



**FOR LARGE AND MEDIUM
COMPANIES
(Unit level / SBU level
turnover > Rs.100 Crores)**

IMTMA - ACE MICROMATIC Productivity Championship Awards 2023

Rules & Guidelines governing the competition.

**Competition open to companies engaged in the manufacture of
Engineering products / Components.**

Contestants are advised to read the following guidelines carefully before filling in the format

- The objective of National Productivity Summit is to showcase best productivity practices in Indian manufacturing space, by sharing knowledge and experience.
 - **Participation in this competition is FREE.**
 - **Download and submit the entry form by logging on to www.productivity.imtma.in on or before 30th June 2023.** Please ensure that the file size being uploaded does not exceed 20 MB. Subsequently the hard copy of the entry duly signed and certified by the senior management should be sent to IMTMA's Bangalore office at the below address.
 - There will be separate awards for Automotive and Non-Automotive sectors.
 - Companies must submit Case study(s) that will showcase and highlight breakthrough achievements that have brought significant competitive advantage to the company. The case study(s) must clearly bring out the value creation and results achieved.
 - While companies can send a maximum of 2 entries per plant/ manufacturing location, please note that only ONE best entry shall be considered for evaluation.
 - **Project must have been implemented and put into regular operation for a minimum period of one year. The project start date must be after January 2019.** Entries that were submitted for the previous IMTMA Productivity championship competition(s) must not be resubmitted. **Such entries will be summarily disqualified.**
- Note:**
- Minor improvements, Kaizens, will not be considered. Participants are expected to submit case studies that have brought in significant improvements to their business.
 - Projects having application of standard products for productivity improvement / Service plugins that are commercially available will not be considered.
 - Companies must submit their entry(s) strictly in the below format along with **Annexure A & B.** Entries without structured information on the case study(s) stands the risk of disqualification.
- The selected case study must be presented at the National Productivity Summit 2023 scheduled on 9-10 November 2023, Chennai by a member of the Senior Management of the organization responsible for the project implementation. The presentation must be made in English language only.
 - Entries will be judged by an independent jury comprising of eminent professionals, whose decision will be final. While significant weightage will be given to the conceptualization, link to business need, associated impact, value creation to stakeholders and business sustainability parameters, the other criteria for evaluation will also include analysis, determination of requirements, generation and evaluation of alternative solutions, innovativeness and the thoroughness of planning and implementation. Neither IMTMA nor ACE MICROMATIC will have any role in judging of entries. The jury reserves the right to accept or reject an entry without assigning any reasons thereof. Therefore IMTMA is not obliged to provide reasons for rejection.
 - Projects may be validated onsite (physically or virtually) by the evaluation team as part of the process, if required.
 - Winners will be awarded cash prizes, a trophy and a certificate. Multiple or partial awards may also be given. Cash prizes will be awarded to Individuals / Team Members.
 - **Presentations can contain concepts and broad contours of the project without disclosing confidential information. Applicants are assured of the confidentiality and their IP rights.**
 - IMTMA reserves the right to publicise the selected case study in their programs / website and other event promotional collaterals.

For any queries please contact:

INDIAN MACHINE TOOL MANUFACTURERS' ASSOCIATION (IMTMA)
@ Bangalore International Exhibition Centre (BIEC)
10th Mile, Tumkur Road, Madavara Post, Bangalore – 562 123

Abhishek (Email: abhishek@imtma.in)
Mob: 9844294387, Tel: 080 66246829) or
Madan (Email: madan@imtma.in)
Mob: 7899437625, Tel: 080 66246711)



Indian Machine Tool Manufacturers' Association (IMTMA)

Head Office : 10th Mile, Tumkur Road, Madavara Post,
Bangalore – 562123, Karnataka, India.

T: 080-6624 6829 / 6624 6711 W: www.productivity.imtma.in

Annexure: A

IMTMA-ACE MICROMATIC PRODUCTIVITY CHAMPIONSHIP AWARDS 2023 FORMAT FOR SUBMISSION OF CASE STUDY FOR LARGE & MEDIUM COMPANIES ONLY (Unit level / SBU level turnover > Rs.100 Crores)

Title of the Case Study:

1. Name of company: **Godrej & Boyce Mfg Ltd**

Address of the Plant / Site location: **Godrej Aerospace PL8 Pirojsha Nagar, Vikhroli (W), Mumbai-400079**

Tel No.: **022-67966852**

Turnover (in Rs. Cr) **253**

No. of employees: **730**

Industry sector (mandatory): **Aerospace**

2. Name of the project leader: **Ashok Sindhu**

Designation: **AGM Manufacturing**

Mobile No.: **9819854751**

Email ID: **ashoka@godrej.com**

Alternate contact person: **Deepak Panchal**

Designation: **DGM Manufacturing**

Mobile No.: **9892749535**

Email ID: **sangdeep@godrej.com**

3. Project implementation

Start date: **Mar 2019**

End date : **Mar 2023**

Is it in continuous operation now? (Yes/No) : **Yes**

We certify that the project described here is factually correct and is in continuous operation.

We confirm that we have read the rules and guidelines governing this competition and agree to abide by the same.

We agree to nominate a member of our senior management to make the presentation in case this entry is short listed for final evaluation of the award.

We have no objections in IMTMA publicising our case study in their programs / website and other event promotional collaterals.

Name : **Maneck Behramkamdin**

(Head of Company/Business Unit / Division)

Designation: Sr VP & Business Head Electronic Signature: _____

Date: 30.06.2023



IMTMA-ACE MICROMATIC PRODUCTIVITY CHAMPIONSHIP AWARDS 2023

Annexure: B

Tick(✓) the appropriate box(es) that best describe your Case study

1. **Scope of the project:** (Please tick as appropriate)
 - Multiple Value streams** (Improvements in Multiple Value streams/ product families resulting in breakthrough benefits).
 - Single Value stream** (Improvements in a Value stream / product family with significant benefits).
 - Localized improvement within a Value stream** (Improvements in identified processes / pockets within a value stream, with incremental benefits).
2. **Project sponsor:** Top management Senior management (CEO / CXO level)
 Middle management (GM/ DGM/ AGM level)
3. **Project trigger:**
 - 3.1 External conditions Internal competitiveness
 - 3.2 **Market conditions:**
 - Uncertain demand Cyclical demand Low volume- High variety Sudden increase in demand
 - 3.3 **Project approach selection**
 - Primarily driven by the costs involved
 - Based on financial benefits, gains
 - Based largely on adoption by peers/ Industry standard
4. **Project focus :**

<input checked="" type="checkbox"/> Manufacturing System Redesign (MSR)	<input type="checkbox"/> Better Asset Utilization (BAU)
<input type="checkbox"/> Productivity Through Quality improvement (PTQ)	<input type="checkbox"/> Optimizing Metal working Process (OMP)
<input type="checkbox"/> Digital Manufacturing & I 4.0	<input type="checkbox"/> Total Productive Maintenance (TPM)
<input type="checkbox"/> Total Quality Management (TQM)	<input type="checkbox"/> Green & Clean
<input type="checkbox"/> Other innovation (Please specify)	
5. **Quality / Analytical tools:** Please tick If you have used any of the tools listed below for developing productivity improvement solutions.

<input type="checkbox"/> Statistical Process Control (SPC)	<input type="checkbox"/> Design of Experiments (DOE)
<input type="checkbox"/> Eight Disciplines of problem solving (8D)	<input type="checkbox"/> Root Cause Analysis (RCA)
<input type="checkbox"/> Standard problem solving tool	<input checked="" type="checkbox"/> Theory of Constraints (TOC)
<input type="checkbox"/> Six Sigma	<input type="checkbox"/> 7 QC Tools <input type="checkbox"/> Lean
Others (Please specify).....	
6. **Project implementation includes**
 - All activities within the organization
 - Upstream and Downstream partners/ suppliers
7. **Productivity improvement includes:** Enhanced output Reduced inputs Manpower Rationalization
Others.

1) Brief description of the Project

Scope :

Increase in production rate of a critical Defence system supplied to MoD

Objective :

Ramp up of rate of production from 2 per month in Mar-19 to 6 per month by Mar-23.

As the border tensions with China escalated, the customer wanted us to ramp up our production as much as we could, as quickly as possible.

Challenges faced while executing the project :

- Rate of production could be increased by capacity expansion, but that would require importing machinery which requires time in months.
- Rate of production could be increased by recruiting additional manpower, but that would require training them on niche skills in assembly & testing, so again it would require time in months.
- One year into the project, COVID struck in two successive years, causing loss of capacity due to unavailability of trained machinists and assembly/testing technicians.
- Third-party QA Agency appointed by customer had limited bandwidth, and further affected by COVID for two years.
- While ramp-up of assembly & testing activities was started with productivity improvement efforts, it required components to be available in increased quantities. Outsourcing of component machining to new suppliers was a challenge due to technical understanding of the requirements by them.
- As an impact of COVID, RM material supply was affected in 2020 & 2021.
- Over last year or more, the supply of the bought-out Parts from war-affected zone is slowed down.

2) Trigger for the project

Background :

The project was triggered by an urgent need by our customer (MoD) for ramping up of production of one of the critical systems for the Defence of our Nation as the border tensions with China escalated. The Nation needed us to produce at double or triple the speed as soon as possible.

Key concerns :

If the production is not ramped up, MoD would not be able to supply enough weapon systems to secure the border fully. This would make the Nation insecure to that extent, and affect the morale of the Forces.

Other option of importing would be very costly and time-consuming apart from the risk of sabotage during transportation from overseas.

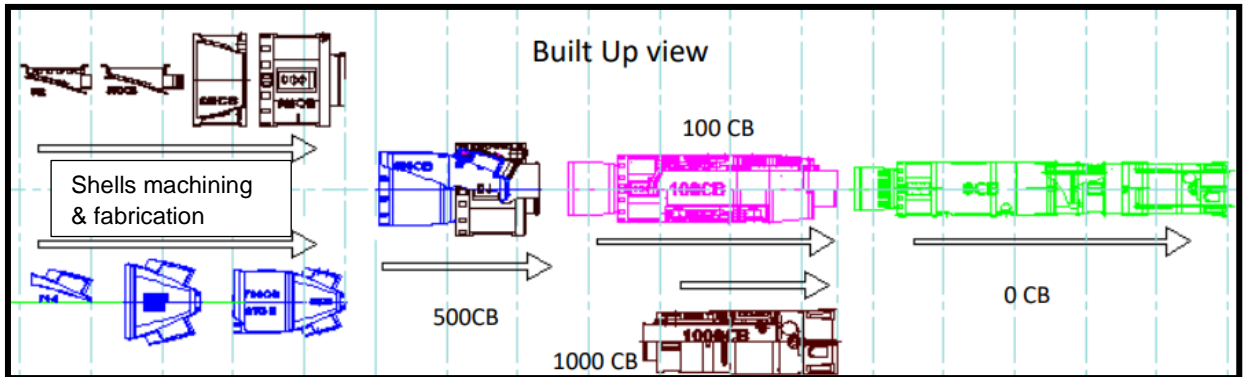
Customer initiatives :

- Customer arranged supply of RM as Free Issue Material in increased quantities to suffice the increased rate of production.
- Customer agreed to place larger quantity Orders to help us justify investments internally.
- Due to larger Orders, larger Advances were received, improving the cash flow situation.
- Customer agreed to suggestions regarding change in the shape & size of input materials, thus saving the material and faster processing of the same.

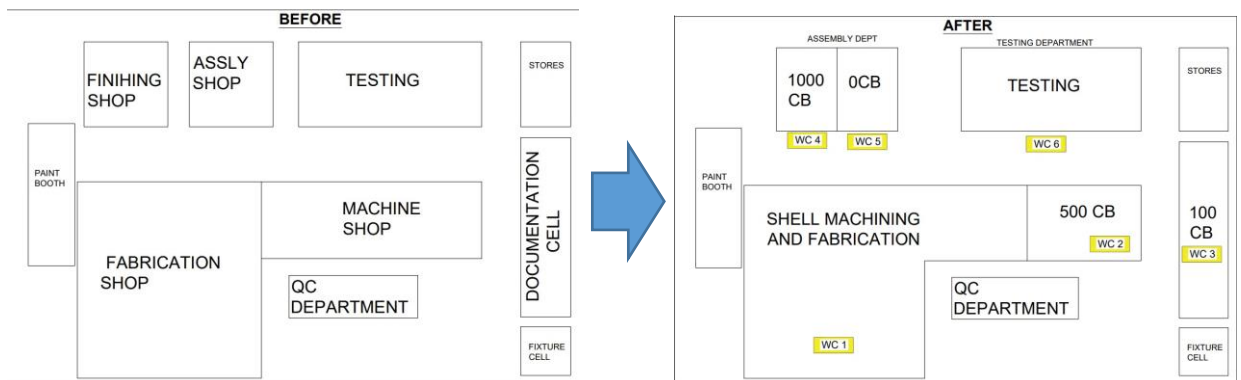
3) Solution generation, Innovation and Complexity

Re-designing of Manufacturing System :

- 1) The final deliverable is assembled in stages as shown below. This consists of 35000 manufacturing & QC operations, to make 2900 types of Parts & Sub-assemblies, and to integrate them into final assembly. It's a complex assembly being a very critical portion of the final weapon system that is integrated at customer's end after receiving other composite & electronic systems from respective suppliers.
The sub-assemblies and final assembly are tested before delivery. Testing is witnessed by customer-appointed QA Agency.



- 2) We approached the problem with Industrial Engineering tools, like Value Stream Mapping, Layout Optimization, and a virtual Line Balancing (since a physical Line set-up was not a possibility being a brown-field project under pressure of ramp-up).
- 3) We operated with Process-oriented Layout where one type of manufacturing processes e.g. machining or welding was centralized in one area of the Shop Floor. We changed it to Product-oriented Layout where different processes required for making of sub-assemblies at various stages were brought together, by forming Work Centres producing a certain sub-assembly or assembly. The idea was that the Work Centres will work in parallel at a balanced speed of output to match the takt (required output rate) at the end of the (virtual) Line.



- 4) We also first shifted the documentation to the mezzanine floor and then gradually digitized it to shrink the size required for storage & preservation of documents.

Leveraging the takt-based repetitive manufacturing set-up :

- 1) As we switched to a product-oriented layout as above, it gave the people opportunity to get on a quick learning curve since they were now doing the same work repetitively every day. That brought in consistency & speed in their output. It also allowed us to perform time study in a focused way, to consult our Japanese consultants, and to reduce the process cycle time

therefore.



- 2) The operators could do better Kaizens in their respective tasks, contributing to the productivity improvement in a big way.
- 3) The Work Centre In-charges developed an entrepreneurial attitude as they saw themselves accountable for delivery of products at a targeted speed. They started creating a pull in the system, and ownership of quality of deliverable increased as it would be visible if any stoppages happened in the (virtual) Line due to unavailability of supply from previous Work Centres.

Rolling the juggernaut in a virtuous circle :

- 1) Next we focused inside the Work Centres. Respective WC In-charges developed their own VSM's, and identified bottlenecks which were deciding the throughput from their Work Centres. Focused Kaizens were ideated and implemented, like low-cost automation of set-up of long shells from horizontal position to vertical position, etc.. Manufacturing processes were reviewed and modified, like changing over from welded sub-assemblies to fully-machined sub-assemblies, to reduce quality issues, inspection requirements and material movement.
- 2) Then the micro-level study of Workstations was taken up, using IIoT to monitor True Value Added (VA) time e.g. Spindle Run Time in machining, Arcing Time in welding, etc. That gave huge insights and a positive pressure on the operators as they realized the amount of NVA present in their working methods. That made them vigilant and True Capacity Utilization started improving.
- 3) The above step-by-step drill-down improved productivity multi-fold, and as the speed of production was seen improving, the team got the motivation to improve further, thus putting the juggernaut in motion in a virtuous circle.

Reinforcing the Supply Chain to ensure full-kit availability :

- 1) The above Assembly 'Line' started pulling the components from Stores in a rhythmic manner, and it was essential to not allow any hitches at the start of the Line due to shortages.
- 2) We did a lot of manufacturing of components in-house in the Machine Shop. However as we switched to the new way, we focused on sub-assembly & assembly machining in-house. No fabrication, sub-assembly or assembly work could be outsourced, as it involved niche skills, high value was already added so transporting them back & forth was risky, and also there was a need to maintain confidentiality.
- 3) We developed suppliers and outsourced the component machining to them to maintain the balance in the Line. Suppliers supported us willingly due to increased business volumes and due to the sense of pride in working for the Nation's cause.

stages by customer-appointed QA Agency who had a limited bandwidth. We decided to maintain & improve the quality standards to build the trust with them, and when we succeeded (by improving the First Pass Yield quarter by quarter) we requested for delegation. To our pleasant surprise, they did start allowing certain stages to be self-inspected by us. This journey is taken forward to an extent that today the QA Agency witnesses only the final inspection stage. For the witnessing of testing parameter set-up, we provided IT-enabled remote monitoring to them, so that they could check and give go-ahead for testing from their desks. This all has enabled the delivery lead time to crash by almost 15% out of the total reduction of 45% in the lead time till date. Balance 30% came on account of Productivity improvement.

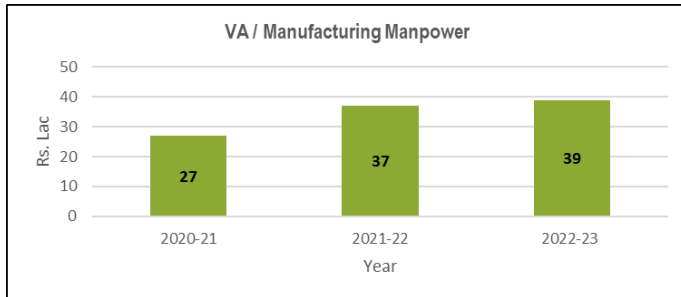
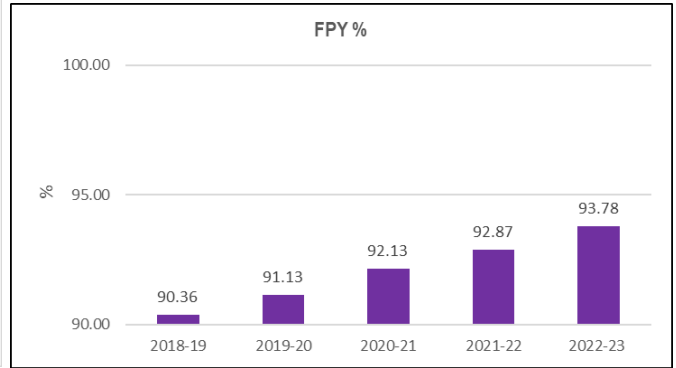
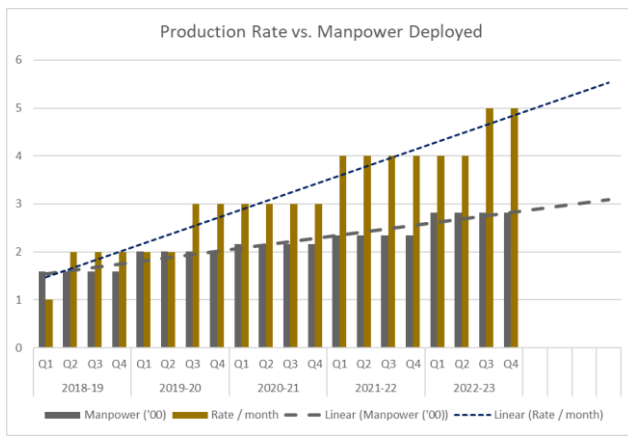
Protecting Environment even as we increased production :

This business runs with the Raw Materials provided as Free Issue Material by the customer, due to the specialized quality requirements. In COVID period, the supply was affected. We brain-stormed ideas on saving material in two ways : 1) Value Engineering efforts making changes to the input material conditions & weights, e.g. we could start with near-shape forging in place of solid cylinders, 2) Recycling of scrap (which is huge, up to 80% of material is removed in Aerospace industry typically) to the smelters. Both these efforts were aligned to the GREEN philosophy which our Company believes in with its heart.

5) Results and Impact

While we increasing rate of production 3 times (achieved 2.5 times till Mar-23, target is 3 times by Mar-24), we augmented manpower only by 1.8 times (no further addition planned till Mar-24) and infused capital only by 30%.

Mandatory parameters:	Before	After	Unit of Measurement
1. Productivity details: Indicate metrics that showcase the productivity gains obtained.	Value Added per Worker 27L p.a.	Value Added per Worker 39L p.a.	₹ L p.a.
2. Effort per Deliverable	2067	1454	Man-day
3. Quality : Reduction of rejects and rework (First Pass Yield)	90.36%	93.78%	%
4. Direct Cost or Cost per piece/unit	Confidential	Confidential	
5. Manpower cost (includes direct/ indirect labour/ contract/ temp resources and man-hours & overtime if any)	₹27 L / Deliverable	₹20.9L / Deliverable	₹ L
6. Delivery	2	5	Nos. per month
7. Safety Incidents	7	5	Nos. p.a.



6) Business Sustainability and Future Focus

Profitable growth for the business :

This product line contributes 90% of the revenues and profits of the Defence vertical. By ramping up its production rate, we could grow the business rapidly, with increased profits. This paved the way to pitch for other similar systems, and over the last 3 years we succeeded in getting the Orders for developing the same. This also improves our standing with MoD and by reference, we could also get more business into other product lines. We also got better negotiation power because of it.

The financial results over this period, as included in the Business Metrics section below, show the impact of this productivity improvement project helping us in the larger gameplan.

Further, since the competitor was already struggling to match the required rate when we started ramping up, we having doubled the speed, virtually makes us a single source of these critical Defence systems, thus giving a business sustainability.

Moving up the value chain by taking off customer scope of work :

Further, over this period of ramp-up, certain other steps were taken by us. We noticed that the customer faces some integration issues at their end, which can be addressed if we can take some of the integration related work in our scope. We proposed to the customer and got it added in our scope.

We worked for import substitution of certain critical bought-out sub-assemblies, and successfully eliminated that need for the customer. In fact, we started supplying that sub-assembly to our competitor to ultimately help the customer and the Nation.

We invested into certain component testing set-up's to take off that load from customer. It helps us in turn to launch our assembly process earlier than in the past, when we had to wait for the customer to test it and provide clearance.

All the above actions have strengthened our position further from business sustainability viewpoint.

Spreading the wings on the basis of improved competitive edge & confidence :

We plan to take certain measures like above going forward to add to the scope and to reduce work at customer's end to make the whole supply chain more efficient, to serve the Nation at a faster pace.

For example, we have started supplying another critical assembly required for final integration of the super-system at customer's end. We are ramping up that production as well, to match the 6 per month speed for the subject system as presented here. Once we match the speed, customer would not require to import that assembly from some countries which are at war.

It would also give cost advantage, and if we succeed in delivering at the improved speed, customer would push more Orders to us immediately, thus we have an opportunity to grow Top Line as well as Bottom Line further.

7) Resource Impact

Parameters:	Before	After	Unit of Measurement
1) Input material	100%	95%	%age
2) Net scrap after recycling	80%	40%	%age

In order to reduce the material efficiency, we studied the input conditions, and since it was FIM (Free Issue Material), we approached the customer with suggestions about changing over to near-shape forgings as the input to manufacturing, that can be made with 5% less material amounting to 100's of kg per month. This change in inputs gives incremental benefits proportionate to the increase in rate of production.

Other initiative we have taken is to convert scrap into useable material again with the help of smelters. The output quality of recycled material is tested successfully to conform to the requirements. Scrap collection methodology is put in place, and the first lot of recycled material is expected to be received soon. This reduces the scrap proportion to 40% from 80%.

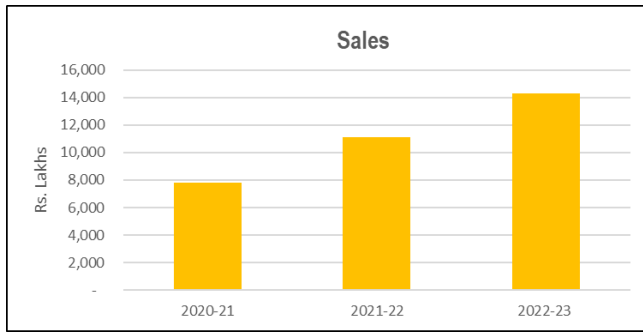
8) Business metrics & recognition

Parameters:	Before	After	Unit of Measurement
Share of business (F3)	50%	80%	%
Customer Satisfaction Index	85.8	93.4	Index

For many years initially, partial requirements of this Defence system were fulfilled through imports. That %age was around 50%. As we ramped up the production, the need for importing reduced, and thus we acquired 80% share of the requirements.

The CSI (Customer Satisfaction Index) is calculated on the basis of responses to Customer Satisfaction Survey carried out annually. The details of the survey as below, with ratings for last 3 years.

The growth in Sales and Profits can be seen as below, due to this productivity improvement project followed by expansion minimally.



Customer appreciation event on milestone completion (Production Rate 5 per month)



9) Scope for horizontal deployment

This idea is already implemented in other verticals of our organization. It is surely applicable for any assembly shop with high lead time.

For example, we manufacture assemblies for ISRO in Space sector. The flow of work is similar to the assembly case presented here. Only difference is the components are Forming-oriented in place of Machining-oriented. Since most of the components are also manufactured in-house in that sector, we have to start balancing the Line from that stage onwards.

Digital dashboard monitoring system deployed for other projects.

PMO concept being used for across the Organisation for similar transformative projects.

Outsourcing of lower-level Parts in the Value Chain and focusing more on higher-level Parts & Assemblies in-house is also working for other projects.

Expertise in MIG welding of Aluminium Shells with Robotic welding is utilised to train people in other projects.