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Vendor TPM Implementation at Indian Automobile Electrical and Electronics Components Manufacturing Organization

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Abstract: In this era of intense competition, supplier management holds key importance as it is not only important from cost management i.e. inventory management, reliability, ,faster delivery to customers Flash Electronics India Pvt.Ltd.is leading Tier 1 supplier of Automobile electrical and electrical components for Bajaj Auto Ltd, Volkswagen India Ltd, General Motors India Ltd, Dellarto India .It adopted TPM as strategic Initiative for achieving manufacturing excellence .It has was awarded with "BAL TPM EXCELLENCE' Award . As a part of Journey towards excellence FEIPL adopted a new initiative of Implementing TPM at vendors end .In this Paper we will discuss Framework of vendor TPM and results obtained for pilot lot

Keywords: TPM, Supplier Development, Manufacturing Excellence.

NOMENCLATURE

TPM	Total Productive maintenance
FEIPL	Flash Electronics India Pvt.Ltd.
BAL	Bajaj Auto Ltd.
TS	Technical specifications
ISO	International standards organization

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I. INTRODUCTION

Suppliers (vendors) are at the heart of any organization's processes and activities. Hence, supplier management is very critical from organization success in market and making profits. Role of procurement function is now changing to 'Strategic sourcing' .Supplier management is crucial from following perspectives

1. To mitigate risks
2. To optimize performance
3. To reduce costs
4. Create loyal relationships
5. To increase administrative efficiencies
6. To increase on boarding speed
7. To protect and enhance brand value

M/s Flash Electronics (India) Pvt. Ltd. is one of the established unit in Indian market and a trusted supplier to major Indian two and three wheeler manufacturers. Major customers include Bajaj Auto, General Motors, and Volkswagen to name a few

As FEIPL is into manufacturing of Electrical and Electronic component for automobile sectors, It manufactures Magnetos, alternators, spark plug caps, sensors required for two wheelers as well as three wheelers

TPM stands for total productive maintenance; it is Japanese philosophy which is used to reduce 'waste' or losses occurring in an organization. TPM works to maximize equipment effectiveness of the equipment. It strives to maintain the equipment in optimum condition in order to prevent unexpected breakdown, speed losses and quality defects occurring from process activities.

II. FRAMEWORK OF VENDOR TPM

FEIPL has supplier base of nearly 460 suppliers in various category like Press parts ,Machined components ,Casting and forging components, Electrical components such as PCB, wiring harness ,Insulating sleeves .In order reduce cost of entire supply chain strategic decision to implement vendor TPM was initiated .

As a part of this initiative, rationalization study of suppliers was carried out .From database of existing suppliers, they were divided into LTS (Long Term Suppliers) and Non –LTS supplier's .Criteria for deciding LTS is as Follows

1. High business volume
2. Product /process criticality
3. Bottleneck to quality and delivery
4. Quality certifications such as ISO 9001 ,TS 16949

Table 1: Rationalization data of suppliers

Material Category	BAL Approved	FEIPL Approved	Grand Total	After Rationalization
Press Parts	3	17	20	10
Rubber	1	10	11	4
Plastic parts	1	7	8	3
Electrical Assly	1	2	3	3
Machining	3	23	26	15
Bearing & Roller	4	1	5	3
EI Insulation Powder	0	1	1	1
Copper	0	4	4	1
Fastners	0	6	6	3
Heat Treatment	0	1	1	1
Magnets	0	3	3	3
Paintings/Coatings	4	1	5	1
PCB	0	1	1	1
Sintered Parts	0	2	2	2
Wire Terminals and springs	1	4	5	2
Wiring Harness and sleeves	1	5	6	5
Grand Total	**19**	**88**	**107**	**58**

Expectations which were set from rationalized suppliers are as mentioned below

- Effective organization structure
- Vision towards component to sub-assembly
- Should takes ownership of product
- Loyalty and transparency
- System oriented approach
- Geographical presence with FEIPL
- Continual improvement through technological up gradation

After rationalisation of vendors, they were further categorised region wise i.e. as per the location. It helped to track the distances of FEIPL to supplier in order to overcome logistics issues, also to plan inventory at warehouse at walunj Aurangabad and at plant located at Chakan, Pune

Table 2: Region wise supplier data

Material category	Sub material category	Region A Pune	Region B A'bad-Satara – Nasik - Mumbai	Region C Rest part of India	Grand Total
Press Parts	Press parts	3	0	0	3
Plastic & Rubber parts	Plastic parts	2	1	0	3
	Rubber parts	1	1	0	1
Casting & Forging	Casting	4	2	0	0
	Forging	5	0	0	0
	Electrical assembly	1	0	0	0
Electrical Assly.	Wiring terminals and assembly	2	1	0	
	Wiring harness	4	1	0	1
	Insulating and sleeves	2	1	0	3
Machining	Machining	12	2	1	15

III. TPM IMPLEMENTATION MASTER PLAN

Table 3: TPM implementation master plan

Number of key vendors in various categories vendor decided based on LTS

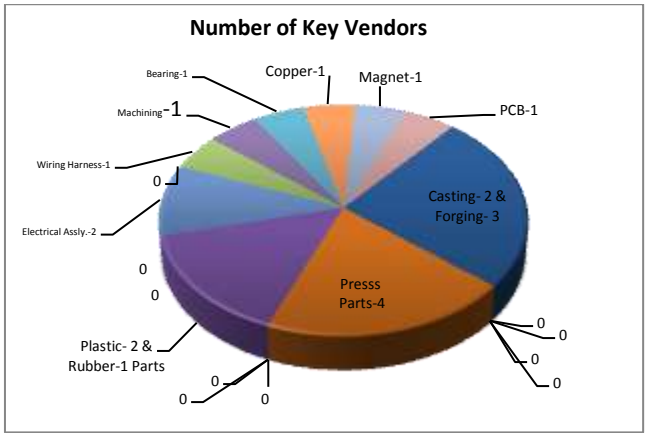

Fig 1: Category wise supplier data

OBJECTIVE OF TPM IMPLEMENTATION

P Productivity Improvement

Q To Improve Quality

-Zero customer complaints

(EFR/Warranty/Line rejection)

C Cost Reduction

D 100% delivery compliance

-Zero line loss at FEIPl

- On time delivery

–reduction in inventory

S Zero accidents

-Compliance with regulatory requirements

M Employee participation and involvement

-Nurture kaizen culture

- Suggestion scheme activity

METHODOLOGY

After rationalization detailed action plan and methodology was formulated to implemented TPM at key vendors .Methodology is as follow

- Announcement of TPM cluster by FEIPL management
- Awareness Training
  - 5S & basic TPM awareness
  - TPM 5 Pillars (JH,PM,QM,KK,SHE)
- Establish TPM organization structure
- TPM declaration by business partners
- JH workshop (step 1,2,3) & Implementation

  Setting TPM Policy and targets

  Manager Model machine activity

  P-Q-C-D-S-M target finalization
- Activation of JH,KK,PM,QM pillar on model machine
- P-Q-C-D-S-M targets and Master plan for plant
- TPM kick off
- Implementation of 5 pillar activity across plant

For better implementation, idea for FEIPL TPM Award was also put forth. Under this award supplier fulfilling the criteria to be awarded

Table 4: Flash TPM Award criteria

Area	Parameter	UOM	Award Target (To be decided)
P	OEE	%	85% with set up change 90% without set up change
	Assembly line OEE	%	90%
	output/man	Nos	Min 10% up YOY
	output/hr	Nos	Min 10% up YOY
	Breakdown occurances & time reduction	Nos	Min 70% reduction
	No of machines in ch step 3	Nos	A rank machines-100%
		Nos	B rank machines -50%
		Nos	C rank Machines -25%
Q	Customer complaints (PPM)	PPM	Zero straight 6 months & <1000 PPM in other months
	Inhouse rejection (PPM)	PPM	70% reduction
	End customer-warranty/EFR/Line return	PPM	Zero
C	Power cost	Rs lacs	10% reduction
		cst/unit	10% reduction
	Rejection and rework cost	Rs lacs	50% reduction
		cst/unit	50% reduction
	Consumables cost	Rs lacs	10% reduction
		cst/unit	10% reduction
D	Delivery schedule adherance	%	100% adherance to schedule
S	Major accidents	Nos	zero
	Minor accidents	Nos	zero
	Green bed area	%	25%
H	Impact on occupational health	Nos	Zero
E	Compliance to MPCB and legal norms		100%
M	Kaizens/employee/month	Nos	1
	Training	hrs/shift	2 mandays /month
	Dev lead time reduction	%	10%
	First time right compliance	%	100%

Review mechanism for vendor TPM implementation also formulated and it is as follows

Table 5: Review Mechanism

Sr.No	Steps	Freuency
1	Suppliers to attend trainings at FEIPL	Once in a Month
2	FEIPL team to visit supplier for training /workshops	Once in a Month
3	FEIPL team to review TPM implementation status at supplier end	Once in a Month

RESULTS

Vendor TPM was initiated at Shriram Rubbers India pvt.ltd .After successful implementation of TPM results were very encouraging

Tangible Benefits

On Time delivery improved from 78% to 95 % .which is very good result

Fig 2: On Time delivery improvement

Rejection of supplier material at incoming stage reduced from 6648 PPM to 1230 ppm .This improves reliability of material provided by supplier

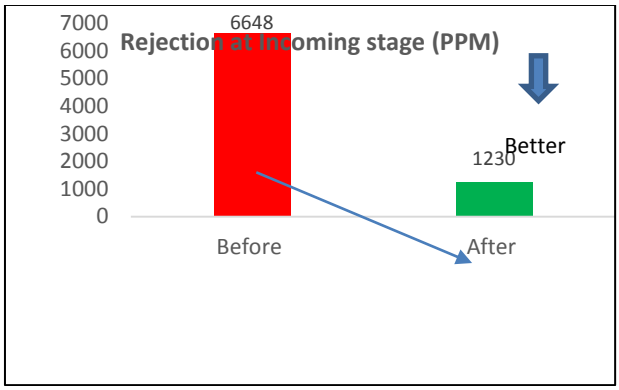

Fig 3: Rejection at incoming stage improvement.

Intangible Benefits

1. OEE of supplier equipment improved
2. Morale of Employees enhanced
3. Cost reduction at vendor end also help improve product cost of FEIPL products
4. Culture of continuous improvement implemented at vendor end

CONCLUSIONS

Rejection of supplier material at incoming stage reduced from 6648 PPM to 1230 ppm .This improves reliability of material provided by supplier

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REFERENCES

[1] Jonathan Wee Jian Meng et.al.'Survey results of Total Productive maintenance effects on manufacturing performance in Malaysia Electrical and Electronics indus', Jurnal Mekanikal Vol.10, no.35, (2012) 82-99
[2] Jain Abhishek et.al,' Improvement of Indian SMEs through TPM Implementation – An Empirical Study , Proc. of Int. Conf. on Advances in Mechanical Engineering, AETAME (2013) 786-792
[3] Jain, A., Bhatti, Rajbir, Sharma, S.K. and Jain, R. (2012b) "TOTAL PRODUCTIVE MAINTENANCE (TPM) is an effective tool for minimization of downtime of machine, production losses and scrap – in context of Indian industries " Proceedings of International Conference on Emerging Trends in Engineering and Technology, April 6-7, 2012, Teeranthkar Mahaveer University, Moradabad (U.P)
[4]Haddad Tamer et.al.'The Applicability of Total Productive Maintenance for Healthcare Facilities: an Implementation Methodolog'International Journal of Business, Humanities and Technology Vol. 2, No. 2,(2012) 148-155,
[5] Rodrigues, M. and Hatakeyama, K. (2006), "Analysis of the fall of TPM in companies", Journal of Materials Processing Technology, Vol. 179 Nos 1-3, pp. 276-9
[6] Panneerselvam, Murugadoss K., (2012), "TPM implementation to invigorate manufacturing performance: an Indian industrial rubric" International Journal of Scientific & Engineering Research, Volume 3, No. 6, pp. 1 – 10.
[7] Dal, B., Tugwell, P. and Greatbanks, R. (2000), "Overall equipment effectiveness as a measure for operational improvement: a practical analysis", International Journal of Operations & Production Management, Vol. 20 No. 12, pp. 1488-502.
[8] Poduval Prashant et.al.'Barriers In TPM Implementation In Industries 'International Journal of scientific and Technology research Vol. 2, ISSUE 5, MAY 2013
[9] Katkamwar Sarang et.al. 'Study of Total Productive Maintenance & Its Implementing Approach in Spinning Industries', International Journal of Engineering Trends and Technology (IJETT) Vol.4, (2013) , 1750-1754
[10] DharP.L.,SinghS.K, 'Studies on solid desiccant based hybrid air-conditioning systems', Applied Thermal Engineering Vol.21 (2001) 119–134.
[11] Bosman, H. (2000). "TPM Activities toward Winning the World Class Award." JIPM TPM 16: 4-7.
[12] Nakajima, Seiichi. (1989). Introduction to TPM. Cambridge, Mass.: Productivity Press.

[13] Ahuja, I.P.S. and Khamba, J.S., (2007), "An evaluation of TPM implementation initiatives in an Indian manufacturing enterprise", Journal of Quality in Maintenance Engineering, Vol.13, No. 4, pp. 338–352.
[14] C. Madhusudhana Rao et.al 'Delivery performance measurement in an integrated supply chain management: Case study in batteries manufacturing firm'Serbian Journal of management, Vol.6, No. 2,(2011) pp. 205-250.
[15] Pandit Shamuvel et.al 'Application of Theory of Constraints on Scheduling of DrumBuffer-Rope System'IOSR Journal of Mechanical and Civil Engineering
ISSN: 2278-1684, PP: 15-20
[16] Ranjan Raj Urs S et.al 'On-Time Delivery Improvement Using Lean Concepts - A Case Study of Norglide Bearing' International Journal of Innovative Research in Science, Engineering and Technology Vol. 3, Issue 6, (2014),13349-13354
[17] Agarwal N, "Review on just in time techniques in manufacturing systems, advances in production engineering and management scientific paper", Vol. 2, Issue 2, p101-110, 2010.

