

Implementation of TQM Concept to Improve Performance of M/S Hi-Tech Metal Forming (1)

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Abstract: *We had vision to implement the TQM at M/S Hi-Tech metal Forming Indore. To implement the TQM, we had tried to capture the Customer voice and act accordingly to fulfill the needs and requirements of customer. We had done the detailed study of the customer needs and detailed study of the existing process going on in M/S Hi-tech. we had studied the M/S Hi-tech process of working and working culture. We had gone through in detail about what they manufacture, how they manufacture and why they are not in line with the customer needs. We had decided control KPI'S (Key Performance Indicators) as per customers needs watch KPI's to achieve those control KPI'S. We set the targets for those control and Watch KPI'S and as a result we achieved the targets in last. We used the improvement tools for achieving those targets. Major tools uses are pareto analysis, Hoshin kanri, QRQC (Quick response quality control), PDCA (Plan Do Check Act) and many more tools.*

Keywords: TQM, Metal Forming, QRQC, PDCA, KPI'S

1. Introduction

1.1 Total Quality Management (TQM)

Total Quality is a description of the culture, attitude and organization of a company that strives to provide customers with products and services that satisfy their needs. The culture requires quality in all aspects of the company's operations, with processes being done right the first time and defects and waste eradicated from operations.

Total Quality Management, TQM, is a method by which management and employees can become involved in the continuous improvement of the production of goods and services. It is a combination of quality and management tools aimed at increasing business and reducing losses due to wasteful practices.

2. Objective and Problem Formulation

2.1 Objective of Project

To Improve the Vendor Quality Performance of M/S Hi-tech Metal forming by using the concept of TQM Model (Total Quality Management). In this project we will use the TQM model or 4 pillars of TQM model and will decide accordingly the contents for 4 pillars on the basis of industry nature and behavior.

2.2 Measures of Performances

- Reduction in PPM
- Decrease in line loss at Customer end (VECV)
- Increase in productivity

2.3 Deciding the parameters or content for Project execution based on TQM Model

1) Satisfying Customer

A customer will be delighted by a Business Partner / Vendor if he will deliver the below mentioned requirement.

- Zero PPM (parts per million).
- Zero Line Loss (due to quality issues).
- On time delivery i.e. 100% delivery compliance (or zero line loss due to delivery compliance)
- Increase in Productivity
- Reduction in their component cost

2) Systemic Processes

- Study the organization behavior.
- Study the nature of products manufactured.
- Study the type of industry and process followed.
- Data collection.
- Pareto analysis of collected data.
- Vendor control KPI (Key performance indicators)
- Target Setting against Control KPI
- Deciding the Watch KPI's and target setting
- Gap analysis and their Format design.
- Execution activity to fill the gaps.
- Data presentation and result declaration.

3) People

Organization propels plays a very important and the vital role for implementing the TQM. Without their support and knowledge TQM implementation is not possible. Everybody needs to be committed for their roles and Responsibilities during the TQM implementation. TQM implementation is not a project implementation; it's a cultural change in the organization that makes it fruitful and effective. To get the results training needs to be identified for the peoples. Maximum training is given to

them on job called as on job training. Responsibilities, ownership and faith is developed among employs to get the results. Rewards system also takes place to encourage the employs.

- MD (Managing Director) - MD commitment is very important for TQM implementation.
- Plant Head – Plays the most important role in TQM implementation.
- Functional heads –
- Supervisors
- Working hands

4)Improvement Tools used

- Pareto analysis
- Hoshin-Kanri (KPI sign off Sheet or a Review Mechanism)
- PDCA (Plan DO Check Act)
- 5 S concept
- QRQC (Quick Response Quality Control)
- Training (Top management, Staff and working hand)

3. Methodology

3.1 Systemic Processes

A. Study the organization behavior

- History
- Turnover
- Facilities available.
- Type of Customer
- Future for-cast or Vision.

B. Nature of Product

Looking at the range of products manufactured by M/S Hi-tech Metal forming we can say that it manufactures Heavy component, Medium range component and Small press components as well.

C. Type of industry and Process followed

Process Followed (Flow of component manufactured)

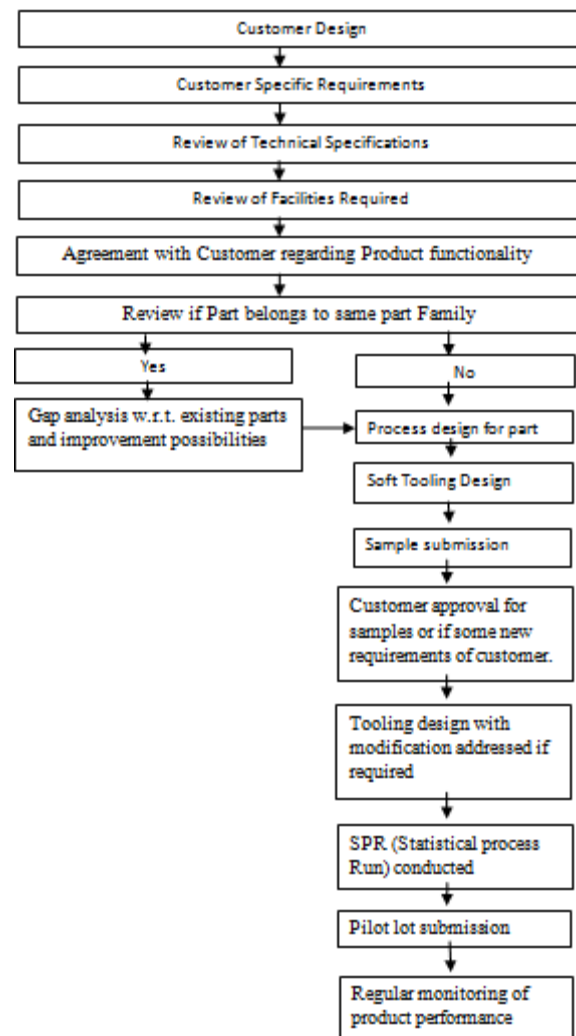


Figure 1: Process flow Diagram for NPD parts

D. Data Collection

- Data collection of PPM Trend for M/S Hi-tech of last 1to 1.5 years.
- Data collection of line losses Trend for M/S Hi-tech of last 1to 1.5 years.
- Data collection of DOL conversion Trend for M/S Hi-tech of last 1to 1.5 years.

E. Pareto Analysis of collected data

A technique used for decision making based on the Pareto Principle, known as the 80/20 rule. It is a decision-making technique that statistically separates a limited number of input factors as having the greatest impact on an outcome, either desirable or undesirable. Pareto analysis is based on the idea that 80% of a project's benefit can be achieved by doing 20% of the work or conversely 80% of problems are traced to 20% of the causes.

- Rejection data to strike first for PPM control.
- Line loss contributing parts to strike first to control line loss.

- Least number of times and min number rejected parts to strike first for DOL conversion.

F. Vendor Control KPI's

- PPM Reduction
- Line loss reduction
- Increase in Productivity
- Decrease in product cost (Optional)

G. Target setting against Control KPI and Gap analysis

- Target setting for PPM
- Target setting for Line stoppage
- Target setting for DOL improvement

After the data collection analyzing its trends, nature and deciding the control KPI'S of M/S Hi-tech metal forming. We had set the targets of the control KPI's. These controlled KPI,s are not directly in control of the Supplier. Controlled KPIs are the performance indicators which are declared by the Customer on the basis of their performance. So to achieve the performance indicators or control KPI,S supplier need to define some activities or Watched KPI,S. Deciding these watched KPI,S is very important, so that these should be synchronized with the controls KPI,S and gives the result in positive direction. Supplier is free to decide their watched KPI, as for the same type of control KPI,S different suppliers may have different watched KPI depending upon their nature of product, type of industry, working environment, Working style etc. Basically supplier has to decide on which area he should strike or decide as a watch KPI so that he could achieve the control KPI targets. Once the watched KPI get decided, target setting of watched KPI is set so that it would be continual improvement.

H. Deciding the watched KPI and Target Setting for M/S Hi-tech Metal forming

- In-house PPM for poor Quality i.e.
- Rework PPM
- In-house rejection PPM
- Receipt PPM
- PDI effectiveness
- Number of Kaizen
- Number of Poke-yoke
- layout Inspection
- Detection improvement activity.
- Gauge and instrument calibration
- Internal process audits
- Tool maintenance
- 1 S and 2 S implementation plan.
- Air tank % rework.

I. Gap analysis and their format design.

After analyzing the data we had divided the whole industry which affects the quality of product and performance at customer end into 11 major areas. We had designed the

roadmap, process and formats to fill the gap of those 11 areas.

11 major roadmaps made for 11 areas are mentioned below.

- In process Roadmap
- Jig Fixture Validation Roadmap
- Tooling maintenance Roadmap
- Layout Roadmap
- Painting and plating Roadmap
- PDI Roadmap
- RQC Roadmap
- Calibration Roadmap
- Machine maintenance Roadmap
- Packaging Roadmap
- Store, Identification, dispatch, Poke-yoke, kaizen, Route card, Roadmap

These above mentioned 11 areas need to be corrected and their gaps had to be filled.

To get the gaps we had designed the formats and made the time plan for the each and every area to get the results on time.

J. Execution Activity to Fill the Gaps

To execute the activity some tools are used. Although above mentioned formats and roadmaps if followed rigorously than its more than enough to get the result but to know that we are working in right direction we need to have the review mechanism and training to the user and executers so that it would work effectively.

We had made some mechanism to have the results.

- PDCA (Plan Do Check Act)
- QRQC Quick response quality control.
- Hoshin Kanri (A Review Mechanism)
- Plan Do Check Act.

In Plan Do check act. First the things have to be planed as we had done during the studies and made the plan. Then we had take the corrective actions and then after we had started the close monitoring to check whether we had the right corrective action and we act or result declare.

- QRQC (Quick Response Quality Control)

To get and achieve the results as we had planed i.e. PPM target, line loss targets and DOI targets we need to act fast so that we get the confidence at customer end.

To get the confidence at customer end we need to act fast and rest of the activity will go side by side so that system and working environment get change and discipline comes in the system.

Each and every problem need to be discussed either of in-house or at customer end or at sub-supplier end.

- Hoshin Kanri

Hosin Kanri is a review mechanism of monthly for controlled and watched KPI. This gives us the clarity about what we had missed and what next have to be done for improvement. This Hoshin Kanri is used to share the status of KPI, S to customer.

CONTROLLED KPI MONITORING SHEET (Hitech)																				
KPI CATEGORY		Base Data 2011 (Q4)	Base Data reference 2012 (Q4)	Data reference	Jan'13	Feb'13	Mar'13	Q1	Apr'13	May'13	June'13	Q2	July'13	Aug'13	Sep'13	Q3	Oct'13	Nov'13	Dec'13	Q4
Controlled KPI	PPM	4363	3556	PPM-Actual	3156	2921	2732	2936	2511	1986	1623	2040	1395	1285	1051	1243	429	306	181	305
				PPM - Rolling								2488	2194	1922	1641	1641	1294	1014	775	775
				PPM - Target	2500	2500	2500	2500	1500	1500	1500	1500	1000	1000	1000	1000	500	500	500	500
				RYG Status	R	R	R	R	R	R	R	R	R	R	Y	R	G	G	G	G
	Line stoppage LD	210 Min	165 Min	LD-Actual	75	45	50	57	40	30	28	33	28	25	15	23	30	0	5	12
				HD-Actual	45	30	20	32	25	20	30	25	15	15	10	13	15	0	15	10
				Aggregate-Actual	30	40	35	35	50	45	20	38	15	5	5	8	5	0	0	2
				Total-Actual	150	115	105	124	115	95	78	96	58	45	30	45	50	0	20	23
				Total-Target	140	140	140	140	105	105	105	105	63	63	63	63	32	32	32	32
				RYG Status	R	G	G	G	R	G	G	G	R	G	G	G	R	G	G	G
	DOL %	85 pasrts	108 parts	Total No of Parts Plan	113	118	123	123	128	133	138	138	143	148	153	153	158	163	168	168
				No of DOL parts	110	113	115	115	121	124	126	126	135	142	148	148	155	162	165	165%
				DOL % ACTUAL	61%	63%	64%	64%	67%	69%	70%	70%	75%	79%	82%	82%	86%	90%	92%	92%
				DOL % TARGET	70%	70%	70%	70%	75%	75%	75%	75%	80%	80%	80%	80%	90%	90%	90%	90%
				RYG Status	R	R	R	R	R	R	R	R	R	R	Y	Y	Y	Y	G	Y

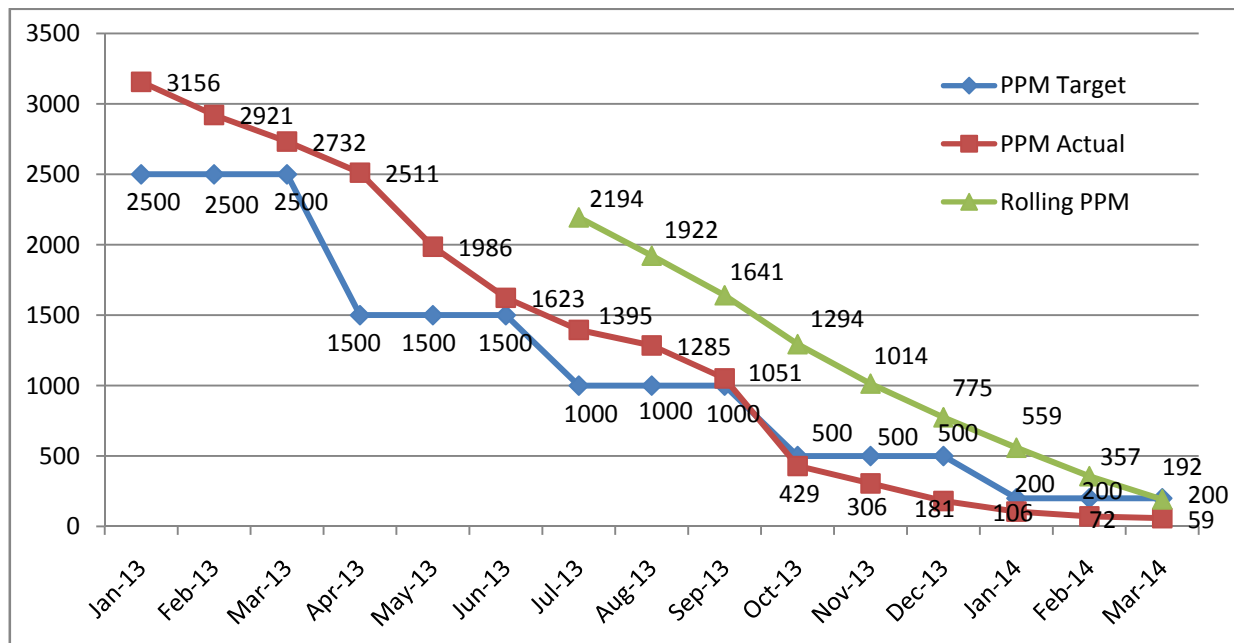
Status of Watched KPI. Table No-16

WATCHED KPI MONITORING SHEET (Hitech)																			
KPI CATEGORY		Frequency	Data reference	Jan'13	Feb'13	Mar'13	Q1	Apr'13	May'13	June'13	Q2	July'13	Aug'13	Sep'13	Q3	Oct'13	Nov'13	Dec'13	Q4
Watched KPI	Inhouse PPM		TARGET	2000	2000	2000	2000	1000	1000	1000	1000	500	500	500	500	200	200	200	200
			ACTUAL	3215	2896	2931	3014	2546	2647	2178	2457	2057	1896	1547	1833	1036	507	312	618
			RYG Status	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	Receipt PPM		TARGET	1000	1000	1000	1000	800	800	800	800	500	500	500	500	200	200	200	200
			ACTUAL	1748	1562	1687	1665	1249	1156	1065	1156	896	743	561	733	326	248	157	243
			RYG Status	R	R	R	R	R	R	R	R	R	R	Y	R	R	Y	G	Y
	PDI Effectiveness		Total no of INVOICE made	148427	142876	139463	430766	141538	114297	87008	342843	14412	11219	14279	39910	14598	14780	12148	41526
			Total No of PDI made	142489	138590	121333	402412	127384	112297	97223	336904	14412	11219	14279	39910	14598	14780	12148	41526
			RYG Status	R	R	Y	Y	Y	Y	G	G	G	G	G	G	G	G	G	G
	No Of Kaizen		TARGET	5	5	5	15	5	5	5	15	5	5	5	15	5	5	5	15
			ACTUAL	6	8	4	16	8	7	8	23	5	7	9	21	6	7	3	16
			RYG Status	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	No Of Pokayoke		TARGET	1	1	1	3	1	1	1	3	1	1	1	3	1	1	1	3
			ACTUAL	2	2	2	6	2	2	2	6	2	2	2	6	2	2	2	6
			RYG Status	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

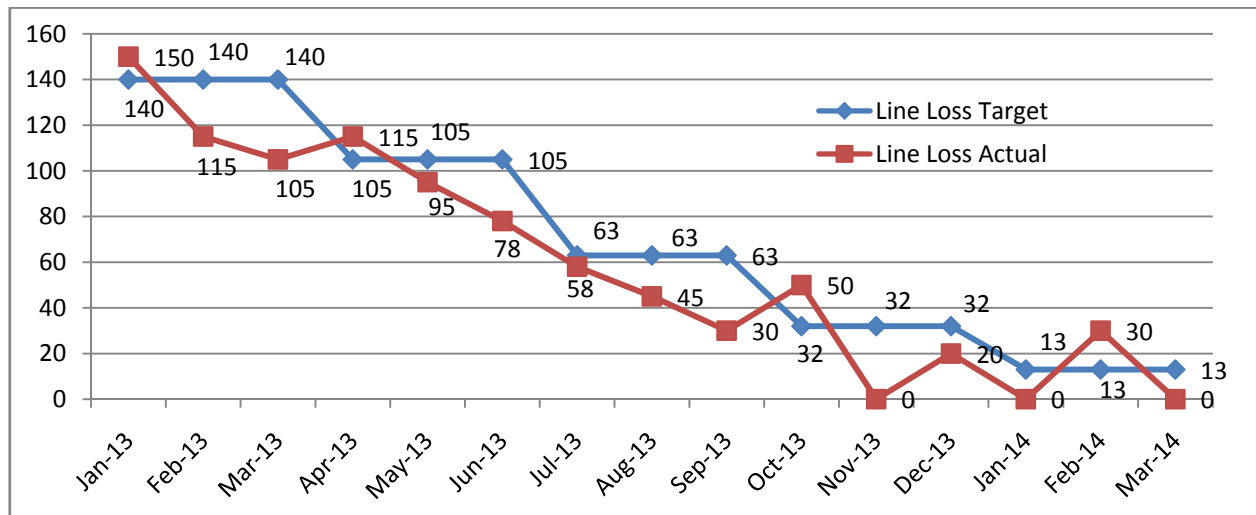
WATCHED KPI MONITORING SHEET (Hitech)																				
KPI CATEGORY		Frequency		Data reference	Jan'12	Feb'12	Mar'12	Q1	Apr'12	May'12	June'12	Q2	July'12	Aug'12	Sep'12	Q3	Oct'12	Nov'12	Dec'12	Q4
Watched KPI	% of parts covered in layout inspection			lay out planned in No's	12	12	12	36	12	12	12	36	12	12	12	36	12	12	12	36
				lay out Actual in No's	12	12	12	36	12	12	12	36	12	12	12	36	12	12	12	36
				No of NC'S found	2	3	8	13	10	3	4	17	4	3	5	7	2	5	3	10
				No of Nc's closed	2	3	8	12	10	3	4	17	4	3	5	7	2	5	3	10
				% OF ncCLOSED	100%	100%	100%	92%	100	100	100	100	100%	100%	100%	100%	100%	100%	100%	100%
				RYG Status	G	G	G	Y	G	G	G	G	G	G	G	G	G	G	G	G
	Detection improvement activity			Gauges planned	5	5	5	15	5	5	5	15	5	5	5	15	5	5	5	15
				Gauges Made	7	6	4	17	8	7	5	20	4	9	5	18	6	8	7	21
				RYG Status	G	G	R	G	G	G	G	G	R	G	G	G	G	G	G	G
	Gauge calibration			TARGET	10	10	10	30	10	10	10	30	10	10	10	30	10	10	10	30
				ACTUAL	12	11	15	38	10	13	12	35	14	10	9	33	12	8	13	33
				RYG Status	G	G	G	G	G	G	G	G	G	G	R	G	G	R	G	G
	Internal process Audit			TARGET	4	4	4	12	4	4	4	12	4	4	4	12	4	4	4	12
				ACTUAL	4	4	4	12	4	4	4	12	4	4	4	12	4	4	4	12
				No Of NC	1	0	1	2	0	2	0	0	2	2	1	5	2	1	3	6
				No Of NC Closed.	1	0	1	2	0	1	0	0	2	1	1	4	2	1	3	6
				% of nc clousur	100%	100%	100%	100%	100%	50%	100%	100%	100%	50%	100%	80%	100%	100%	100%	100%
				RYG Status	G	G	G	G	G	R	G	G	G	R	G	Y	G	G	G	G
	Tool Maintainace			TARGET	15	15	15	45	15	15	15	45	15	15	15	45	15	15	15	45
				ACTUAL	16	18	15	49	14	18	16	48	16	17	13	46	15	18	17	50
				RYG Status	G	G	G	G	R	G	G	G	G	G	R	G	G	G	G	G
	1S/2S implimentatio n			TARGET	System not in Place				25%	50%	70%	70%	80%	85%	100%	100%	100%	100%	100%	100%
				ACTUAL					25%	25%	50%	60%	75%	80%	85%	100%	100%	100%	100%	100%
				RYG Status					G	R	R	Y	Y	Y	Y	G	G	G	G	G

Results for PPM trend from Jan-13 to Mar-14.

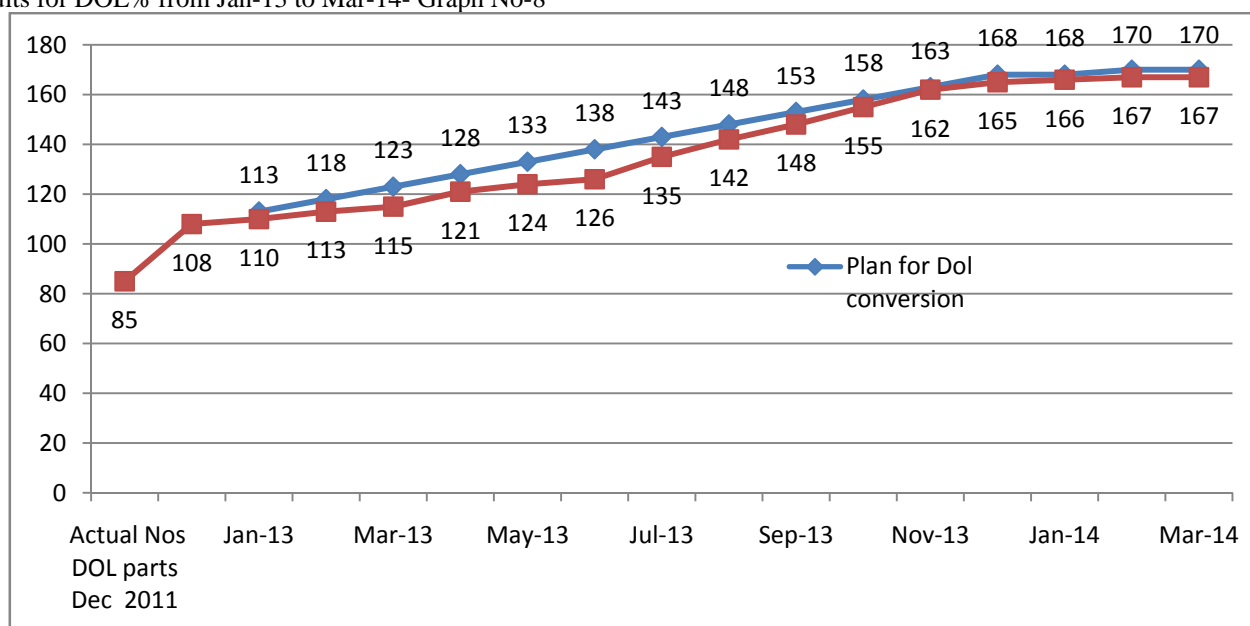
Control KPI'S Results in Graphical Forms up-to March-14



Results for line Stoppage Jan-13 to Mar-14. Graph No-7



Results for DOL% from Jan-13 to Mar-14- Graph No-8



4. Conclusion

1. In my study I had taken the concept of four pillars MODEL of TQM.
2. Satisfying Customer, Systemic Processes, Peoples and Improvement Tools
3. We had started working to implement TQM at M/S Hi-Tech. Initially we had started visiting VECV i.e. customer to understand his requirements and needs, after understanding his requirements and needs we had studied the M/S Hi-tech process of working and working culture. We had gone through in detail about what they manufacture, how they manufacture and why they are not in line with the customer needs.
4. When we had studied we had found the gap in understanding the customer requirements, competencies, facilities and working culture. We had gone through in detail about the gap analysis. We had decided to generate a systemic process with a good cultured environment that inline the customer requirements and need.
5. We made a CFT (Cross functional team) which takes the ownership to implement the TQM and decided process. We had made the detailed process how to meet the customer requirements. We had analyzed the gap, did the detailed study, designed the formats and used the improvements tools to get the desired results. To improve the competencies we organized the class room and on job trainings.
6. We had decided control KPI'S (Key Performance Indicators) as per customers needs watch KPI's to achieve those control KPI's. We set the targets for those control and Watch KPI'S and as a result we achieved the targets in last. We used the improvement tools for achieving those targets.
7. Major tools uses are pareto analysis, Hoshin kanri, QRQC (Quick response quality control), PDCA (Plan Do Check Act) and many more tools.
8. Successfully we had implemented the TQM at M/S Hi-tech and get the customer confidence, new parts business and reduced the cost of poor quality.
9. We had observed a great change in working culture which is comfortable and system driven as we had vision at the start of project. Peoples are now very comfortable and enjoying their work with low work load. Earlier work load was there due to mismatch and hotch-potch working environment.

10. My warm regards to MD Mr. Jintendra Doshi and whole M/S Hi-tech team and VECV team for support and guide. Without the support of above all this project cannot be possible to implement. TOM implementation is real bench mark of team work.

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