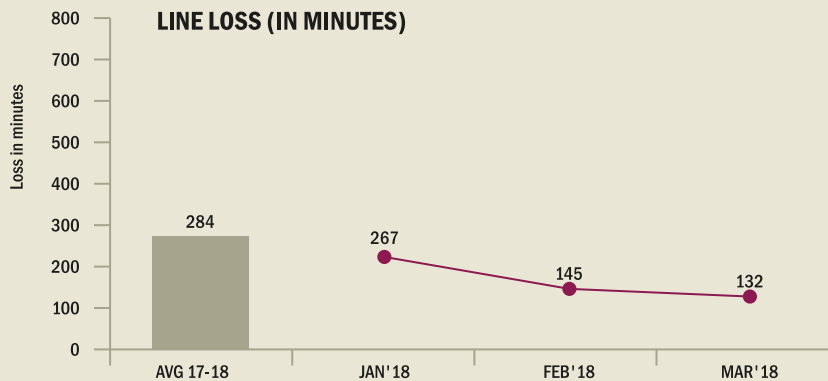


Kamal Singh

Case Study Theme / Project Title

Problem Statement :

Elimination of Customer Line losses by reducing Frame body defect



Linkage of Project with objective of Business

Companies Goals / Objectives

- Enhanced Customer Satisfaction by satisfy our customer needs expectations of quality, safety, reliability and service.
- Timely delivery of products and services to meet our customer's requirements.
- Ensuring our personnel is properly trained so that they are better able to serve our customers.
- Continual Upgradation of technologies, process & system.

Project Objective

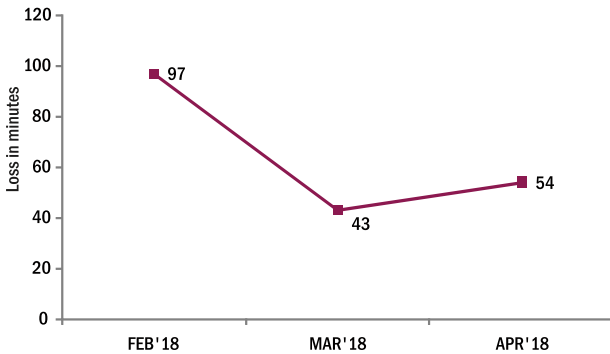
Elimination of Customer Line losses by reducing Frame body defect for

- Customer satisfaction level **increased**.
- Customer complaints **reduction**.
- Technical capability **enhancement**.

Benchmarking for Target Setting

Our Competitor M/s Badve has avg monthly 64 minutes line losses, so we decided target not a single minutes line losses at customer end.

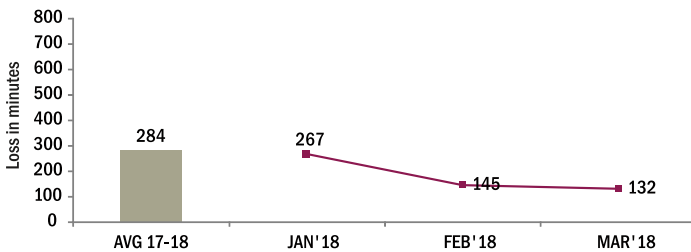
COMPETITOR BENCHMARK (LINE LOSS) - M/S BADVE AUTO



Theme: Line loss to be reduce upto 0 minute

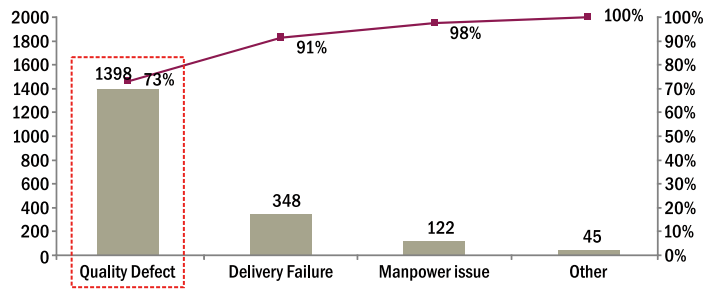
Trend of the Problem

Line Loss (in Minutes)



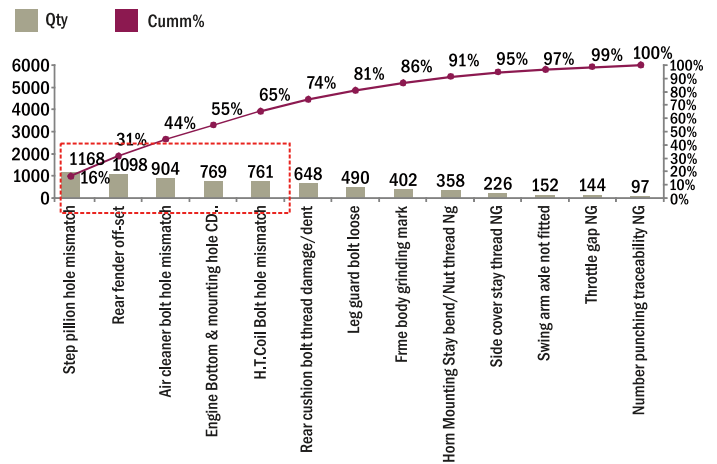
Theme: Line loss to be reduce upto 0 minute.

Analysis of line loss



Conclusion: Component having high Quality issue.

Analysis of line loss (Pareto Chart for Defect)



After Analysis we identify the 5 top major defect which effect customer Line losses, so we select the these five major defect

Conclusion: Component having high Quality issue.

Analysis of line loss (Defect Analysis)

SR. No.	DEFECT NAME	Dec'17	Jan'18	Feb'18	Mar'18
1	Step pillion hole mismatch	761	1366	2087	602
2	Rear fender off-set	479	1182	1849	459
3	Air cleaner bolt hole mismatch	703	1087	1489	364
4	Engine Bottom and mounting hole CD out	618	588	895	371
5	H.T.Coil Bolt hole mismatch	527	1421	1005	210
6	Rear cushion bolt thread damage/dent	423	1267	1029	244
7	Leg guard bolt loose	316	900	578	197
8	Frame body grinding mark	0	931	609	69
9	Horn Mounting Stay bend/Nut thread NG	238	500	387	311
10	side cover stay thread NG	0	354	426	122
11	Swing arm axle not fitted	53	303	185	51
12	Throttle gap NG	109	113	97	152
13	Number punching traceability NG	61	183	145	14

ACTION TAKEN ON WAR FOOTING

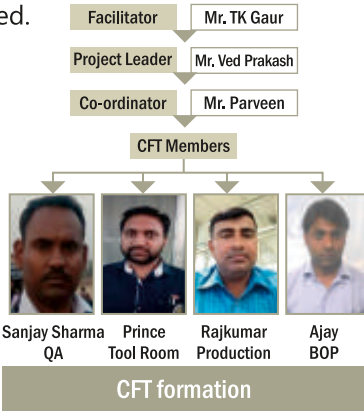
ACTION DETAILS :- War Room Creation

Activity Started:

- 1- Quality Improvement CFT Formation.
- 2- Activity Plan made For Mgt system/mfg system improvement.
- 3- Q- Gate Matrix Made & gates being Strengthen the inspection process so as to prevent the defect outflow.
- 4- Role & Responsibilities being defined for key position & Night shift Focus started.



War room creation



ACTION DETAILS :- War Room Creation

Activity Started:

- 1- Dock Audit Started to control defect outflow to customer.
- 2- Escape rate monitoring for PDI inspector & fix their accountability for the part checking and inspection for Customer Chronic Problem observed on customer feedback.
- 3- for strengthen the quality gate Inspector training given and periodic audit will be twice in shift to monitor the effectiveness of inspector.



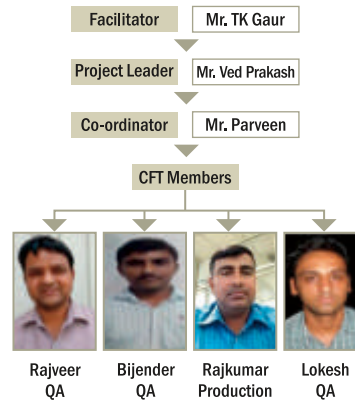
Training provided to all PDI inspector & welder

ACTION DETAILS :- War Room Creation

Activity Started:

- 1- CFT Team Formation done for Detection & Occurance level & Responsibility fixed.

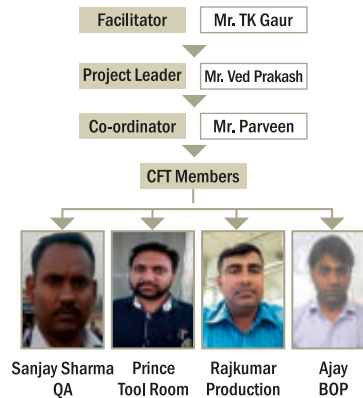
TEAM FOR DETECTION CONTROL:



Responsibility & Key Action :

- Dock Audit started.
- WTA audit Started.
- Real time data recording started & rework monitoring.
- Customer supplier relationship establish.

TEAM FOR OCCURANCE CONTROL:



Responsibility & Key Action :

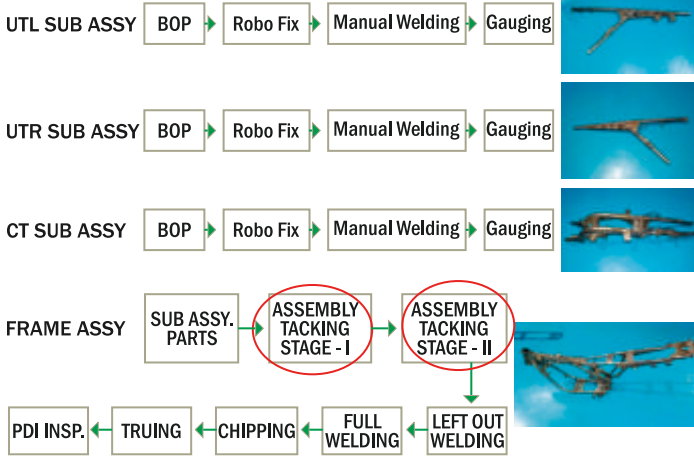
- Select top 5 Defect as an Improvement Project.
- Work on them to find actual root cause.

Define The Problem

Project Name- Step Pillion Hole Mismatch.

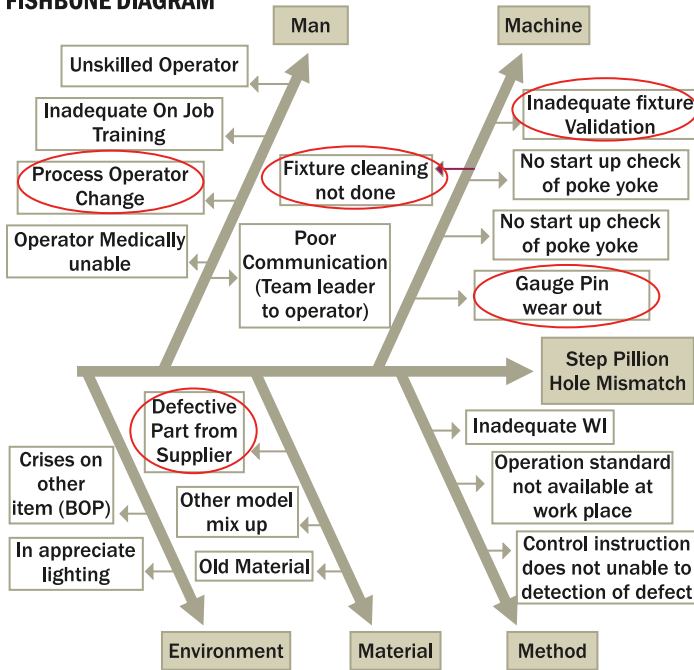
PROBLEM DESCRIPTION: Step Pillion hole Mismatch (contributing dim 112.5 & 176.5 mm have variation beyond the specification in Y & Z direction).

Process Flow Diagram



Analysis to find Possible Cause

FISHBONE DIAGRAM



Validation of Possible Cause

Stage	Possible Cause	Validation	Result
Man	Unskilled Operator	Operator training	OK
	Inadequate On Job Training	Training criteria defined	OK
	Process Operator Change	4M change record	OK
Material	Defective Part from Supplier	Part Sub Tube Check Found NG	NG
	Other model mix up	Physical verification	OK
	Old Material	Physical verification	OK
Machine	Inadequate fixture Validation	No record available	NG
	No start up check of poke yoke	Poke Yoke check sheet available	OK
	Gauge Pin wear out	Calibration not done	NG
Method	Operation standard not available at work place	OS available	OK
	Control instruction does not unable to detection of defect	OS available	OK
Environment	Inadequate WI	OS available	OK
	In appreciate lighting	Lux level less	NG

Analysis to find Root Cause

ARRIVING AT ROOT CAUSE

Why - Why Analysis						
STEP	CAT	1	2	3	4	5
OCCURRENCE	Step Pillion hole mismatch	Part Sub Tube Dim 162.65 ± 0.5 NG	Sub Tube Notching tool wear out	Tool PM Plan not adhered		
		Fixture	Pivot Pin not coaxial	Pin wear out	Fixture PM Plan not adhered	
DETECTION	Step Pillion hole mismatch		Handy gauge pin wear out at PDI inspection There in no inspection at ROBO Fixture	BOP Receiver gauge cam profile wear out		

ACTION PLAN

Sr. No.	CAUSES	CATEGORY	ACTION	RESP	TDC	STATUS
1	Tool PM Plan not adhered	Part	Tool corrected at supplier end	Ajay	Done	●
2	Fixture PM Plan not adhered	Fixture	THAS activity to be started & execute as per plan	Prince Jain	Done	●
3	BOP Receiver gauge cam profile wear out	Part	cam profile changed in BOP rec gauge	Ajay	Done	●
4	There in no inspection at ROBO Fixture	Fixture	Inspection started at ROBO fixture	Kamal	Done	●

Validation of Root Cause & Action

Root Cause	Validation	Result
Tool PM Plan not adhered	PM plan to checked & verified	OK
Fixture PM Plan not adhered	New Fixture PM plan is available & execution of THAS is verified & found OK	OK
BOP Receiver gauge cam profile wear out	During GEMBA verification at BOP found OK	OK
There in no inspection at ROBO Fixture	Monthly ROBO inspection plan is available	OK

Benefits of the Project

Tangible Benefits (Quantitative)

- 1- Customer Line loss reduced.
- 2- Customer Complaint reduced.
- 3- Productivity improved at customer end.
- 4- Inhouse tool breakdown reduced.
- 5- Cost of poor quality reduced.

Intangible Benefits (Qualitative)

1. Customer Satisfaction Level Increased.
2. Operator's Fatigue Reduced.
3. Technical Capability Enhanced.
4. Process knowledge increased by working on Gemba.
5. Team Confidence Buildup.

Foreseen difficulties & countermeasures

S. N.	POTENTIAL RESISTANCE	COUNTERMEASURE	STATUS
1	Bop part sub tube NG (pipe length more)	Sub tube L/R to be checked 100% at BOP Stage & After inspection tick marking to be done & correction to be done at Tier-2 End (Mitering Machine to be procured to eliminate the notching profile variation at M/S Emkay End).	●
2	During Tack welding, pipe distortion creates dimensional shift in one side of Pillion Bkt makes fitment NG in vehicle.	In house Welding of pillion bkt to be trialed out.	●

Menon and Menon Limited, Kolhapur

Products Manufactured : Cylinder Heads and Cylinder Blocks

Category - Cost Reduction

Turnover - > 250 Crore

Title of Case Study

MOULDING SAND TEMPERATURE CONTROL SYSTEM THROUGH LOW COST AUTO SPRINKLERS INSTEAD OF COOLER

ACT Case Study Competition- Stream

Stream : Cost Reduction (Through Energy saving)

Presented By _____



Sushilkumar Patravale



Abhilash Borkar

Case Study Theme / Project Title

Problem Statement :

Excess power consumption of WBQ3 sand plant cooler (Auxiliary Power).

Linkage of Project with objective of Business

COMPANIES GOALS / OBJECTIVES

- **Cost reduction** - by eliminating waste & reducing non-conformance.
- Adopting new & effective technology, equipment's and process to improve quality, reliability and cost.
- Improving productivity of man and machine.
- Improve the skill level of employees.

Project Objective

To Reduce the Auxiliary Power Consumption of Foundry

Benchmarking for Target Setting

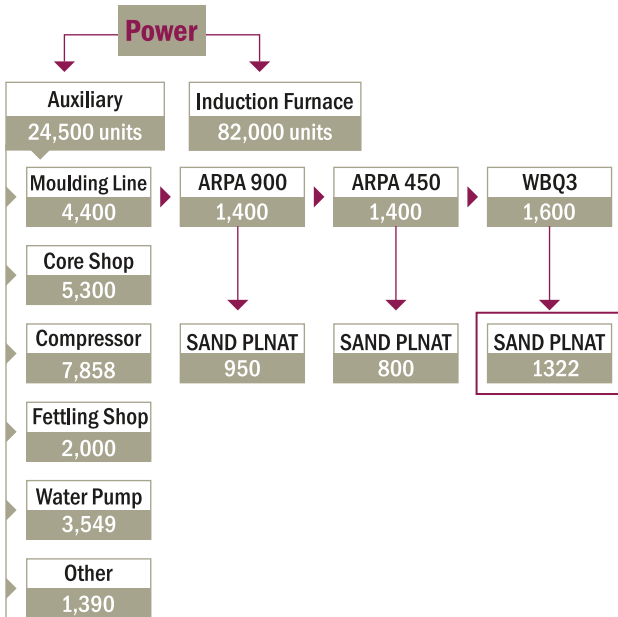
Auxiliary power consumption of Foundry.

Bench Mark: 24,500 units/day (Existing).

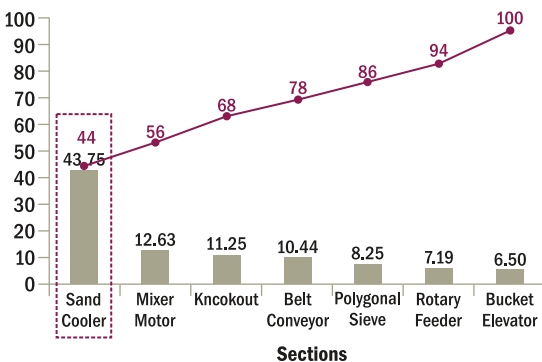
Target: 23,800 units/days
(Reduction of 700 units per day).

Root Cause analysis – Flow Chart

Power Consumption Flow Chart in Foundry



Pareto Analysis - Auxiliary Power Consumption – WBQ3 Sand Plant



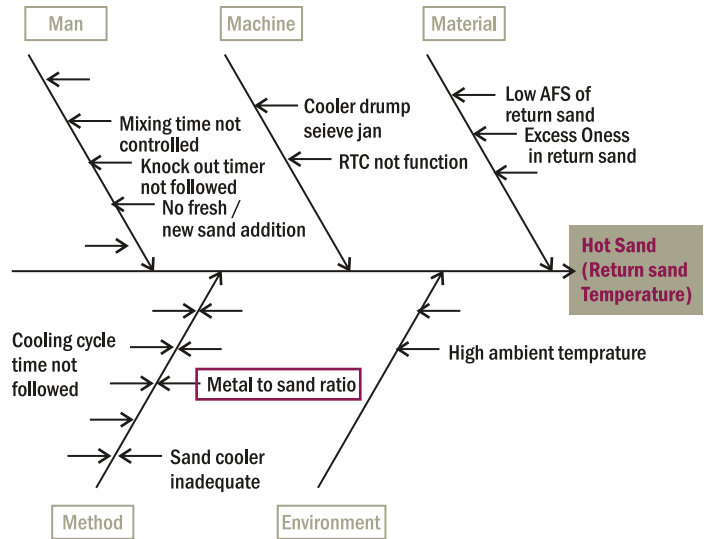
Analysis to find Root Cause

Data Analysis

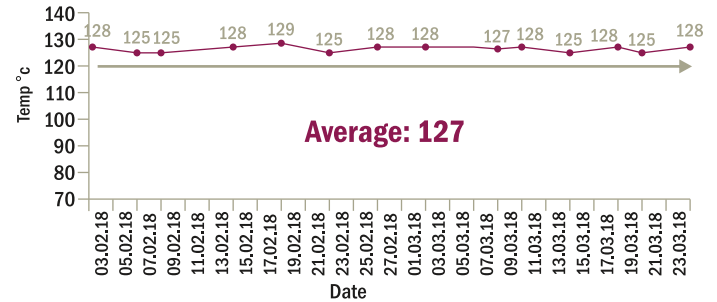
CAUSE AND EFFECT DIAGRAM

Item Name - Cylinder Head

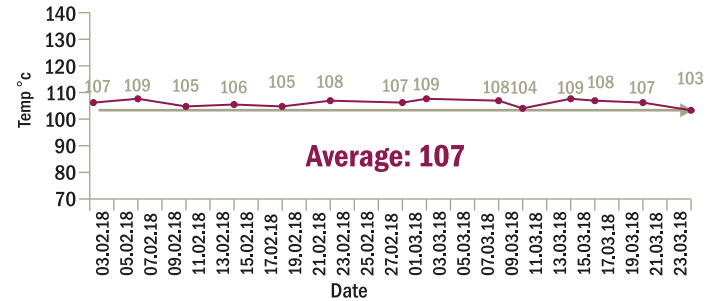
SSM, SSP, ATB, AND, ONC, AAP, UPP, SVV, RGM



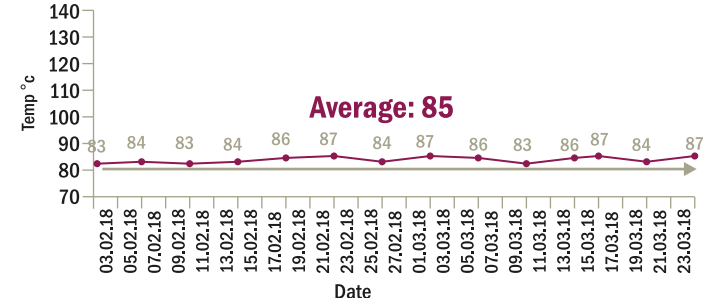
RETURN SAND TEMPERATURE ARPA 900 Line

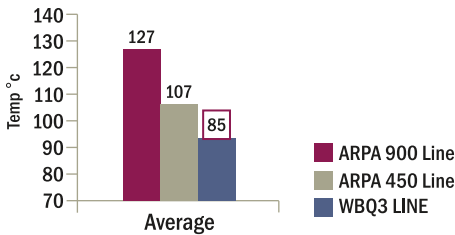


RETURN SAND TEMPERATURE ARPA 450 Line



RETURN SAND TEMPERATURE WBQ3 Line





From Data Analysis we Concluded that

1. Return Sand temperature of WBQ3 Line is low (as compared to other two moulding lines).
2. To analysis the difference between sand temperature of 3 moulding lines.

ANALYSIS OF DIFFERENCE IN THE RETURN SAND TEMPERATURE OF 3 DIFFERENT MOULDING LINES

With reference to the Brain Storming session and Cause and Effect Analysis – we decided to study the Metal to Sand ratio of 3 Moulding Lines.

Metal to Sand ratio of three moulding lines found as follows -

- ARAP 900 Moulding Line :- 1:4
- ARAP 450 Moulding Line :- 1:4.5
- WBQ3 Moulding Line :- 1:5.5

The Metal to Sand ratio of WBQ3 line is better

THE METAL TO SAND RATIO OF WBQ3 LINE IS BETTER AS

- Mainly Cylinder head products are produced on WBQ3 Line.
- All the cylinder Heads are produced using the top & Bottom cover cores , thus the direct contact of molten metal with moulding sand is not there.
- The higher metal to sand ratio products e.g. Cylinder Blocks are transferred from WBQ3 line to other lines.

All these avoids the rise of return sand temperature in WBQ3 Line

ARRIVING AT ROOT CAUSE

Why Why Analysis

Item name:- WBQ3 Line Power Consumption

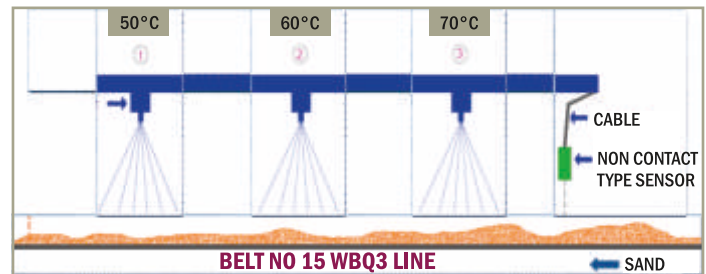
Defect	Probable Cause	Why	Why	Why
Excess power consumed at WBQ3 Moulding Line	More power consumption of sand cooler	High capacity used for low metal to sand ratio	Previous metal to sand ratio is high	
Action				As Metal to Sand ratio of WBQ3 moulding line is better 1:5.5, sand cooling system can be avoided by use of alternative method

Root Cause: Sand cooler used for WBQ3 Line, which having better Metal to Sand Ratio.

ACTION PLAN

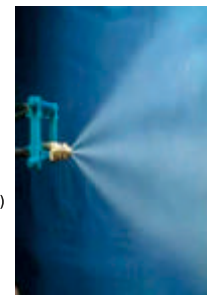
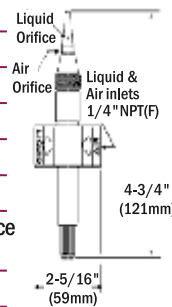
- Use of alternative method for cooling the return sand of WBQ3 line.
- Use of sprinklers for cooling the return sand of WBQ3 line, instead of sand cooling system.
- Use of sprinklers with auto sensing the return sand temperature.

Layout of sprinkler on BC No 15



Type of sprinkler required -

- Spray Pattern: Fogging
- Droplet Size: 20-60µ
- Max liquid velocity: 1100 cps
- Liquid Flow Rate: 6-30 gal/hr
- Liquid Pressure: 2-20 psig
- Air Consumption: 12 SCFM
- Liquid Spray Dia: 12" to 96" distance from nozzle
- Weight: 318 grams



Corrective Measures

Gap Analysis

- Sprinkler may start on continuous basis to cool the return sand, this may lead to excess cooling of return sand (wet sand) and may lead to issue of excess moisture in sand, leading to casting defects.
- This Gap is removed by using the Auto Sensors for sprinklers, which operators as per return sand temperature (50 °, 60 °C and above 70 °C).

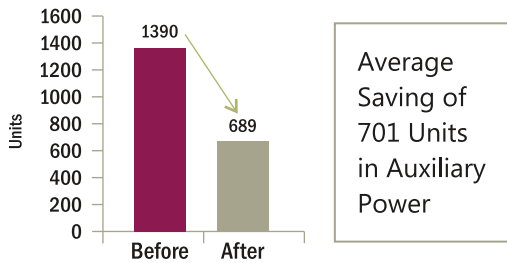
Monitoring of Results

Results Monitoring

By use of Auto Sensing temperature Sprinklers instead of Sand Cooling system for cooling the return sand, Saving in Auxiliary Power.

Using Sand Cooler

Using Sprinklers



Uniqueness of the Project

- Saving of valuable resource of Power and there by reducing the manufacturing cost of product.
- Study conclusion of team, Return sand temperature w.r.t. to Metal to Sand Ratio.

Benefits of the Project

Tangible Benefits (Quantitative)

P	Green sand available for the production by reduction in temperature issue.
Q	Return Sand temperature in specified range 45 – 50 °C
C	Power Saving – Cost – Daily 700 units i.e. 1.4 lacs monthly, 16.8 Lacs Yearly
D	Moulding sand (prepared sand) delivery rate for production improved.
S	Dust formation eliminated
M	Team moral improved
E	Clean and Safe working Environment

Intangible Benefits (Qualitative)

- Reduction in power consumption.
 - | High demand industrial power saving.
- Clean work environment.
 - | Dust generation through sand cooler eliminated.

ACMA CENTRE FOR TECHNOLOGY

ACT SERVICES ARE DEPLOYED THROUGH FOLLOWING MECHANISMS

CLUSTERS

OVERSEAS TRAINING

CERTIFIED COURSES

PUBLICATIONS

RESEARCH AND DEVELOPMENT PROJECTS

CONFERENCES/ACT MANUFACTURING EXCELLENCE SUMMIT

Neel Auto Private Limited (JBM Group)

Gurugram

Category - Cost Reduction Turnover - < 250 Crore

Title of Case Study

TRANSPORTATION COST REDUCTION OF FRAME BODY KTR

ACT Case Study Competition- Stream

Stream : Cost Automation

Presented By _____



Satender Yadav



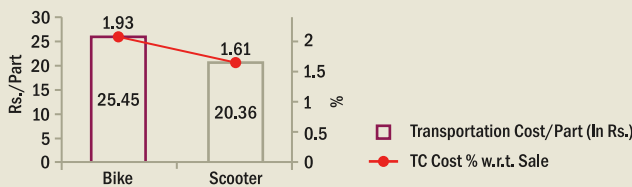
Sumit Kumar

Innovation – SPEAKING MACHINE

Problem Statement :

High Transportation Cost of Bike frame-AANP.

**TRANSPORTATION COST
(HERO SCOOTER V/S BIKE FRAME)**



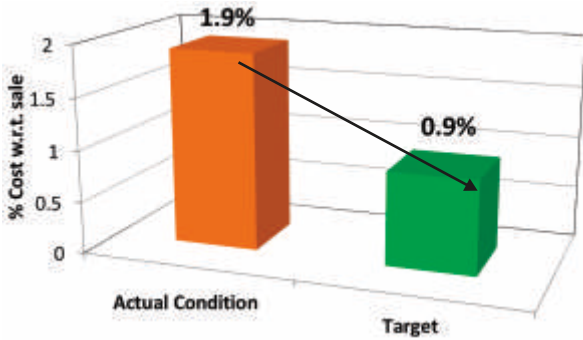
Linkage of Project with objective of Business

COMPANIES GOALS / OBJECTIVES

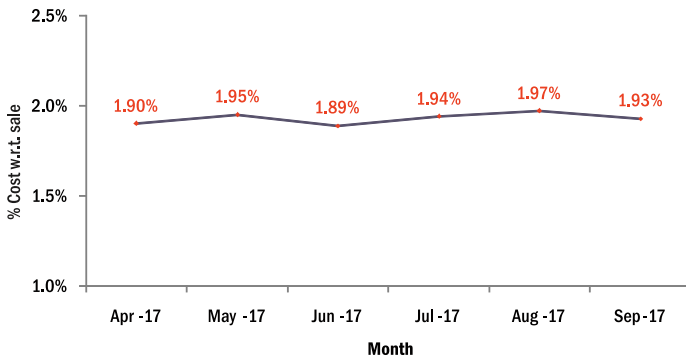
- Transportation Cost Reduction.

Project Objective

Transportation Cost Reduction From 1.9% to 1.0%

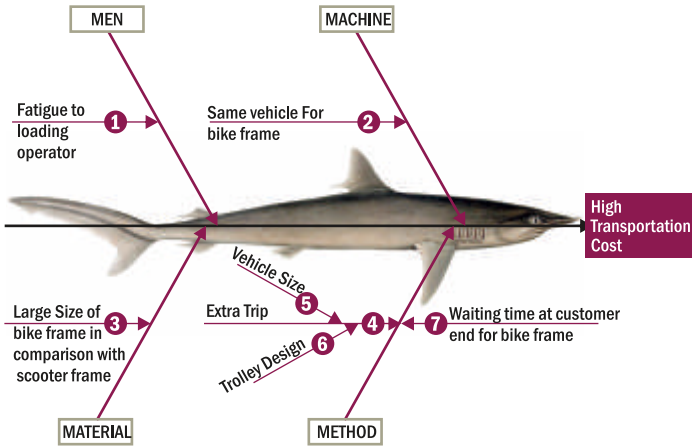


Past Trend of the Problem



Theme : To reduce transportation cost in bike frame-AANP from 1.93% to 0.9%.

Analysis to find Root Cause



S.No.	Category	Probable Cause	Verification method	Result
1	Man	Fatigue to loading operator	Gemba observation	Invalid
2	Machine	Same vehicle For bike frame	Vehicle trip data check	Invalid
3	Material	Large Size of bike frame in comparison with scooter frame	Bike & scooter frame comparison	Invalid
4	Method	Extra Trip	Data of Trip	Valid ①
		Trolley Design	Trolley design verification	Valid ②
		Vehicle Size	Vehicle Size w.r.t. trolley	Valid ③
		Waiting time at customer end for bike frame	Customer end data of waiting time	Invalid

Validation of Root Cause & Action

Extra Trip of vehicles

It was observed that vehicle can carry only 4 trolleys with 48 parts so size of vehicle & Trolley not suitable to carry more parts.

Result - Vehicle carrying less parts.

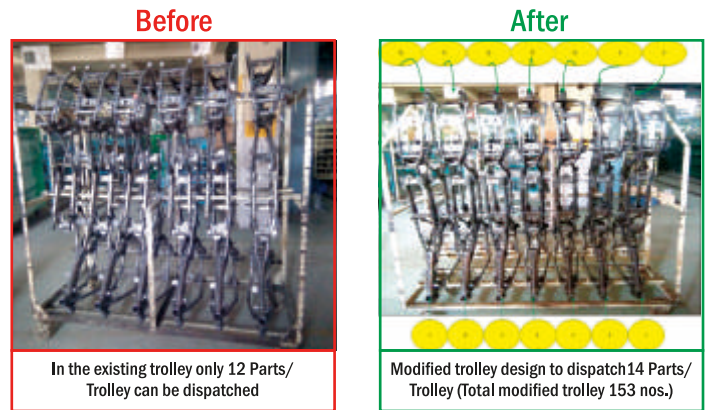
Conclusion - Vehicle size & Trolley design needs to be modified.

WHY-WHY ANALYSIS

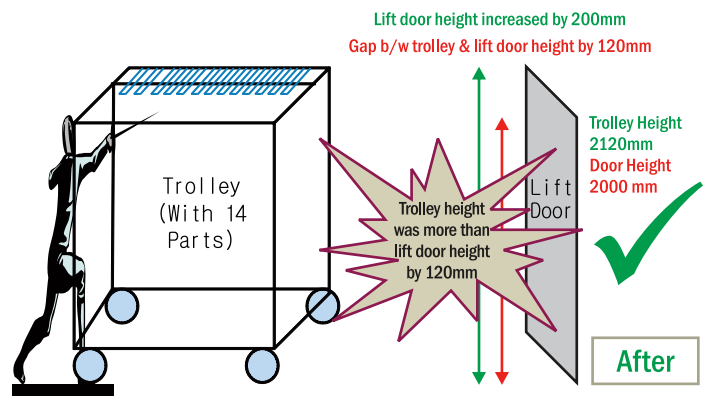


Corrective Measures

Trolley Design Comparison



After modification of one trolley we done trial, during trial we faced lift door height short issue so we modified lift door height



Capacity Utilization increased from 85% to 100%

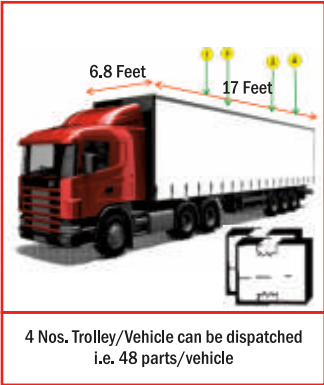
Before



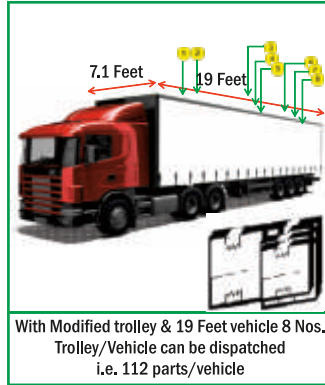
After



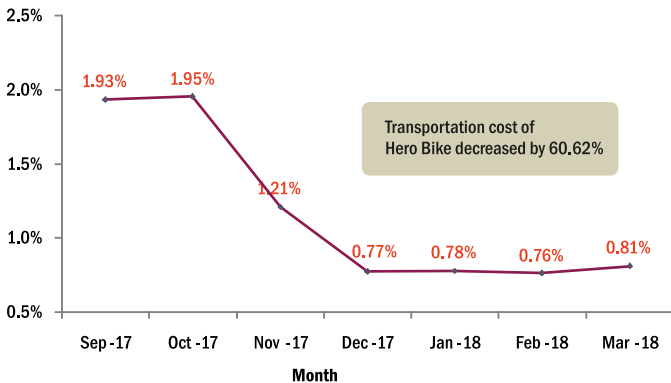
Before



After



Monitoring of Results



Benefits of the Project

Tangible Benefits (Quantitative)

COST BEFORE IMPROVEMENT

#	Analysis	Vehicle Size = 17x6.8 Feet
1	No. of Trolley/Vehicle	4
2	Trolley Size (LxWxH)	2030x850x1660 mm
3	Qty/Trolley	12
4	Qty/Vehicle	48
5	Cost/Trip	Rs. 1222
6	Cost/Part	Rs. 25.45

COST AFTER IMPROVEMENT

#	Analysis	Vehicle Size = 17x6.8 Feet
1	No. of Trolley/Vehicle	8
2	Trolley Size (LxWxH)	2040x690x2000 mm
3	Qty/Trolley	14
4	Qty/Vehicle	112
5	Cost/Trip	Rs. 1686
6	Cost/Part	Rs. 15.05

ACT
VISION

ACMA Centre for Technology (ACT)

To provide expert guidance to members by improving their manufacturing competitiveness, enhancing their Quality standards and improving productivity and profitability through its various interventions.

Cummins Technologies India Pvt. Ltd. Phaltan

Category - Safety & Environment

Turnover - > 250 Crore

Title of Case Study

ELIMINATION OF SAFETY & ERGONOMIC RISKS INVOLVED IN CAM AND CRANK BORE ALIGNMENT CHECKING AT QSK 23 CYLINDER BLOCK LINE.

ACT Case Study Competition- Stream

Stream : '4' Safety & Environment

Presented By



Shikha Rani



Rahul Dhaigude

Case Study Theme / Project Title

Problem Statement :

Operator was doing deburring on cylinder block (kept on ground) in bending position



Placing the crank bore alignment bar back in box and lifting cam bore alignment and placing it in tackle.

Operator had to lift alignment bar from its storage box every time for crank cam bore check process



Operator had to Lift the crank bore alignment bar by using tackle



Pulling the alignment bar back from the crank hole after alignment check

Operator had push the rod manually in crank bore for checking the alignment of crank bore



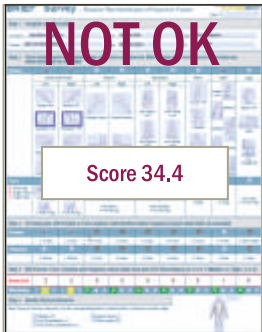
Project Objective

“To reduce Risk Priority Score of Crank Cam Alignment Station from 34.4 to 16.8” & “To create a safe and women friendly process for crank and cam bore alignment check”.

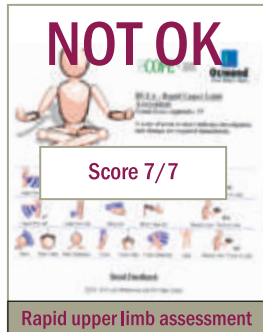
Benchmarking for Target Setting

Reduction in RPS (Risk Priority Score) by 50% to improve ergonomics practices at critical processes, PHP itself is a benchmarked plant.

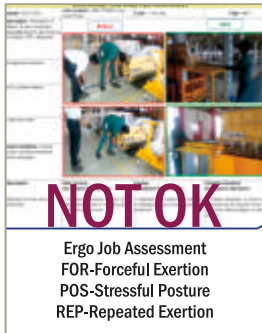
Past Trend of the Problem



Score >30 shows High hazard score



Score 7/7 shows Immediate action Required



Ergonomics Risks may lead to MSD's

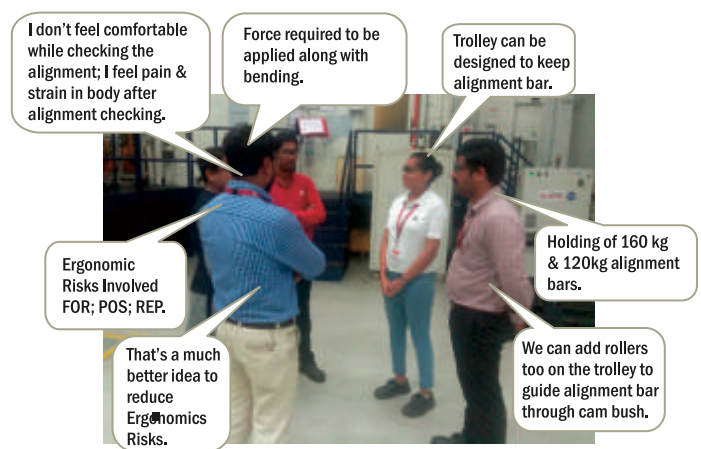
Theme: To improve ergo score by 50%.

Analysis to find Root Cause

Data Analysis through Humantech Tech Tool and Ergo Score

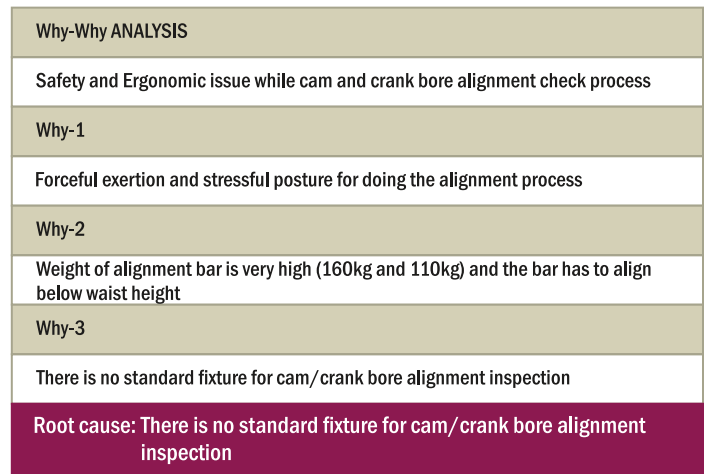


Brainstorming



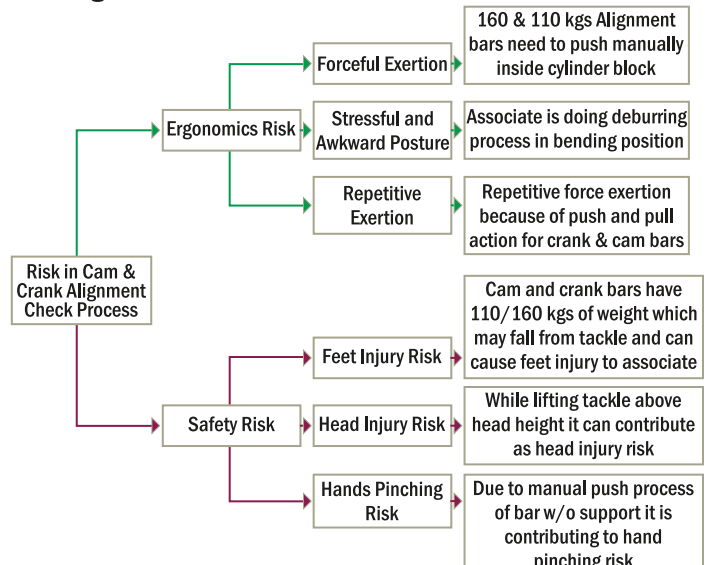
Theme: To improve ergo score by 50%

Root Cause analysis - Flow Chart



Theme: Eliminate ergo and safety risk at cam & crank bore alignment check process.

Arriving at Root Cause



Action Plan

FOLLOWING ACTION PLAN CAME UP AFTER CFT DISCUSSION WHILE GEMBA MEETINGS:

S.No	Action Plan	Resp.	Tgt. Date	Status
1.	We need to make a fixture for block keeping in Pan face up condition	Amit	10/07/2018	Completed
2.	Make movable trolleys for both alignment bars as per the height of crank & cam position when block kept on fixture	Vijay	05/08/2017	Completed
3.	Also provide rollers on trolleys. So that operator can easily pull/push the alignment bar	Vijay	05/08/2017	Completed
4.	To reduce the aligning time of trolley with the fixture provide a guideway for taking position of trolley and guide pin for locking the trolley with fixture at the required position	Shikha	28/08/2017	Completed
5.	Drawing, fixture, SOP, WI need to be updated	Mahesh	20/09/2017	Completed
6.	PM schedule need to be prepared	Abhijit	20/09/2017	Completed

Uniqueness of the Project

- In house design of fixture and crank and cam trolley.
- Idea and Input directly taken from operators.
- Simple, low cost solution with high effectiveness.

Benefits of the Project

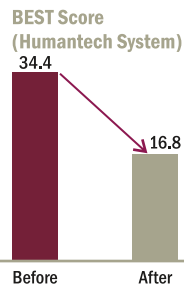
Tangible Benefits (Quantitative)

Reduction of Ergonomic Risks involved in Alignment Checking

Productivity improved by 20%. Manual intervention minimized.

One Manpower saved & Man Engagement improved.

Cycle time reduction from 90min to 15mins (83% improvement)



Intangible Benefits (Qualitative)

Increase work station flexibility-Female friendly.

Quality improved as risk of dent, scratch, damage during alignment totally removed.

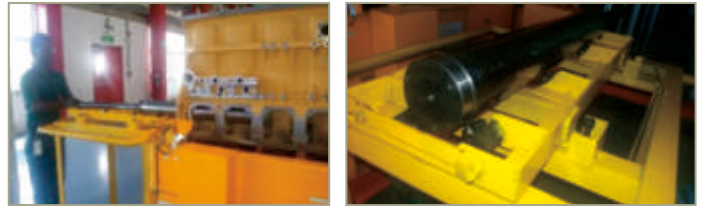
Moral of the operator enhanced.

Hand injury risks associated with the activities gets minimized.

Horizontal Deployment

At QSK23 cylinder head line, cam bush alignment needs to be checked.

Design of similar trolley for cam bush alignment check. Improvement: Trolley designed at conveyor height eliminating the need of lifting cylinder block with tackle.



**ACT PROGRAMS
MAKE YOUR PLANTS
HOSPITAL CLEAN
& GARDEN GREEN**

Manufacturing plant should be

**HOSPITAL CLEAN
INSIDE**



**GARDEN GREEN
OUTSIDE**



Kores (india) Ltd - Foundry Division Chakan Foundry

Category - Automation

Turnover - > 250 Crore

Title of Case Study

TO IMPROVE THE SHE CONDITION OF WORK STATION FOR SAND –METAL SEPARATION AT HPML BY LOW COST AUTOMATION

ACT Case Study Competition- Stream
Stream : Low Cost Automation

Presented By _____



A.R. Kolekar



B.B. Shivale

Case Study Theme / Project Title

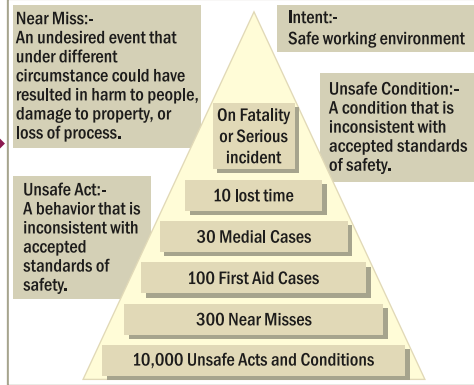
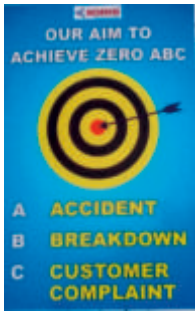
To eliminate the SHE hazards (Ergonomic, physical and biological hazard) associated with sand – metal separation activity.



1. Physical hazards
 - Cut due to chips
 - Continuous bending
 - Falling over chips
2. Ergonomic Hazards
 - Strain in back, hand and shoulder.
 - Fatigue
 - Headache
3. Biological Hazards
 - Dust in eye
 - Flying chips in eye
 - Dust in breathing
4. Behaviors Hazards
 - Irritation
 - Absenteeism

Linkage of Project with objective of Business

Companies Goals / Objectives



Eliminate the SHE hazards associated with sand-metal separation

Project Objective

To eliminate the SHE hazards (Ergonomic, physical and biological hazard) associated with sand - metal separation activity.

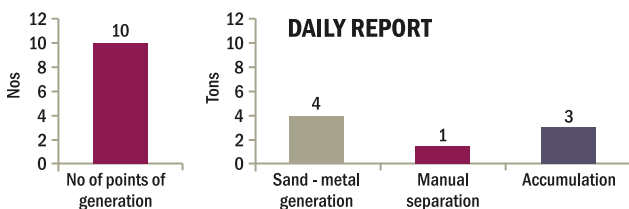
Benchmarking for Target Setting



Magnetic Separator at Kores PEFCO foundry.

- Horizontal deployment is too costly.
- Cost of Magnetic separator is more than 2 lakh.

Past Trend of the Problem:- Data analysis

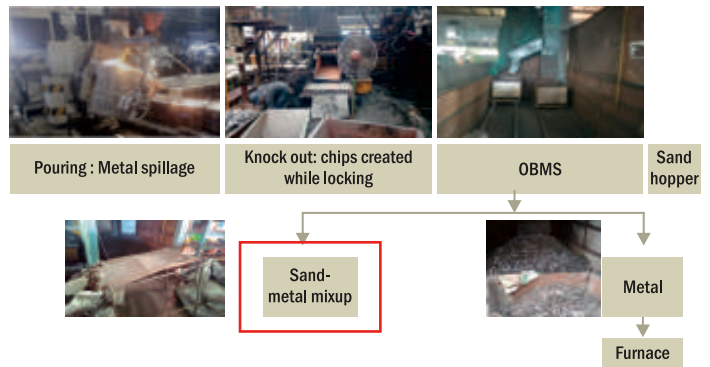


Working days = 25

- Segregation time = 1 Ton/2 man days.
- Total generation = 3 to 5 tons.
- Points where mixture is created = Rhino OBMS, HPML OBMS, R3 belt conveyer magnetic head pulley, AR3 bely magnetic head pulley, polygonal sieve discharge, Near Pouring of RHINO and HPML, Koyo OBMS.
- Old Accumulation = 2-3 tons per day.

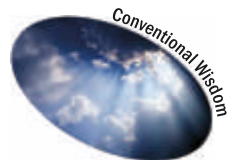
Above report is considering 2 man working for 24 hours.

Process Flow Chart



Ergonomic Hazard
Why
RC: Sitting & Bending

Units = No of Hazards

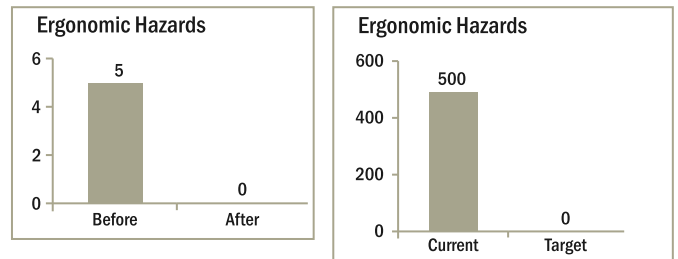


Perform sieving operation by standing

Kaizen 01/02
Date 18th Apr. 2018

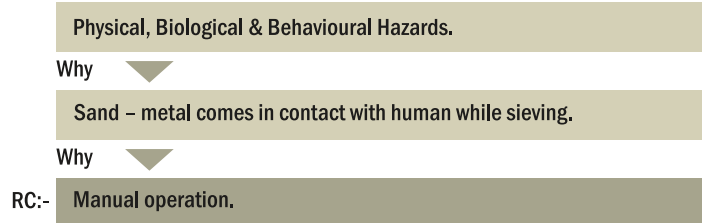
Operators Complaining supervisor

Effectiveness of Kaizen



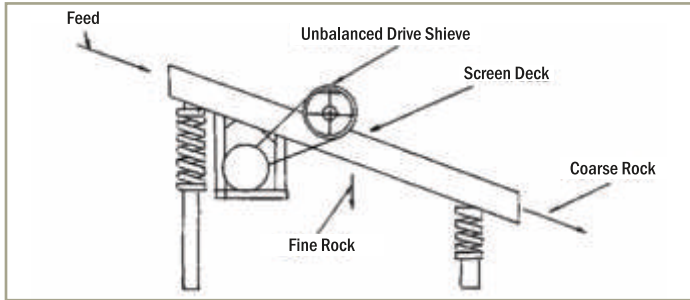
Now for 100 tons (monthly)

Analysis to find Root Cause:- Why - why Analysis



Inference: Complete process is manual so required an automatic sieve.

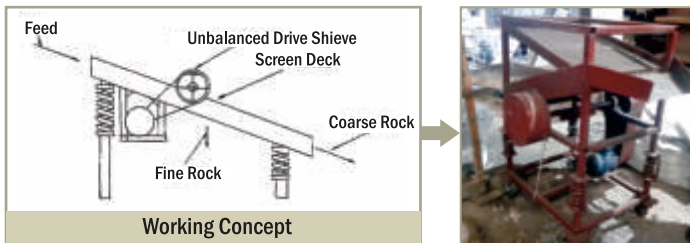
Validation of Root Cause & Action:- Idea generation



Unbalanced weight with rotating motor can move spring to and fro. Spring can make free for up – down & to-fro movement.

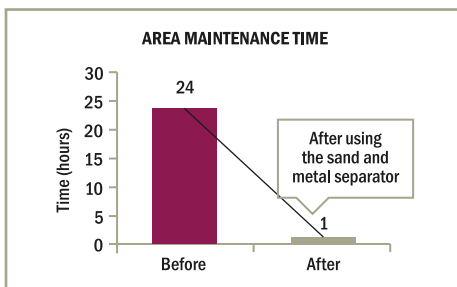
Uniqueness of the Project

- Simple automation can increase the man productivity by three times. For eg. (Automatic sieve using unbalanced load, rotating motor and spring).
- Reduce the man fatigue and increase the moral.



Benefits of the project

Tangible benefits



Intangible Benefits

- Improved Worker morale
- Worker feel energetic.
- Easy to maintain area.
- Area's aesthetic look increased.

Rewards and Recognition



Holding Gains: Sustenance Plan



- Forklift deployed for the movement of separate sand and metal movement.
- OPL displayed for awareness.

Horizontal Deployment

Scope for horizontal deployment :

1. Koyo line - Chakan Plant
2. Sinto line - Pefco Plant
3. Rhino line - Pefco Plant

Learnings from the project

- Unbalanced and spring can work as automatic sieve.
- Simple and suitable automation can increase the man productivity.
- Increase the moral of workers by reducing the fatigue of work.

Alfa Cotec Industries

Gurugram

Category - Automation

Turnover - < 250 Crore

Title of Case Study

30% COST REDUCTION OF CYLINDER BLOCKS - KTCJ MODEL IN PAINTING PROCESS

ACT Case Study Competition- Stream Stream : Cost Reduction

Presented By _____



Mr. Subhendu



Mr. Sanjeev

Case Study Theme / Project Title

Problem Statement :

High Painting cost Rs. 4.53 / Pc. against target cost Rs. 3.17 / Pc.

Linkage of Project with objective of Business

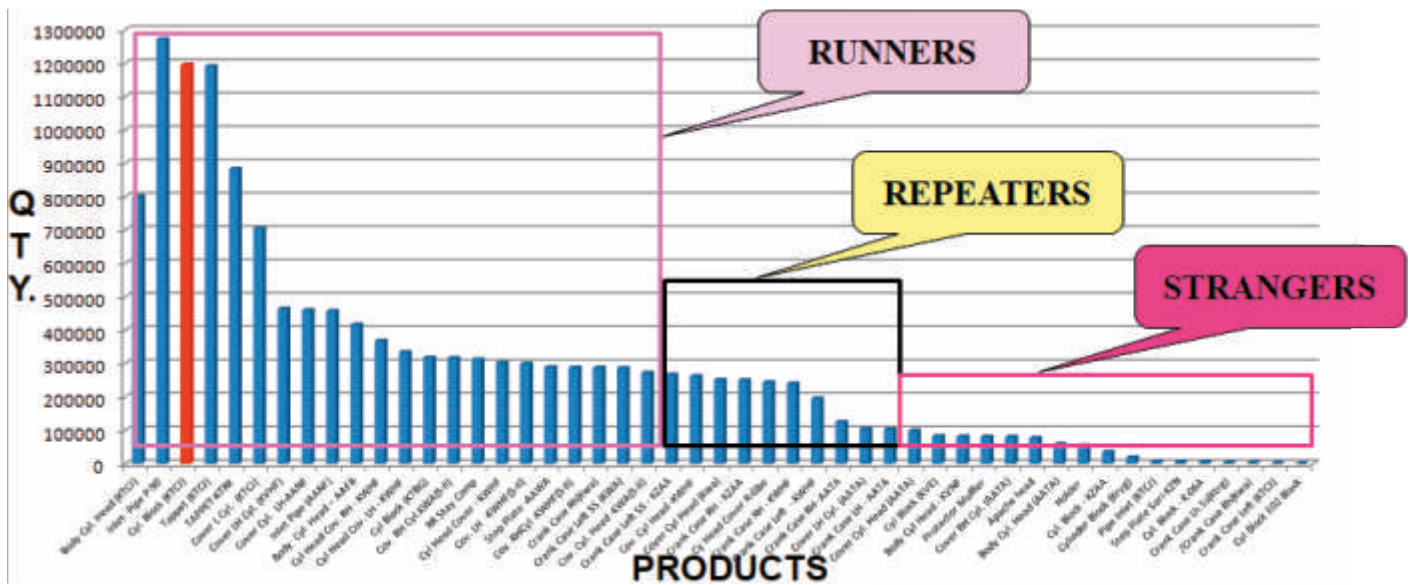
Companies Goals / Objectives

- Provide world Class Quality at Competitive Cost.
- Maximize customer satisfactions.
- Optimizing employee productivity.
- To achieve zero defect.
- On-time Delivery.

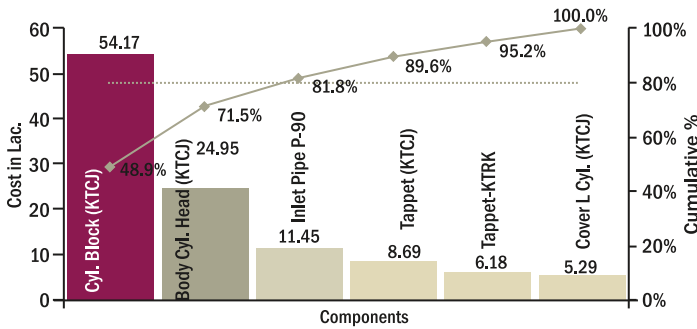
Project Objective

- 30% cost reduction of Cylinder Blocks.
- KTCJ Model Painting process.

PQ Analysis (data Of 12 Months)



Cost Wise Pareto Chart for Top Six Components



MIS Report - Cylinder Blocks KTCJ Model Painting Process Cost

S.N.	Description	U/M	2014-15	2015-16	2016-17	2017-18	2018-19	
1	Manpower	Rs/Pc.	2.10	2.30	2.00	1.90	0.80	
2	Electricity	Rs/Pc.	0.16	0.16	0.15	0.12	0.07	
3	Raw Materials	Paint	Rs/Pc.	2.10	2.40	2.30	2.06	1.85
	Thinner	Rs/Pc.	0.60	0.70	0.60	0.45	0.45	
Sub Total		Rs/Pc.	4.96	5.56	5.05	4.53	3.17	

Business Target Set

Project Objective

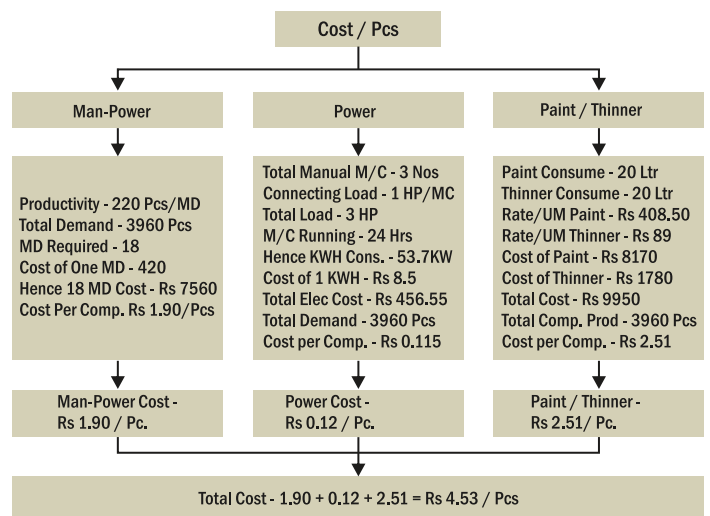
30% Cost Reduction of Cylinder Blocks KTCJ Model Painting Process

Benchmarking for Target Setting → **Bench marking against the Management Business Target**

Cylinder Blocks Painting cost = Rs. 4.53 / Pc.
Our Target to cut 30% Painting Cost i.e. Rs. 3.17 / Pc.

Root Cause analysis - Flow Chart

COST VERTICAL IDENTIFICATION



Theme: 30% cost reduction of Cylinder Blocks KTCJ Model Painting process

Validation of Root Cause & Action

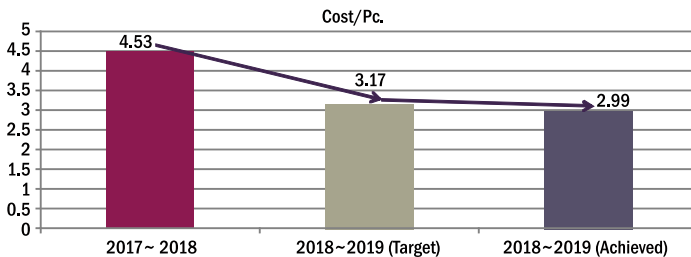
VALIDATION

S.No.	Problem	Root Cause	Action Plan	Validate
A	Manpower Cost is too high	Threaded Nut & Bolt Fixture Using for Masking & De-masking of the components	Toggle Clamp Fixture used to reduce the cycle time	Done
B	Electricity Cost is too high	Due to Less Productivity spinning Motors runs 24 Hrs	One Spinning station eliminated	Done
C	Paint/Thinner Consumption is High	Due to Multi Transshipment, Paint is spillage during the same	Low Cost Automation Machine built up to avoid Paint spillage	Done

Monitoring of Results

RESULTS MONITORING

S.No.	Particulars	Cost / Pc.	
		Before	After
A	Manpower	Rs. 1.90	Rs. 0.64
B	Electricity	Rs. 0.12	Rs. 0.06
C	Paint Consumption	Rs. 2.06	Rs. 1.85
	Thinner Consumption	Rs. 0.45	Rs. 0.44
TOTAL		Rs. 4.53	Rs. 2.99



Cylinder Blocks Painting cost = Rs. 4.53/Pc. in Year 2017-2018

Our Target to cut 30% Painting Cost i.e. Rs. 3.17/Pc. But achieved 34% painting cost saving i.e. Rs. 2.99/Pc.

Benefits of the Project

Tangible Benefits (Quantitative)

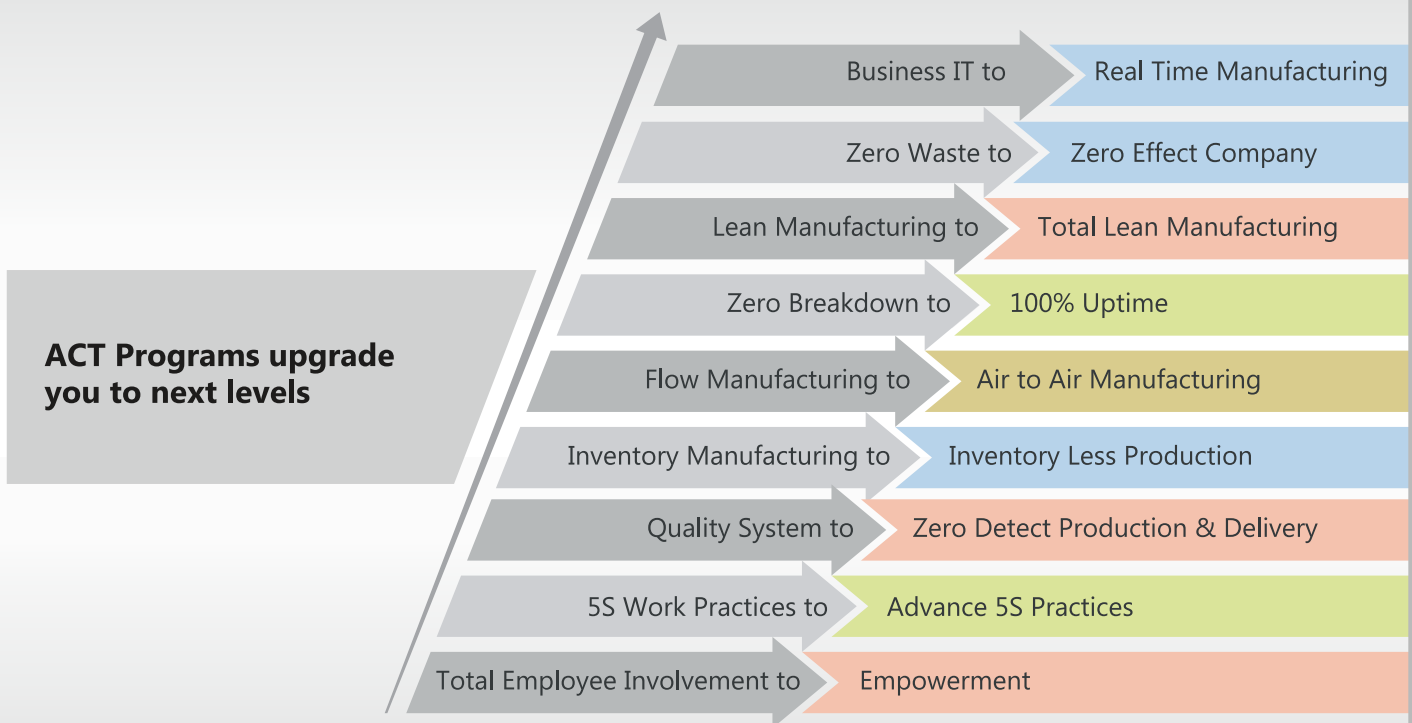
BEFORE COUNTER MEASURE :

- AVERAGE PRODUCTION QTY. KTCJ = 99,652 Pcs. CYLINDER BLOCK PER MONTH
- AVERAGE VALUE OF KTCJ CYLINDER BLOCK PER MONTH (99652 x Rs.4.53) = Rs. 4,61,423.56/-
- AVERAGE VALUE ANNUALLY (461423.56X12) = Rs. 54,17,082.72/-

AFTER COUNTER MEASURE :

- AVERAGE PRODUCTION QTY. KTCJ = 99,652 Pcs. CYLINDER BLOCK PER MONTH
- AVERAGE VALUE OF KTCJ CYLINDER BLOCK PER MONTH (99652 x Rs. 2.99) = Rs. 2,97,959.48/-
- AVERAGE VALUE ANNUALLY (2,79,959.48 X12) = Rs. 35,75,513.76/-
- AVERAGE NET SAVING ANNUALLY (54,17,082.72 - 35,75,513.76) = Rs. 18,41,568.96/-

ACMA CENTRE FOR TECHNOLOGY



J. K. Fenner (India) Limited

Sriperumbudur, Chennai plant

Category - Innovation

Turnover - > 250 Crore

Title of Case Study

MTTR IMPROVEMENT THROUGH SPEAKING MACHINE

ACT Case Study Competition- Stream

Stream : Innovation

Presented By _____



K.Nirmal kumar



D.Naresh

Innovation – SPEAKING MACHINE

Problem Statement :

Low MTTR in 200 Ton Curing press.

IMPORTANCE OF THE PROBLEM :

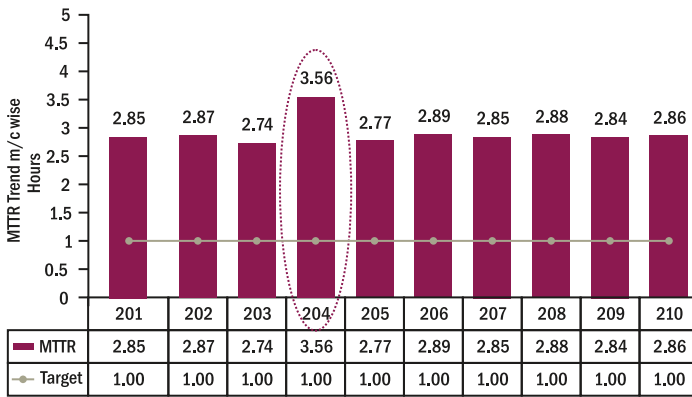
- P – Machine availability low.
- Q – Machine breakdown lead to In process rejections.
- D – Not able to meet Customer Demand.
- M – More fatigue during Break Down - operator Morale decreased.

Linkage of Project with objective of Business

COMPANIES GOALS / OBJECTIVES

- Plant should achieve 2 Crores cost saving for the year 2018-19.
- Eliminate rework.
- Reduce set up time to improve OEE.
- Improve profitability by reducing specific power/ product.

MTTR Trend m/c wise – 200 Ton Curing press



Theme : To improve MTTR in 204 Curing m/c – Model Line

MTTR Analysis

MTTR (mean time to repair) is the average time required to fix a failed component or device and return it to production status.

Mean time to repair includes the time it takes to find out about the failure, diagnose the problem and repair it. MTTR is a basic measure of how maintainable an organization's equipment is and, ultimately, is a reflection of how efficiently an organization can fix a problem.

MTTR classified as :

- MTTI (Mean Time To Identify)
- MTTK (Mean Time To Know)
- MTTF (Mean Time To Fix)
- MTTV (Mean Time To Validate)

Theme : To improve MTTR in model line

MTTR Analysis - Model Line

Causes / System	Mold in/out issue	Auto cycle issue	Pressure not raise	Ejector issue	Temperature issue	Oil leakage	Home position Error	Ram Movement issue	Sensor failure	Heater failure	Air pressure issue
Electrical Breakdown	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Hydraulic Breakdown	Yes	No	Yes	No	No	Yes	No	Yes	No	No	No
Mechanical Breakdown	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No
Pneumatic Breakdown	No	No	No	No	No	No	No	No	No	No	Yes

From the above analysis, Electrical Related issue is High

MTTR Analysis - Model Line

MTTR / Causes	Mold in/out issue	Auto cycle issue	Pressure not raise	Ejector issue	Temperature issue	Oil leakage	Home position Error	Ram Movement issue	Sensor failure	Heater failure	Air pressure issue	Total Time
MTTI (Mean Time To Identify)	113	132	63	115	96	0	90	86	98	72	80	944
MTTK (Mean Time To Know)	34	33	32	35	36	0	27	29	29	27	30	311
MTTF (Mean Time To Fix)	68	44	105	69	96	0	72	67	59	72	120	771
MTTV (Mean Time To Validate)	11	11	11	12	12	0	9	10	10	9	10	104
Total Time	225	220	210	230	240	0	180	190	195	180	200	

**MTTR Analysis for Oct-17 to Dec-17
From the Matrix MTTI contributing is 59% of MTTR**

What is MTTI (Mean time to identify)

MTTI would be the difference between the on-set of any event that is deemed revenue impacting and its actual detection by the technician who then initiates some specific action to recover the event back to its original state.

- Time to identify the cause of the incident
- Up to 80% of the time to resolve a service failure can be attribute to finding the source

Incident Management Process



Idea's to Reduce MTTI

- Special Training for Maintenance team Technician's.
- Re-visiting of WHY-WHY analysis.
- Re-schedule of PM Activity.
- Interlock for M/C to be linked with Auto Cycle.
- Display of Alarm.

Steps involved in implementing speaking machine

- All the possible abnormalities in a machine are listed down.
- Caution conditions for the abnormalities are created.
- Voice Annunciator system designed based on number of abnormalities and caution condition.
- PLC program modified to generate output for each abnormality & caution condition.
- Each alarm output from PLC linked with voice Annunciator system.
- Every time when the alarm is enabled voice Annunciator system will announce that particular alarm message.

Note: In order to reduce the MTTI we have implemented the speaking machine concept

All the possible abnormalities in a machine are listed down

In 200 T oil seal curing machine all the possible abnormalities are listed down as below:

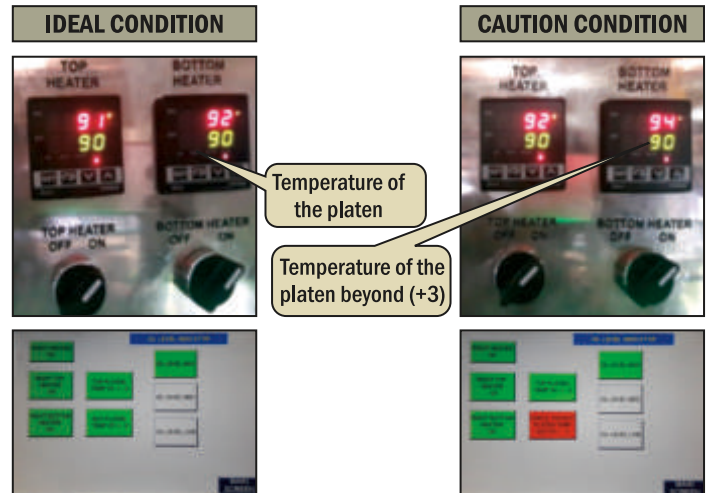
- Left Top heater, not ok.
- Left Bottom heater, not ok.
- Left Top heater, out of specification.
- Left Bottom heater, out of specification.
- Left Oil, level low.
- Left Top platen temperature, above plus or minus, 3 tolerance.
- Left Bottom platen temperature, above plus or minus, 3 tolerance.
- Left Oil, at, Medium level.
- Left Emergency stop.
- Right Top heater, not ok.
- Right Bottom heater, not ok.
- Right Top heater, out of specification.
- Right Bottom heater, out of specification.
- Right Oil, level low.
- Right Top platen temperature, above plus or minus, 3 tolerance.
- Right Bottom platen temperature, above plus or minus, 3 tolerance.
- Right Oil, at, Medium level.
- Right Emergency stop.

Total 18 possible abnormalities found

Caution condition for the abnormalities

Caution condition under which machine will intimate the operator that there is a problem which if it is not addressed immediately it will lead to break down condition.

In this condition machine will run in auto cycle continuously only warning message are given to the operator to alert him to inform maintenance team to address the issue and solve it.



Indicates that temperature of the platen within specification limit (± 5) and within caution limit (± 3).

Alarm indicates that the temperature of the top platen 4°C higher than the set point. Machine will not stop under this condition.

Voice Annunciator system design

Voice Annunciator designed based on number of alarms generated in a machine. Existing alarm system is available in HMI (Human Machine Interface) and all the alarm are converted into mp3 media format and loaded into voice Annunciator.

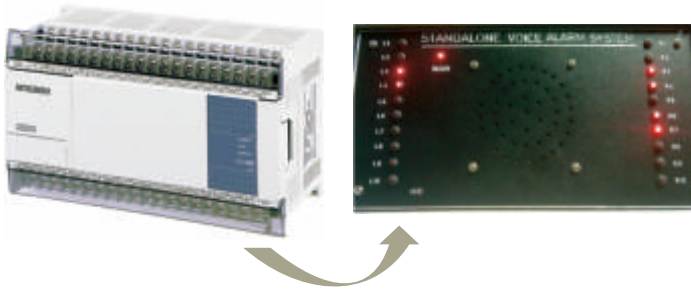
Voice Annunciator will announce recorded voice message corresponding to the input & this voice message will repeat until the input is high.

Guide lines for designing voice annunciator

Type	Microcontroller based Voice Annunciator with re-recordable
No. of Input Channels	Based on number of alarms generated in a machine
Input signal	From PLC NPN or PNP
Output	Audible message for individual alarm
Interval time	3 sec
Operation sequence for error	Sequence priority from 1 to 20
Display of current alarm	Red LEDs for individual alarm
Termination	Through terminal blocks provided at back side of the unit
Aux. Supply	90-270 V AC / DC
Enclosure	MS sheet with Texture finish Siemens grey Powder coat of shade RAL7032
Box dimension	400 (H) x 400 (W) x 250 (D)
Mounting	Projection

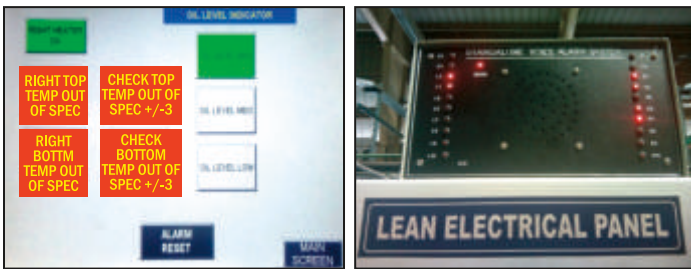
PLC program modification

Output generated for each alarm from PLC to provide input to voice Annunciator.



Monitoring of Results

Each alarm output from PLC linked with voice Annunciator system



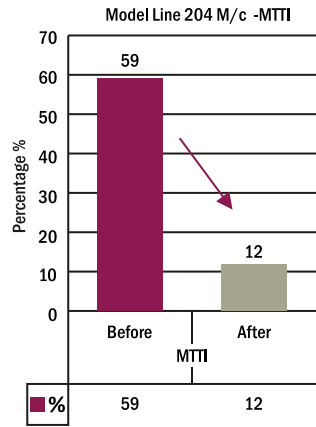
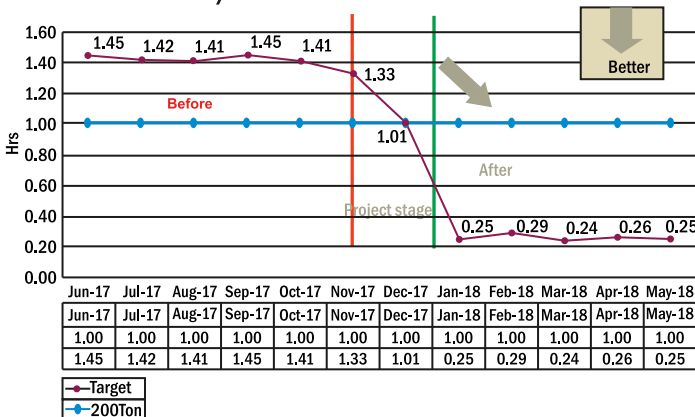
- Warnings & process deviations will be announced.
- To acknowledge the status or alarm, alarm reset button is provided in HMI screen.

Uniqueness Of Project – Speaking Machine

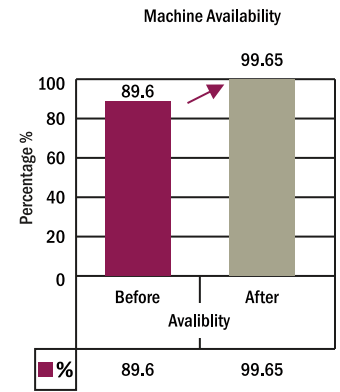
- Prediction Mechanism – Abnormality will be Highlight immediately, Without stoppage.
- Brain of Machine – Will Sense the abnormality.
- MTTR in Reduced Trend-Machine availability is Increased
- MTTI is Negligible.

Benefits of the Project

Model line 204 M/C - MTR Trend

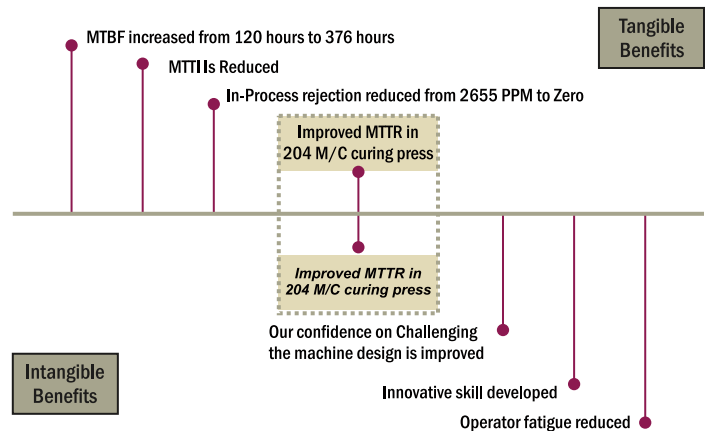


MTTI is reduced From 59 % to 12 %



Availability is increased 89.6 % to 99.65 %

Tangible & In-Tangible Benefits



Nipman Fastener Ind. Pvt. Ltd.

Haridwar

Category - Innovation

Turnover - < 250 Crore

Title of Case Study

TO ELIMINATE SUB CONTRACTED JOB WORK PROCESS IN BOLT "A" & "B" CYLINDRICAL STUD.

ACT Case Study Competition- Stream

Stream : Innovation

Presented By _____



Sunil Kataria



Harendra Tyagi

Case Study Theme / Project Title

Problem Statement :

There was a Sub Contracted Job Work of Shots Blasting in Bolt Cylinder stud 'A' & 'B', which is the team thought was a non value adding Operation (NVA) and can be Eliminated. Hence The Team took this project.

Linkage of Project with objective of Business

COMPANIES GOALS / OBJECTIVES

- Cost Reduction.
- Productivity improvement.
- Continuous improvement in all processes.
- Total Employee Involvement.

Project Objective

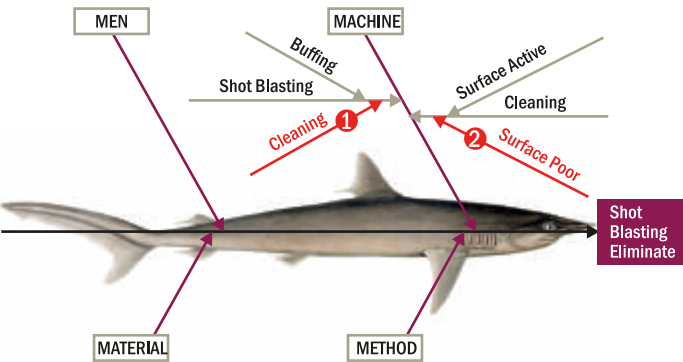
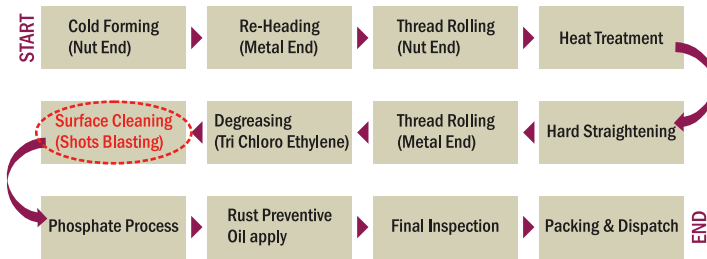
To Eliminate Sub Contracted Job Work process of Shots Blasting in Bolt "A" & "B" Cylindrical Stud.

Past Trend of the Problem



There was a Sub Contracted Job Work of Shots Blasting in Bolt Cylinder stud 'A' & 'B', which is the team thought was a non value adding Operation (NVA) and can be Eliminated.

Root Cause analysis – Flow Chart



Analysis to find Root Cause

1 Out Side Job work (Shots Blasting) to be eliminate.		
Question What is your final action?	Answer Shots blasting process replaced by degreasing process after Re - validation	
Why	Answer	Action
Shots Blasting Process on Stud "A" & "B"	For Stud surface cleaning	
Stud surface cleaning?	For Better Surface activation	
For Better Surface activation?	Better Phosphate coating	Shots blasting process replaced by degreasing process after Re-validation

Data Analysis

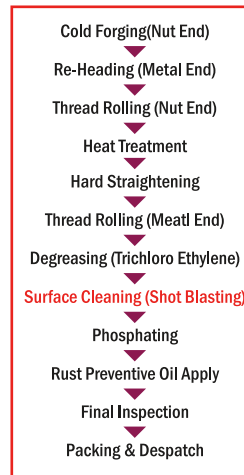
Before



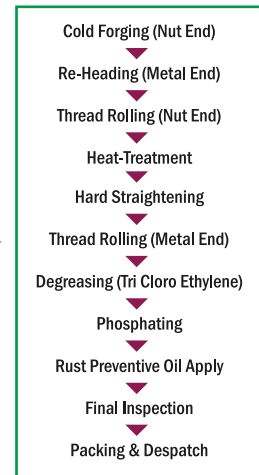
After

Shots blasting process Eliminated & replaced by degreasing process

Before



After



2 Degreasing process not effective

Question What is your final action?	Answer Temp. 10 °C and Time 3 Minutes increase in Vapor Degreasing by Tri Chloro Ethylene.	
Why	Answer	Action
Degreasing process not effective?	Product not clean properly.	
Product not clean properly?	Stud Surface not activate.	
Stud Surface not activate?	Stud properly not clean by tri chloro ethylene.	Vapor Degreasing time increase
Stud properly not clean by tri chloro ethylene?	Process not validate with tri chloro ethylene.	Temp. 10 °C and Time 3 Minutes increase in Vapor Degreasing Process (Tri Chloro Ethylene)

Before

Vapor Degreasing Process



Temp. = 80 + 5 °C
Time = 12 Minutes

After

Vapor Degreasing Process



Temp. = 90 + 5 °C
Time = 15 Minutes

Arriving at Root Cause

Root Causes	Solutions
Shots Blasting Process on Stud "A" & "B"	Shots blasting process replaced by degreasing process after Re-validation
Stud properly not clean by tri chloro ethylene	Temp. 10°C and Time 3 Minutes increase in Vapor Degreasing by Tri Chloro Ethylene.

Action Plan

Sr. No.	Counter Measure - What	Who	When	Where	How
01	Shots blasting process replaced by degreasing process after Re-validation	Sunil Kataria	26/10/17	Job Worker End	PFD Change.
02	Temp. 10°C and Time 3 Minutes increase in Vapor Degreasing by Tri Chloro Ethylene.	Harendra Tyagi	12/10/17	Vapor Degreasing M/C	PQCS Change.

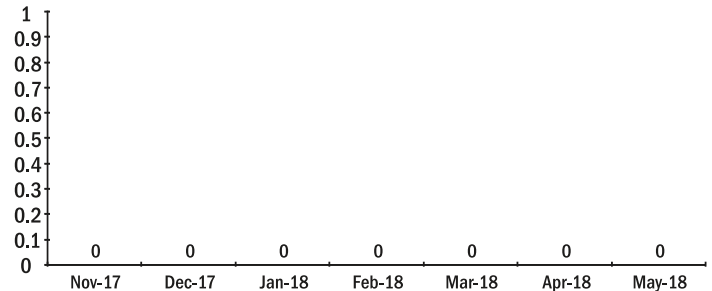
Validation of Root Cause & Action

Validation

CATEGORY	POSSIBLE CAUSES	CHECKED	OBSERVATION	SIGNIFIED CAUSE
MAN	-	-	-	-
MACHINE	-	-	-	-
MATERIAL	-	-	-	-
METHOD	Degreasing process not effective	Check	Check and found not effective	YES
	Shot Blasting Process on Stud "A" & "B"	Check	Yes	YES

Monitoring of Results

Results Monitoring



Out Side Job Work (Shots Blasting) Process Eliminate.

Benefits of the project

Tangible Benefits (Quantitative)

- Daily Cost Saved Rs. $30000 \times 0.31 = 9300$.
- Monthly Saving Rs. $9300 \times 25 = 223500$.
- Yearly Saving Rs. $223500 \times 12 = 2790000$.
- Process lead time reduced (4 Hrs) & productivity increase.
- SST life improve from 48 hrs to 60 hrs.

Intangible Benefits (Qualitative)

- Job Work eliminate.
- Customer Satisfaction improved.
- Team moral increased.
- Daily paper work reduced.

ACMA CENTRE FOR TECHNOLOGY

Programs

Suppler Excellence	Enhanced operation management
Lean Manufacturing	Advanced Engineering
Zero Effect & Zero Defect	New Product Development
New Product Design	Digitization Real Time Manufacturing
Smart Supply Chain	

write us to at: sangeeta.sharma@acma.in | act@acma.in

ACMA

ACMA Centre for Technology (ACT)



CULMINATION CEREMONY OF THE **FORCE MOTORS** CLUSTERS PITHAMPUR PLANT 2ND JULY 2018

The program was chaired by
Dr. Abhay Firodia Chairman Force Motors Ltd.,
Mr. F R Singhvi Chairman Skilling & Development
and Mr. Sunil Arora, Co-chairman Skilling & Development,
Mr. Dinesh Vedpathak, Head ACT along with Senior officials of Force Motors Ltd.

The team presented the gains and progress of the 2 years Journey.
Glad to share that He had appreciated all the efforts put by
ACMA team for achieving the results.

He also mentioned about working together in future.
Mr. Prashant Inamdar President Operations FML will be preparing the
structure for the support required from ACMA.

The ACT Team, Mentor Mr. Sunil Mutha and
Counsellors Mr. Hemant Dike, Mr. Vivek Haridas and
Mr. Aniket Khasnis had done extremely well Dr. Firodia and
our Chairman & Co-chairman appreciated their efforts.

In such a giant organisation we could achieve 100% involvement of the employees.

Following are some of the key achievements -

- Undesirable Practices corrected - 8747 Nos & 12 undesirable habits eradicated.
- QCC - 367 project completed & 143 QC Circles formed and active.
- 8400 + kaizens implemented (1300 Nos. referred to R&D for product design modifications).
- 265 machines converted to My Machine.
- 2100+ operating standards revisited.
- 500 Poka yokes.
- 16 VSM projects and 32 Low cost automation Projects.



ACMA Centre for Technology (ACT)

GLIMPSES OF FORCE MOTORS CLUSTER CULMINATION CEREMONY

2nd July 2018

Force Motors Clusters



Areas Covered in Clusters

- Foundation Cluster in Press Shop.
- Foundation Cluster in Body Shop.
- Advance Cluster in Power Train + Rear Axle.
- Advance Cluster in Vehicle Assembly.

ACT Team



Sunil Mutha - Mentor



Hemant Dike - Counselor



Vivek Haridas - Counselor



Aniket Khasnis - Counselor



Reviewing progress and Displays



Applaud for Good work



Appreciation of Best Contributors



Presentations of Clusters



Address by Chairman



Appreciation of Best Contributors



Mentor's Speech



Address by Co-Chairman



Address & Vote of Thanks by Head ACT



Experience Sharing by Counselors



Address by Dr. Firodia



100 senior team and FML officials attended the function



Group Photo

ACT 1ST NPD DESIGN CLUSTER

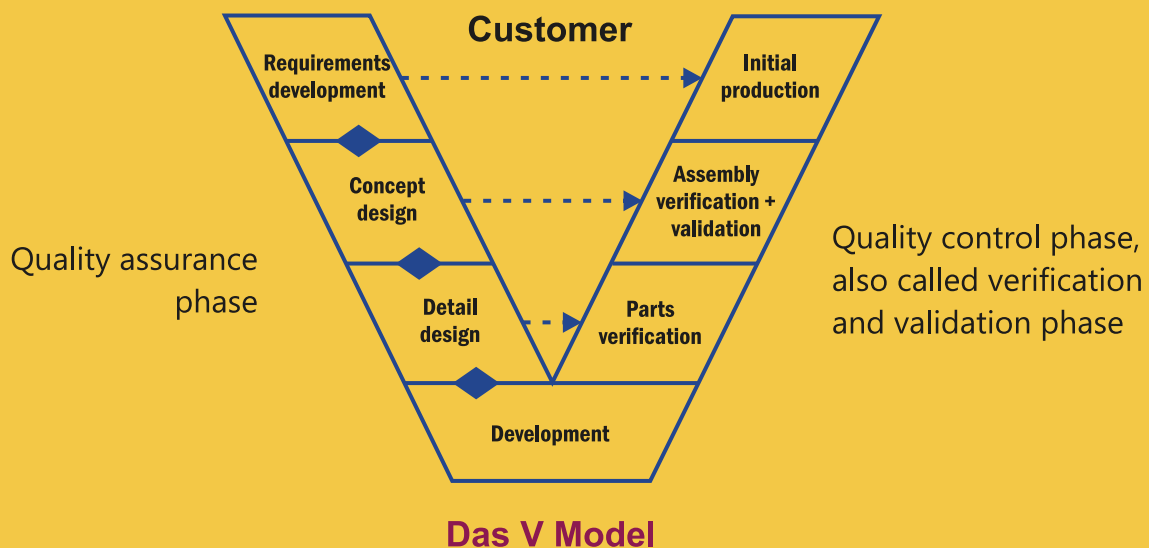
DESIGN QUALITY ASSURANCE WORKSHOP

ACMA center for technology started its 1st NPD Design cluster in April 2017. This was launched to improve design and development capabilities of automotive component manufacturers. This cluster was introduced for the companies who have design responsibilities. Now the cluster has already progressed 14 months.

Currently there are four teams enrolled under this cluster programs.

1. Three divisions of Wheels India Limited.
2. Harita Seating Systems.

Since, this was the 1st cluster of its type, the strategy of “understanding existing company practices and developing course content accordingly” has been adopted. For product development process, successful German system approach of complex product development called “Das V Model” has been adopted. Also, key inputs from VDA 6.3 is taken in developing the modules and check points.



As per Das V Model, left side arm of V is deployment where quality is being assured. In this phase, we strive to prevent mistakes. The bottom is the development. Right arm of V deals with quality control. In this phase, problems are identified and solved before the product is finally delivered to the customer.

Every month, an experience sharing session is held during monthly review meeting of the cluster. Based on knowledge gained through these session, all concepts and tools for verification, validation and quality control phase has been introduced and being practiced by all four teams. Some standard design quality assurance tools have also been introduced. Thus, right arm of V is stabilized.

However, there were challenges to develop a comprehensive intervention for improving design quality that is complete, meeting VDA 6.3 requirements, intuitive and lean (Left arm of V). This is critical to establish an improved Quality assurance system of product design within organizations and prevent mistakes while design work.

A workshop was conducted recently in Chennai on 09th June 2018 at the home of Mr. Selvamani (Mentor - NPD). This was organized to develop an intervention plan for Quality assurance phase.

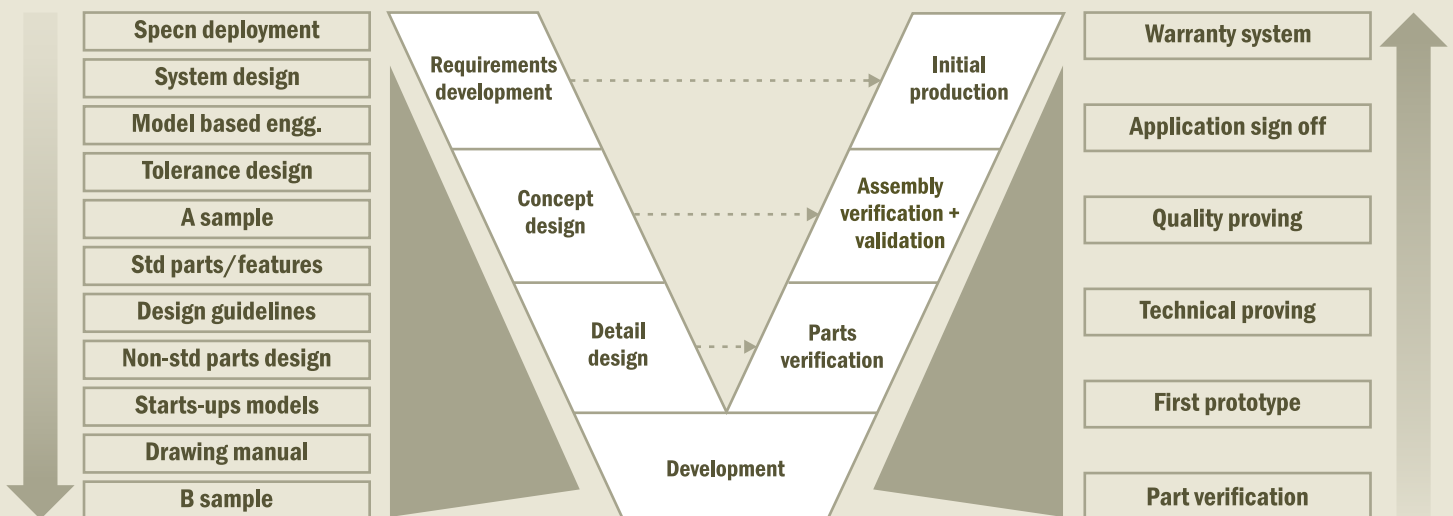
Following person were invited to attend the workshop.

- Mr. Selvamani S – Mentor, NPD.
- Mr. S Narayanan – Expert, NPD.
- Mr. Vishal Saxena – Counselor, NPD.
- Mr. R S Sharma – Expert VDA 6.3.
- Mr. S Shanmugam – Expert, Design Process.
- Mr. R Balasundaram – Expert, Design office practices.

The workshop was concluded with following results -

- Application of physics must be promoted. For this purpose, a module “Model based engineering” should be developed.
- Since VDA 6.3 puts lot of emphasis on FMEA, it is important to give attention to failure modes at all stages. This is addressed in the following tools:
 - Deployment specifications
 - Design guidelines
 - Design of non-standard parts
- Purpose of “A” samples and “B” samples must be clarified as lot of confusion is there in this area.
- Activities for configuration design and platform design must be clarified as this is the least understood subject in local automotive companies in general.

With above results, a complete course intervention has been developed now by cluster mentor, image of which is given below with the name of all concepts and tools.



Further, detailed course content material is under preparation according to above intervention and soon will be ready to deliver at company end.

A BRIEF NOTE ON CARDIFF, UK AND VDA-QMC, GERMANY VISITS

From
ACMA
ACMA Centre for Technology (ACT)
side attended by:

IN CARDIFF, UK
Mr. Dinesh Vedpathak &
Ms. Sapana Baravkar
(21st to 26th May 2018)

IN VDA-QMC, GERMANY
Mr. Dinesh Vedpathak, Mr. V K Sharma, Mr. Sunil Mutha,
Ms. Sapana Baravkar & Mr. Sushil Sharma
(28th May to 1st June 2018)

A ACMA-CARDIFF EXECUTIVE EDUCATION PROGRAM & B2B MEETING WITH WELSH GOVT, 21ST MAY - 30TH MAY 2018, CARDIFF, UK



ACMA signed MOU with Cardiff during the ACT 2nd Summit in January, 2017 at Pune and successfully conducted its 1st program in June 2017 on topic "Advanced Lean" with 14 participants. In continuation, the 2nd program on topic "Smart Manufacturing through Big Data Analytics" and B2B meeting with Welsh Govt team (during program) was held in May 2018. Mr. Dinesh Vedpathak and Ms. Sapana Baravkar led a team of 11 participants for this program at Cardiff, UK.

The Objectives of this program were:

- ▶ Expose Indian Auto Component CEOs / Sr. Management team for next level of manufacturing.
- ▶ Witness implementation of real time Manufacturing.
- ▶ Initiate Business / Technology tie ups for Indian companies with Welsh companies.
- ▶ Walk through steps for Industry 4.0.
- ▶ During this program, Participants visited Protolabs, Control 2K and British lab in the areas of Technology, Automation and Real time monitoring of data.

As per one to one feedbacks received from participants, the program was designed quite in depth and was very useful for their companies.



OUTCOME

- ▶ 5 companies are taking next level steps for business opportunities with Welsh companies & their direct contacts were established with Welsh Industry forum team.
- ▶ One company will setup a sponsored laboratory at ACMA COE, Sonipat.
- ▶ All Participating companies are keen in joining ACT Automation / Digitization cluster programs and are ready to take joint R & D projects.
- ▶ ACT will be designing Smart Manufacturing program for Middle management team of Engineering and Maintenance personnel at Cardiff UK and also at ACMA COE by End of December 2018.

B VISIT TO SWANSEA UNIVERSITY, CARDIFF, UK 24TH MAY 2018 FOR JOINT “R & D PROJECTS ON CORROSIONS ”

ACMA CENTRE FOR TECHNOLOGY is in process of designing next program on “Corrosion Free Manufacturing” and its launch is proposed in April 2019 in the form of cluster programs and joint R &D programs with universities and auto industries.

Swansea University is working in this area quite well and are interested to take joint program / projects. We visited their entire facility and witnessed live projects being done for the industries.



OUTCOME

- ▶ First awareness session is being planned in India as one / two days program in India for creating awareness by end of December, 2018.
- ▶ Swansea experts team will visit companies in India to create a road map for corrosion free manufacturing with ACT by end of December, 2018.
- ▶ They will present case studies in various ACMA-ACT events.
- ▶ ACMA-Swansea joint Course at their university will be designed.
- ▶ Swansea University will guide ACMA membership for setting up Corrosion analysis labs in their companies.

C ACMA - WELSH INDUSTRY FORUM, AIRBUS, SONY MEETINGS FOR JOINT CLUSTER PROGRAMS WITH ACMA - CARDIFF AND EXCHANGE OF KNOWLEDGE FOR CAPABILITY DEVELOPMENT OF ACT TEAM 24TH MAY 2018 AT CARDIFF UNIVERSITY

Meeting with above team was conducted for sharing ACT Services and team were quite impressed by structured methodology of ACT and also Cardiff team is fully aware about ACT activities in India.

Welsh government also operates similar programs for their various sectors in auto and not auto manufacturing areas. They are keen to capture Welsh companies needs which are mostly QCD improvements with lead time reduction in case of Airbus suppliers and largely quality areas for Sony's 236 suppliers

OUTCOME

- ▶ Cardiff will capture voice of Welsh Industries and based on this ACT road map will be modified, expected by end of December 2018.
- ▶ ACMA will conduct one day awareness program on cluster methodology with revised road map as per above point and its benefit to Welsh Industry forum and its suppliers by end Nov 2018.
- ▶ Sony plant is keen in starting a pilot supplier cluster shortly for their UK suppliers.
- ▶ A team of UK experts will visit Indian cluster companies to understand process and its benefits.

D ACMA - PRO-VICE CHANCELLOR & FUTURE DEAN OF CARDIFF UNIVERSITY MEETING

Our team met Ms. Nora H de Leeuw and Ms. Bethan Caines at their office and she expressed happiness after ACMA signed MOU and consistently engaged in programs. Also, ACT will be supporting Cardiff graduates for internship in Indian cluster companies.

OUTCOME

- ▶ Cardiff University is ready to provide space for office in present premises of university and in 2020 new Research building is getting developed and ACMA would operate from there.
- ▶ ACMA would support 100 graduates from Cardiff for internship with nominal charges per student supported by ACT Counsellors mentoring these students for 3 to 6 months, starting from 2019-20 fiscal year.
- ▶ Cardiff will support ACMA COE by developing joint programs.
- ▶ ACMA-Cardiff joint papers will be published in HBR in April 2019.
- ▶ Visited and photos captured which are very useful for ACMA COE.

E ACMA-VDA-QTCB MEETING AT BERLIN FOR ACT TEAM CAPABILITY DEVELOPMENT AND JOINT PROGRAMS 28TH TO 30TH MAY 2018



ACMA team exchanged its capabilities with VDA-QMC team at their office as per MOU 2017 for exchanging knowledge with both sides for mutual benefit. VDA-QMC is focussing largely on Training its memberships whereas ACT is focussing largely in implementation through its cluster programs. Joining hands together by both parties will enrich delivery contents for Indian and German auto component sector. Volkswagen, Mother Plant at Wolfsburg, near Berlin and BMW 2-Wheeler plant, Berlin were visited by ACMA-VDA team. Both plant visits enriched knowledge on best practices and supplier development activities.



OUTCOME

- ▶ VDA-QMC will train and certify 16 ACT Counsellors in India for VDA 6.3 Certification.
- ▶ ACT will support VDA-QMC for supplier assessment in India.
- ▶ Leadership development program for error free management is being designed for ACMA and will be conducted in India by end Oct 2018.
- ▶ VDA-QMC will also support ACMA COE for conducting programs in India by dispatching faculties from Germany.
- ▶ BMW 2-wheelersupplier development head agreed to provide training for ACT team during their visit to India or will coordinate through Indian counterpart for this.

Overall, both visits were very useful and enriched knowledge which is useful for upgrading ACT Cluster contest in due course of time.

**Program On
Production Management,
Osaka, Japan, 21st June to 4th July 2018**



Key learning point from the program

Material Flow Cost accounting/Analysis-as an effective environmental & management tool to attain balance of business profits and environment.

Creation of Low carbon Societies.

Implementation of 5S conditions in SME.

MH- Reduce material handling and transportation between processes.

Setting up ISO 14053 Environment.

Establish Standard Operations, preparation of QC process chart and SOP.

IOT-as a next step of automation for better data management for effective management control and to improve operational capability.

JIT-The method to produce/supply necessary at right time and qty.

Business and Environment

	Risk	Opportunity	MOST IMPORTANT Business & Environment impacts
Business & Environment	<ol style="list-style-type: none"> 1. Current Product Obsolescence 2. Additional Investments 3. Present level of skills will not be enough 4. Inadequate supply chain 6. Current marketing channels not sufficient for global business expansion 7. Complex business laws 	<ol style="list-style-type: none"> 1. New product innovation such as EV 2. Opportunities for local/foreign collaboration 3. Opportunities to learn new skills/ideas 4. Collaborative efforts with like companies 5. Innovative options 6. Opportunities to learn and expand business knowledge through team efforts. 	<p>Environmentally friendly products. Low carbon societies.</p> <p>Opportunities for young generation</p> <p>International collaborations</p>
	Key Stakeholder	Expectation	
Stake Holder	<ol style="list-style-type: none"> 1. customer 2. Society 3. Investors 4. Employees 	<ol style="list-style-type: none"> 1. Timely delivery at right price of quality goods 2. Minimal carbon Impact, affordability 3. Steady return on investments with progressive approach 4. Progressive management, opportunities to learn, fair compensation 	
KGI	To support SME companies to set and achieve 15 % cost reduction by March 2019		
Problem	Higher material cost-higher specs/overstocking	Higher auxiliary costs	Higher changeover costs
	Higher energy costs	Higher system costs	
KPI	KPINo1 KPI.- 5% reduction in material costs	No2 KPI- 5 % reduction in energy costs	No3 KPI -5% reduction in system costs
Action (Do)	<ol style="list-style-type: none"> 1. Change in design specs 2. Avoid extra allowance on raw materials 3. Look for alternative materials 4. Change part design- e.g. casting to forging 5. Supply chain 	<ol style="list-style-type: none"> 1. Use of alternate form of energy-e.g. solar panels 2. Selection of low power consuming equipment 3. Use low power consuming electrical fittings 4. Inculcate self discipline in using daily power consumption appliances. 	<ol style="list-style-type: none"> 1. Implementation of JIT 2. IOT project for better operational availability and better production management control 3. Start with 3-S 4. Standardization 5. QC Chart 6. SOP
Higher Corporate Value with External Benefits			

Action Plans after returning to your company

Activity	Month/year
MFCA-creating awareness with small projects	5 by March 2019
3S- Organizing common seminars through local industry institutes	5 by March 2019
IOT	5 by March 2019

Approach for initialing IOT in SMEs:

To improve material availability

- * Identify the critical operation/process/machine
- * Identify the factors which hinder the operation of equipment – e.g. CNC machining centre
- * Installing suitable sensor on the machine and by means of USB camera and small PC collect the error code and send to server through end gate.
- * Server can be cloud or existing data storage.
- * Use automatic analysis software to create Pareto chart and identify major cause.
- * Focus on major cause & capture video before and after the operation when red lamp lights up.
- * Send the abnormal videos and times to server to analyse root cause and drafting measures.

Production management using IOT

- * Identification of process communication issues
- * Clustering group of machines/ lines to collect relevant data form machines / processes for analysing through end gate and cloud or company's host system.
- * Analysing data via cloud platform to take timely corrective actions.

ACMA CENTRE FOR TECHNOLOGY

For International Programs kindly contact to

Email - ekta.agrawal@acma.in

Mobile No. - 9657657258

Expert Information Seminar & Technology tour organized for India Team on "Consumption-based power generation from solar energy, Germany"

8th July 2018 to 14th July 2018 in Bavaria, Germany.

ACMA Centre for Technology is moving towards Green Manufacturing & Renewable source of energy & its Storage.



Group Photo with Minister



Launch of the Expert Seminar



Mr. Dinesh Vedpathak,
Head ACT explaining about Green Manufacturing



Visit to Phaesun company -
development in rural Electrification



Visit to Varta Company -
Solution for energy storage



Visit to IBC Solar Plant -
For international PV projects & Solar Storage



Visit to Steca Elektronik -
ACMA Centre for Technology
moving towards Green Manufacturing



Solar Park in Germany

ACT - SERVING INDUSTRY THROUGH CLUSTER PROGRAMS

The ACMA Centre for Technology (ACT) was formed in 1989 with a vision to provide technical support and services to ACMA members to help them adopt global best practices. ACT continues to deliver on this mandate, by establishing global best practices at its members' manufacturing plants through 'Cluster programs'. A Cluster is a "group of companies that come together to improve their competitiveness". These companies work together to overcome their common challenges and to achieve the pre-defined goals stated in the cluster roadmap under the able guidance of ACMA Counselor and watchful eyes of ACMA Mentor.

VARIOUS CLUSTER PROGRAM CATEGORIES OFFERED BY ACT TO SUIT ON GOING NEEDS OF THE INDUSTRY INCLUDE:

- ▶ Zero defect & Zero effect Cluster
- ▶ Engineering Excellence Cluster
- ▶ Low Cost Automation Cluster
- ▶ Lean Tool Engineering Cluster
- ▶ Advance Plus (MFCA) Cluster
- ▶ Advance (Lean manufacturing) Cluster
- ▶ Foundation Cluster
- ▶ New Product Development Foundation Cluster
- ▶ New Product Development Design Cluster

As on 1st August'2018, following ACT cluster programs are operating in companies indicated against each:

Sr.no	Cluster type	No of Cluster running	No of companies
1	ZED	3	19
2	Engineering Excellence	1	6
3	NPD (design + foundation)	2	11
4	Advance	3	18
5	Foundation	3	17
6	Innovation (Advance Plus)	1	4
7	Supplier Cluster (HERO)	6	52
8	Supplier Cluster (LMW)	1	11
9	Customer Projects	2	5
	Total	22	143

The cluster-based deployment is an integrated and holistic approach, which is an effective way for all round development and upliftment of the country's MSME sector through Large sector up to OEMs.

ACT has successfully established world-class shop-floor practices at member companies through its cluster programs. These cluster programs are a widely popular intervention and aim at creating global competitiveness among the participating companies. While improving manufacturing competitiveness, ACT also ensures that these programs result in profitable and sustainable improvements.

The value added by ACT at the member companies through its cluster programs over the last five years is depicted in following graphs. While first graph shows savings in Rupees during the cluster program, the second one shows the level of satisfaction of the participating companies.



Graph - 1

The cluster approach has proved to be an effective and successful tool for upgradation of industry all over the country in a cost-effective manner. Cluster program allows one company to visit other companies which provides learning through sharing.

OUR METHODOLOGY

The counselor visits the companies on regular basis and monthly review meetings are held in presence of mentor. Typical changes brought about in a cluster program include:

- ▶ Total employee involvement (TEI)
- ▶ Green & Clean Plants
- ▶ Improvement in overall plant visibility
- ▶ See through plants
- ▶ Building capabilities & creating facilities
- ▶ Hospital clean & garden green plants



ACHIEVEMENTS FROM CLUSTER PROGRAMS CULMINATED IN DECEMBER'2017:

Table-1 highlights overall savings from each cluster program and the average level of satisfaction of the participating companies in the program.

ACT Cluster Program (completed)	Cluster Period	Closing Month	No. of companies at end	Net Savings (Rs L)	Feedback by Company CEO (Target=100)			
					81-85	86-90	90-95	95-100
ACT Engineering Excellence Cluster 3	Dec 2015 – Nov 2017	December-17	8	2500				96%
ACT Advance Cluster 8	Jan 2016 – Dec 2017	December-17	6	1416				96%
ACT Advance Cluster 7	Jan 2016 – Dec 2017	December-17	3	105				99%
ACT Advance Cluster 6	Jan 2016 – Dec 2017	December-17	6	630				98%
ACT Foundation Cluster 9	Jan 2016 – Dec 2017	December-17	6	528				96%
1st ZED cluster	Dec 2015 – Nov 2017	December-17	6	716		89%		
1st Export Cluster	Apr 16 - Mar 17	May-17	3	NA			94%	
Advance Cluster 5	Jan 15 - Dec 16	January-17	8	1077				96%

Table - 1(Savings, Cust. Satisfaction – cluster wise, Dec'2017)

Table-2 evaluate the scoring method for capturing customer satisfaction - from each company in every cluster program.

Sr. No	Category	Cummins	Hero Cycle	JK Fenner	Hero Cycle	Lucas TVS	Sanjeev Auto	WIL Padi	WIL SP	ZF Steering
1	Counselor Visits	10	10	9	10	10	10	9	10	10
2	Inputs Received	10	10	10	10	10	10	10	10	10
3	Relevance of Inputs	10	10	10	10	9	10	10	10	10
4	Delivery as per plan (roadmap)	9	9	9	9	9	10	9	9	9
5	Learning from model company visits	10	9	8	9	9	9	9	10	9
	Total score (out of 50)	49	48	46	48	47	49	47	49	48
		% 98	96	92	96	94	98	94	98	96

Table - 2 (Capturing customer satisfaction EEC-3, 2015-17)

The cumulative gains for clusters that culminated in Dec'2017 is Rupees 70 Crores. The overall average customer satisfaction level is 96%.

ACHIEVEMENTS FROM CLUSTER PROGRAMS - NEW PRODUCT DEVELOPMENT CLUSTERS:

Results so far:

- ▶ Initial quality improvement of new products – **0.4X**
- ▶ Lead time reduction for samples – **0.2X**
- ▶ Lead time reduction for SOP – **0.25X**
- ▶ Rich failure directory
- ▶ Increasing incidents of first time right products
- ▶ Cost reduction efforts, through frugal engineering, standardisation and re-use, building up
- ▶ Rigorous application of Requirements management to understand and resolve customer requirements & conflicts
- ▶ Competence building - **18 Design Guidelines** (Average per company) has been prepared and practiced
- ▶ Competence building - **10 books of knowledge** (Average per company) has been identified & under development

ACT – EVER EVOLVING

Armed with the success of its regular clusters, ACMA centre for technology, has now started collaborating with the OEMs to improve upon their supplier base - mostly consisting of tier - 1 and tier - 2 companies. One such successful example is Hero Motocorp Supplier Excellence Program, launched in September'2017 with 52 supply chain partners. The companies are distributed over six clusters spread over three locations - NCR, Ludhiana and Haridwar.

Results in a short period of seven months are quite encouraging (see table-3):

Parameters	Unit	SEP'17	MAR'18
1s & 2s AUDIT SCORE	%	37	75
SAVINGS AS PER QCC	Rs	--	94.43 Lacs
SAVINGS thru KAIZENS	Rs	--	172.62
REWORK	PPM	27,315	17,960
CUSTOMER RETURNS	PPM	111	63
CUSTOMER COMPLAINTS	Nos	11	4
DELIVERY PERFORMANCE	%	93%	98%

Table-3 : Results HSEP cluster

ACT has launched 2nd Cluster Program for Hero Motocorp Supplier in August 2018. There are also plans to seek collaboration with other OEMs for supplier improvement programs.

Acting on its mandate as always, ACT has designed two new cluster programs to meet the evolving requirements from the auto component industry. We are now in the process of launching two new cluster programs – Low cost automation cluster program & Lean tools engineering cluster program.

To know more about ACT cluster programs, please contact / write to:

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sangeeta.sharma@acma.in | +918802848888

Abhinav Rastogi :

abhinav.rastogi@acma.in | +918800446702

ACMA Centre of Excellence (ACoE),

**IIT Delhi Technopark Campus,
Sonapat**

A brief

The existing talent gaps in the Auto Component Industry are repeatedly discussed at multiple forums and discussions of ten close with the proposal of some Institutional identity to do the needful. ACMA along with AOTS, Japan, MACE India, IIT Delhi, and Cardiff University, UK will be some of the strong pillars that support the establishment and functioning of ACoE for the benefits either for the Organizations or Educational Institutions, would be just apart of the larger Universe. ACoE will not only bridge the age-old gaps existing between the Education System & the Industry Requirement but will also act like a channel for employees willing to take a leap towards the next level of their capabilities. Keeping a close attention on the kind of ecosystem prevailing in and around the Auto Component Industry in India, the modus operandi of ACoE is designed in such a manner that maximum benefits would reach out to Organizations, Employees, Institutions, Students, etc.

Vision

To impart World Class Technical and Behavioral Skills to Auto Component Manufacturing Organizations for improving their effectiveness in terms of delivering best in class quality to the customer by enhancing capabilities for design and development to ensure cost competitiveness, creating a safe and productive Work Environment that brings out the best of every smart employee.

Facilitate for creating smart operators and managers

Mission

Focus on "Design in India" for Enhanced Design Capabilities.

Provide conducive learning environment to trainees for enriched experiential learning.

Support Organizations to create an intrinsic environment that promotes "Quality should be First & amp; Safety is a Must".

Develop "My Organization" concept from present My Working Area concept.

Objective

To impart World Class Technical and Behavioral Skills to Auto Component Manufacturing Organizations for improving their effectiveness in terms of right time delivering best in class quality to the customer along with creating a safe and productive work environment that brings out the best of every employee.

Organizations/Institutions, as well as their employees, will get tremendous benefits out of the evolution of ACMA Centre of Excellence (ACoE).

Below are few of the expected benefits:

Organizations:

- All the trainings to be conducted by experts from Academia/Industry.
- Solutions for all kind of Technical & Behavioral training will be made available at one single window.
- Behavioral Trainings to be conducted based on real time challenges, rather than philosophical concepts. It will facilitate employees with better work place management.
- Practical Skill Trainings to be imparted in a simulated environment instead of a theoretical class room. It will expand the employee's horizon of understanding Quality & Safety.

Institutions:

- Students get to interact with a lot of Industry Experts to gain better understanding of the Corporate Expectations.
- A practical learning opportunity for the students in a simulated environment.
- Enhanced Personality Development as they undergo Behavioral Skills Training.
- Opportunities of better placements with improved Technical as well as Behavioral Skills.
- Pre-employment skill training programs with commitment from Industry to hire from the pool.

Key Unique Factors

Learning Environment:

The environment at ACoE (residential) will facilitate working professionals to identify a new horizon of their technical and behavioral skills.

Industry based curriculum:

The training pedagogy will be based on the latest trends to cater to the existing and emerging needs of the automotive and autocomp industry.

Long Term Benefits:

Programs to be designed to enhance short term as well as long term benefits for the industries/business.

Trainee Centric Sessions:

Trainee's need and desire to learn will be the epicenter of sessions conducted at ACoE. The design of the sessions will further augment and fulfill the trainee's desire to learn.

Amalgamation of Training & Facilitation:

The center, which will be managed by industry experts, will be able to deliver trainings as per the specific needs of the industry & will design Technical & Behavioral sessions in an innovative yet practical manner.

Faculty:

Our panel of Faculty members would be industry professionals with rich industrial exposure - both in terms of Technical as well as Behavioral skills.

The Infrastructure

- ACMA has already identified IIT Delhi's Sonipat Centre (Haryana), which is spread over 40 acre of land and is ready with all facilities like 140 well equipped rooms for staying, either with single occupancy / double occupancy.
- ACMA has already completed furnishing of its area with all training facilities and instruments for various laboratories are on the way and first lab of mechatronics for the 6 levels of automation steps will be ready by end Aug 2018.
- Other laboratories like, Product Design & Development, Lean Mfg., Zero Defect Quality, Zero Breakdown, Innovation, 3D printing, laser-cutting, other upcoming technologies, Measurement & Standards, Behavior skills laboratories will be commissioned along with a separate learning corner as "Japanese way of doing things" by end Dec 2018. In due course of time, ACoE will support for Patent Filling / Design registration / Copyright and will also

be equipped with latest software's in its lab like Engineering material selection software / Plastic advisor software for design and similar other tools.

- ACMA CoE will bring other Knowledge partners involvement at ACoE programs shortly.

The Curriculum

The syllabus would include all the relevant Technical and Behavioral skills required to prepare industry ready personnel for Auto Component Industry. Few of the skills have been mentioned below:

Technical Skills:

- Automation
- Lean Manufacturing
- Designing Engineering Skills
- Zero Defect Quality

Behavioral Skills:

- Communication Skills
- Team Building
- Time Management
- Managerial Skills
- Creative thinking

The Functional Model

The Functional Model will include:

- A core team of **Key People** managing the activities at ACoE, deployed by ACMA.
- Administrative Team along with the Faculty to be deployed on the payrolls of ACoE to gradually make the institute self-sustainable.
- A combination of **Permanent Faculty & Visiting Faculty** to be deployed at ACoE for various Technical as well as Behavioral Skill Trainings to be imparted.

The Knowledge Partner's role

ACMA CoE team is looking forward to have active involvement of its knowledge partners (AOTS-Japan, Maruti Center for Excellence (MACE)-Gurugram, IIT -Delhi and Cardiff University, UK) in the following way

Knowledge partner can:

- Sponsor labs / areas for their branding either directly from them or can bring outside suitable partner which will benefit both sides.
- Support in designing joint programs.
- Share faculties for various training programs at ACoE.
- Design long term Certification Programs of which most of the portion can be done at ACoE and partial program can be done overseas to save training cost.
- Share knowledge on various new technologies for mutual benefit.

- Design Joint Programs where part of the program can be executed at the premises of Knowledge Partners.
- Suggest best in class available faculties / sources of knowledge.
- Help to establish best in class e-library for future.
- Build e network for exchanging on line courses.

ACoE Team (as of 31st July 2018)

ACoE Team Members as of 31st July 2018:

ACoE Board :

N K Minda

President, ACMA

Ashok Taneja

Past President, ACMA

Srivats Ram

Advisor, Skilling & Mentoring, ACMA

F R Singhvi

Chairman, Skilling & Mentoring, ACMA

Sunil Arora

Co-Chairman, Skilling & Mentoring, ACMA

Vinnie Mehta

DG, ACMA

Dinesh Vedpathak

CEO, Skilling & Mentoring, ACMA

ACoE ACMA Team :

Sapana Baravkar

ACoE - Sr. Director & Head ACoE

Deepak Agarwal

ACoE - Technical Head

Deepak Jain

ACoE - Lab Head

Raginee Singh

ACoE - Admin Head

Binny Tomy

ACoE - Coordinator

Special Team :

Rajiv Kapoor

Executive Director - Group HRM at UNO MINDA

Vikas Jain

GM - Finance at Minda Industries Ltd.

Shankar Lal Gupta

VP - MANUFACTURING EXCELLENCE UNO Minda

Rakesh Anand

Advisor at Shriram Pistons & Rings Ltd.

Manoj Khanna

Senior Plant Manager at Shriram Pistons & Rings Ltd.

SPECIAL ADVISOR : M M Singh, CEO, MSIL

KNOWLEDGE PARTNERS : AOTS, JAPAN/ MACE/ India IIT Delhi/Cardiff, UK

Soft launch of ACoE, on 31st Jul 2018 at Sonipat



1st Course on "Developing Capabilities of Automation" 4th to 6th Sep 2018

Developing Low Cost Automation Capabilities

Course Highlights:

This is a laboratory-based course (with 50% Theoretical input & 50% Practical)

A. Faculty:

Mr. Ramana Murty is a Mechanical Engineer with 36+ years of industrial experience. He is responsible for

Low Cost Automation cluster systems of ACT division. He drives Indian Production System through ACT Cluster/Training programs.

Under His guidance, companies have done large improvements in various areas like SMED, Low Cost Automation, Productivity improvements. Previously he was associated with companies responsible for Design and development of Special Purpose Machine Tools, Facilities Planning, Technology Assimilation at Various plants.

His Specialties:

- Conceptualization, Design & Development of Special Purpose machines and Automation
- Technology assimilation
- Facilities planning & Process layout
- Setting up SPM building Facility
- Tool Engineering
- Hydraulic & Pneumatic control System Design

B. Course Certificate:

All participants will receive a Certificate at the end of course.

C. Who should Attend:

Shop floor Engineers working in Production, Maintenance, Engineering, Industrial Engineering and Design, Improvement Dept. Participants with 3 years or more experience in above areas will be helpful.

D. Deliverables:

- This course provides an overall exposure to the technology of Low Cost Industrial Automation and Control as widely seen in factories of all types for discrete manufacturing.
- The course, discusses a wide range of related topics from the advantage and architecture of automation systems, and Sensors, discrete and continuous variable control systems, hydraulic, pneumatic and electric actuators, industrial communication.

E. Course Layout:

- Introduction to Low Cost Automation
Definition of Automation, Advantages, Disadvantages
History of Automata/ Mechanica / Karakuri
Low Cost Automation
Automation Videos

- Architecture of Industrial Automation Systems
Introduction & Definition of Industrial Automation system
Industrial Communication System
The elements of Industrial Controls
Level 0 Sensing & Actuation
Industrial Actuator Systems
Level 1 Automatic Controls
Level 2 Supervisory Controls
Level 3 Production Controls
- Introduction to Automatic Control, PLC & HMI Programming & Servo Drives and Controls.
Introduction to Control Systems (Closed/open Loop)
PLC & HMI Programming
Servo Drive controls, Servo Actuators
- Introduction to Sensor Technology & Applications
Sensor Technology- Type of Sensors, Selection of Sensors and applications
- RFID Technology & Applications
- PC Control Systems
PC Control Systems, Data Acquisition, Communication devices, Measurement Systems etc.
- Role of Automation in Industry 4.0
- Principles of Hydraulics Systems & Applications
Basics of Hydraulics
Hydraulic Symbols & Circuit Design
Hydraulic Pumps, Motor, Actuators, Valves and Accessories- Function and applications
- Principles of Pneumatic Systems & Applications
Basics of Pneumatics
Pneumatic Symbols & Circuit Design
Pneumatic Compressors, Air preparation systems, Valves, Actuators (cylinders, Grippers) and Accessories - Function and Applications
- Error control Vs Defect Control

F. Venue:

ACMA Centre of Excellence (ACoE), IIT Delhi Sonipat Campus, Haryana.

G. Duration:

3 Days (Residential / Non – Residential)

H. Schedule of Three Days Course:

Course on Developing Low Cost Automation Capabilities			
Timings	Day 1	Day 2	Day 3
	04-09-2018	05-09-2018	06-09-2018
9.00 am to 10.30 am	Introduction to Automation	PLC, HMI Programming & Servo devices	Principles of Pneumatic Systems Applications
Faculty	Mr. A.V. Ramana Murty	Deutek Controls India Ltd.	Mr. A.V. Ramana Murty
10.30 am to 10.45 am	Tea break		
10.45 am to 11.30pm	1) Architecture of Industrial Automation Systems & Control	Principles of Hydraulics Systems & Application	RFID Technology & Applications
Faculty	IIT Delhi		ID Tech Solutions
11-30pm to 12:15pm	2) Sensor Technology		PC Control Systems
Faculty	M/S Keyence		Pyramid Control Systems Pvt Ltd
12:15pm to 1:00pm	Error control Vs Defect Control	Mr. A. V. Ramana Murty & Mr. Deepak Agarwal	Role of Automation in Industry 4.0
Faculty	Mr. A.V. Ramana Murty	Mr. A. V. Ramana Murty & Mr. Deepak Agarwal	Mr. Deepak Agarwal
1.00 to 2.00 pm	Lunch		
2.00 to 3.30 pm	Pneumatics Lab Exercise	Assignment on Modular Production System	Six Station Modular Production System Demonstration
Faculty	Festo/ACMA Lab Co Ordinator Mr. Deepak Jain	Festo/ACMA Lab Head Mr. Deepak Jain	Festo/ACMA Lab Co Ordinator Mr. Deepak Jain
3.30 to 4.00 pm	Tea Braek		
4.00 to 5.00 pm	Hydraulics Lab Exercise	Sensors Lab Exercise	Servo Control System Lab Exercise
Faculty	HYDAC/ACMA Lab Co Ordinator Mr. Deepak Jain	Festo/ACMA Lab Co Ordinator Mr. Deepak Jain	Festo/ACMA Lab Co Ordinator Mr. Deepak Jain
5.00 to 5.30 pm	Certification Ceremony		

I. Period:

4th September to 6th September, 2018

J. Timing:

09:30 am to 05:30 pm

K. Batch Size:

25 Participants

L. Fees for Participation (in INR):

(For 3 days course Non-Residential)

For ACMA Member / ACT-UNIDO Cluster Members (Non -Members will be charged 10% extra on Program Fees)

INR 5,000/- + 18% GST as applicable per participant

(If a company/institution enrolls 2 or More participants, a discount will be applicable & the fee would be **INR 4,000/- + 18% GST as applicable per participant**)

Tea and Course material is included in above course fee.

Lunch is available at ACoE cafeteria at nominal charges of INR 180/- + GST per lunch.

Looking for skilling your Employee?

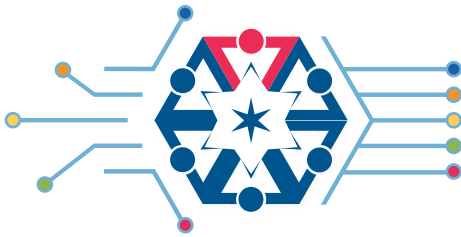
1st Batch Overbooked



ACMA Centre of Excellence is ready to Design courses as per your need.

Contact : **M. S. Raginee Singh**

e: raginee.singh@acma.in, m: +91 99991 97693



ACMA TECHNOLOGY SUMMIT & EXPO 2019 (4th Series)

29th & 30th January 2019

The Disruptive Innovation Challenges

4TH SUMMIT OVERVIEWS- FLOW & KEY SESSIONS

- National & International Speakers - Our speakers experience and their achievements in their core areas are key differentiators which sets a tune for each session. They will share both, Failures and successes, which in turn are helpful for participants to take next step more cautiously. Challenges are there to make all of us strong to face it.
 - Technology Session - Clear ideas to embrace right technology at Right time by right team will be the outcome of this session. Live case studies make these sessions livelier from well-known national & international technology players.
 - Innovation Sessions - Prime Minister of India recently spoke on the need of Innovation, not at manufacturing sector but each sector which are affecting life of common man. You will witness such latest innovations making big changes in common man's life and manufacturing sector too.
- Innovation Zone - Witness latest in 3D Printing, Robotics, Automation, VR, Sensors, Measurements, Logistics, Light weighing, High speed manufacturing and many more. Participants will get opportunity for "TOUCH and FEEL" Themselves.
- Global Business Pavilions - Business growth is a function of technology and Global pavilions bring buyer and seller at same platform.
- Virtual Reality experiencing Zone - Experience ACMA' achievements in Zero Defect Quality, have learning experience and listen from horses' mouth for their achievements by virtual tour on shop floor. There will be many more experiences which you can have at summit.
- ACMA Awards 2018 Presentation Ceremony - Celebrating Excellence.
- Panel Discussion - Preparing Supply Chain for Business Transition Model.
- Live interviews of Successful Business leaders (National & International) - Change Makers
- Technical White Paper Presentations.
- Business opportunities in Japan, UK, Germany and USA.
- Successful Case studies presentations by ACMA Gold Award Winners.
- Stalls / Exhibitions: Start Up innovation Expo - Meet the innovators which present you both, a total disruption and its solution.

KEY HIGHLIGHTS

EXPERIENCE SHARING BY ACMA GOLD AWARD WINNERS 2018

Today, ACMA Awards are one of the most sought-after recognitions in the Indian auto component industry.

These were instituted in year 1966 and are presently conferred for excellence in Export, Technology, Quality and Productivity, Manufacturing, Supplier Development, Human Resource, Consistent Performing Company of the Year, Automation, Excellence in HSE (Health, Safety & Environment), Business Growth, Digitization, Resource Optimization and Make in India Drive.

TECHNICAL WHITE PAPERS & KEYNOTES

National & International experts will present Papers & Keynotes on theme.

AWARDS

- ▶ ACMA Awards 2018 - Celebrating Excellence
- ▶ Best Exhibitor Awards
- ▶ ACMA Young Talent Awards
- ▶ Appreciation of Slogan Competition Winners
- ▶ Best Paper on Disruption
- ▶ Best Film / Poster / Collage on Disruption



BE A PART OF THIS MEGA SUMMIT

Plenary Sessions

Cross Learning

Knowledge Networking

Keynote Addresses by Industry Experts

Transformation Sharing by Companies

Platform to interact with Key
Manufacturing Professionals

Opportunity to meet a Large gathering
of Auto Sector People under one Shelter

Stalls / Exhibitions - Start Up
Innovative Products / Services

Successful Case Studies

Appreciation / Recognition

WHY TO ATTEND THIS SUMMIT?

Audience

Automotive sector companies, OEMs & Component manufacturers, Leaders from Corporates, Starts up, Institutions and award winners.

Huge Marketing opportunity

Opportunity to brand your products / services.

Mega Publicity

ACMA's IMPACT magazine, Websites and live updates on social media like Facebook, twitter takes to larger audience quickly.

Digital Platform

www.acma.in and www.digitalact.com are preferred by auto sector and you can witness this summit live. (For more details, keep visiting both websites).

WHO SHOULD JOIN?

- ▶ CEOs, Top Management, Senior Executives, Practicing Engineers, Supervisors, Associates from manufacturing & service industries.
- ▶ Manufacturing Professionals who want to achieve superior performance in today's challenging business environment.
- ▶ Business Development Heads/Plant Heads/Production Heads.
- ▶ Technical Professionals/Industry Consultants.
- ▶ Institutes/University Professors and Students.
- ▶ Other Industry & Service Representatives.

Brand Promotion Opportunities

The Summit provides best platform to companies / service providers to promote their brand in auto component industry. There are various "Brand Promotional Opportunities" available for the Summit. Interested companies / service providers may communicate their interest to us in advance.

Exhibit- Innovation Expo at Summit

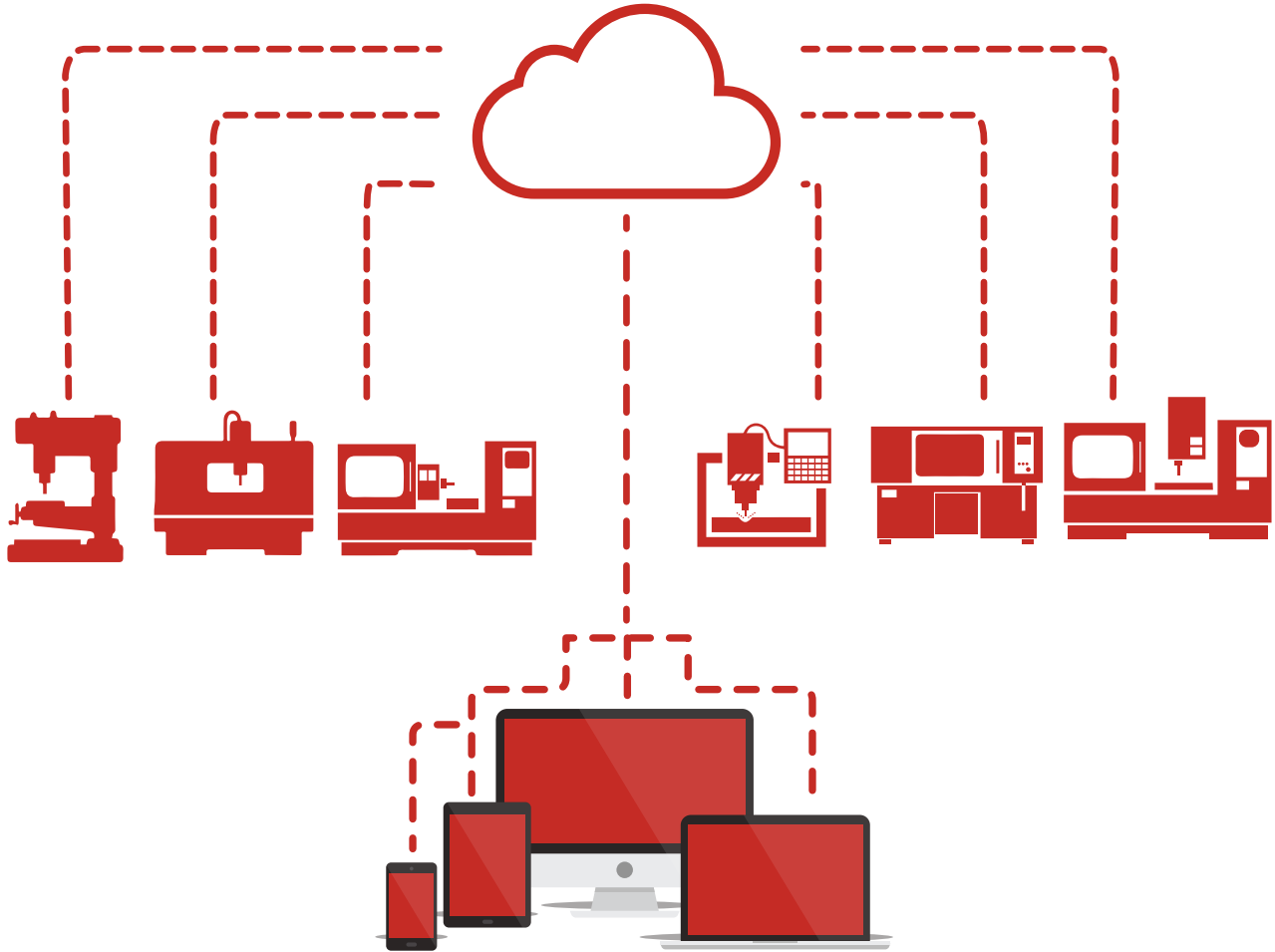
Do you believe in your offerings? if Yes, ACMA Summit is the right platform for you.

As there are a limited number of stalls available for startup exhibitors, Book your stall today!

If you are looking for another branding option / presenting on stage, do write to us and we will help you in this regard at best possible way.

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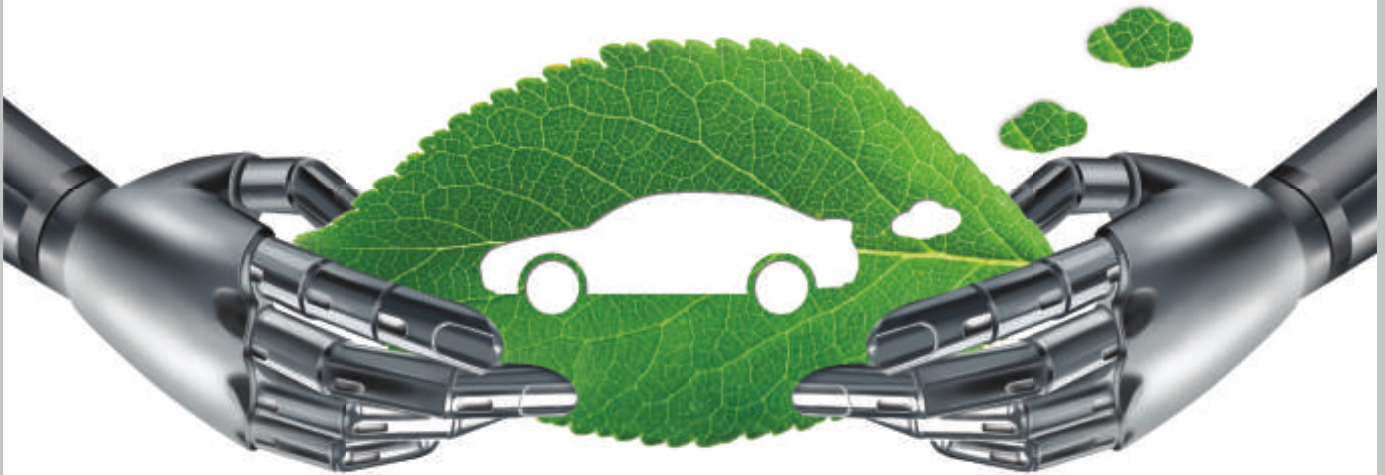
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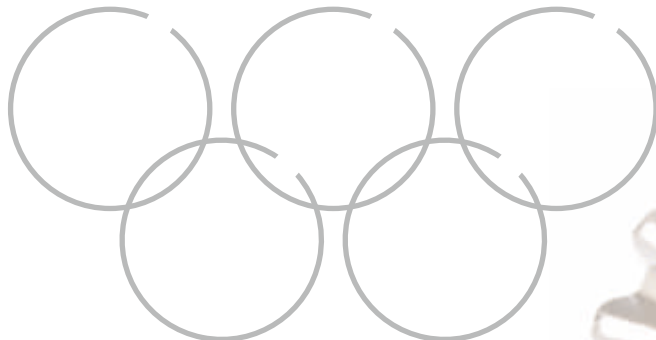
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ACMA Technology Summit & Expo 2019 (4th Series)

The Disruptive Innovation Challenges

Make in India Initiative

29th & 30th January 2019,
Hotel JW Marriott, Senapati Bapat Road, Pune.

Contact us to know more about ACT Clusters & Programs

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ACMA

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