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**. Please submit your case study through productivity portal www.productivity.imtma.in
- There will be separate awards for Automotive and Non-Automotive sectors.
- **The filled in format should be uploaded in the productivity portal www.productivity.imtma.in on or before 30th April 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.
- 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 November 2023, 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 alternatives, 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.
- **Applicants are assured of the confidentiality and their IP rights. Presentations can contain concepts and broad contours of the project without disclosing confidential information.**
- 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
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Madan (Email: madan@imtma.in
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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: Enhancing Machine assembly capacity by reducing waste

1. Name of company: SAHAJANAND LASER TECHNOLOGY LIMITED

Address of the Plant / Site location: E-30, GIDC, Electronic Estate, Sec-26, Gandhinagar 382028

Tel No.: +91-7490038872

Turnover (in Rs. Cr): 183 Cr
No. of employees: 350
Industry sector (mandatory): Industrial Laser Machine

2. Name of the project leader: Mr Malhar Rajyaguru
Designation: Head Operations
Mobile No.: +91-7490038872
Email ID: opex@sltl.com

Alternate contact person: Mr Ameya Bhawsar
Designation: Head Production
Mobile No.: +91-8980900388
Email ID: opex4@sltl.com

3. Project implementation

Start date: 1-June-2021
End date: 30_Sep-2022

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

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: Mr Malhar Rajyaguru
(Head of Company/Business Unit / Division)
Designation: Head Operations Electronic Signature: Malhar Rajyaguru
Date: 29-Apr-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** :
   - ☐ ✓Manufacturing System Redesign (MSR)
   - ☐ ✓Productivity Through Quality improvement (PTQ)
   - ☐ Digital Manufacturing & I 4.0
   - ☐ Total Quality Management (TQM)
   - ☐ Other innovation (Please specify) ……
   - ☐ ✓Better Asset Utilization (BAU)
   - ☐ ✓Optimizing Metal working Process (OMP)
   - ☐ Total Productive Maintenance (TPM)
   - ☐ ✓Green & Clean

5. **Quality / Analytical tools:** Please tick If you have used any of the tools listed below for developing productivity improvement solutions.
   - ☐ Statistical Process Control (SPC)
   - ☐ Eight Disciplines of problem solving (8D)
   - ☐ Standard problem solving tool
   - ☐ Six Sigma
   - ☐ Design of Experiments (DOE)
   - ☐ ✓ Root Cause Analysis (RCA)
   - ☐ ✓ Theory of Constraints (TOC)
   - ☐ ✓ 7 QC Tools
   - ☐ ✓ Lean

   Others (Please specify) Project Management

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.

IMTMA-ACE MICROMATIC PRODUCTIVITY CHAMPIONSHIP AWARDS 2023

FORMAT FOR SUBMISSION OF CASE STUDY

Instructions:

- **Contestants are expected to present the case study on the following parameters within Eight (8) A4 size pages.**
- Font size should not be smaller than Arial 11. Only MS Word format is to be used.
- Contestants are encouraged to include charts/ tables/ graphs/sketches/ photos / URL linked videos and other graphical illustrations to bring out the merits of their project / case study.

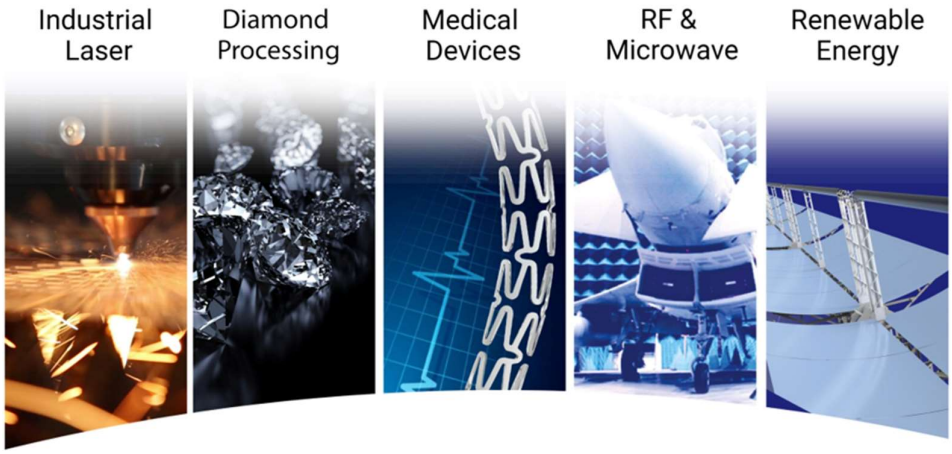
Note: All sections listed below must be adequately addressed and cannot be left blank

Your case study will be evaluated based on following criteria (as per the weightage points listed below) relative to the other entries.

(a) Trigger for the project (b) Solution generation, Innovation and Complexity
(c) Implementation (d) Results / Impact (e) Sustainability and Future Focus
(f) Resource impact (g) Business metrics (h) Scope for horizontal deployment

1. **Brief description of the project.**

SLTL Group is an innovation-driven group of companies, with its in-house R&D expertise it caters to the need of various industries. The Company provides solutions in the wide spectrum of industrial laser, Diamond & Jewelry processing, Medical devices, RF & Microwave, and Renewable energy.



Laser Cutting assembly was originally planned for a capacity of 15 machines/month. With Increased Customer Demand due to good market response, we needed to improve the productivity & hence the capacity of the assembly shop. This Project was to improve the Assembly time of laser cutting machines to serve on-time delivery.

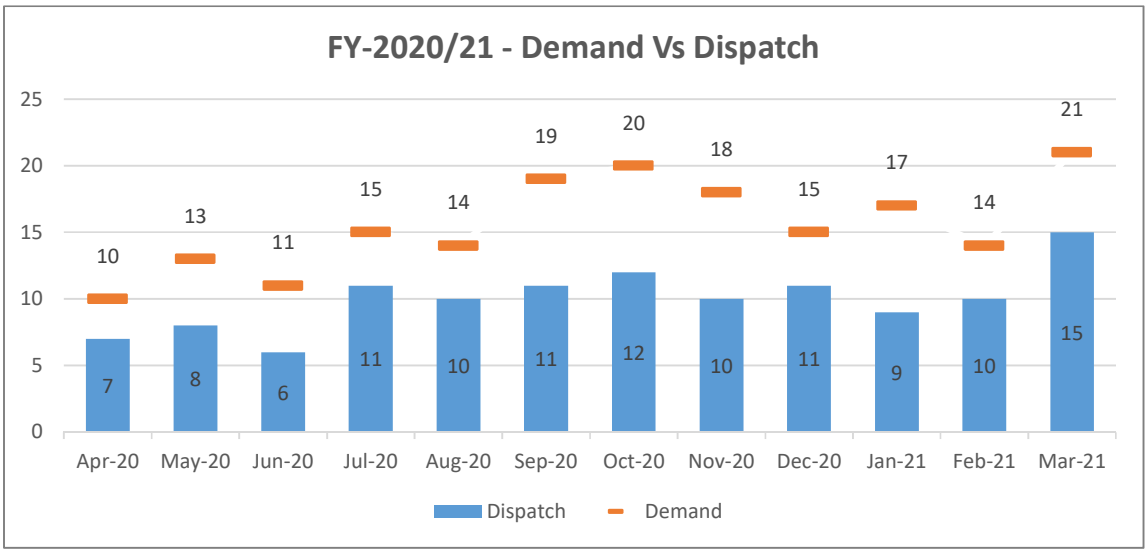
The Old line also didn't have any provision for data collection, handling, and processing which had to be incorporated in our proposal.

2. The trigger for the project.

According to Future Market Insights (FMI), between 2022 and 2032, the global market for Laser cutting machines will grow at a CAGR of 5%-6%.- reaching a valuation of approx. 60000 nos in 2032.
The marketplace is shifting rapidly with the ongoing development of innovations in technology, which affect economic conditions. Consumer goods manufacturers are heavily reliant on new technological developments in order to have more enhanced products and services, which encourages the usage of laser cutting machines, which deliver precise design and product performance.

For SLTL, this has been reflected as an increase in the demand for Laser cutting machines, which has gone up to 1 machine per day or more with good market response & product popularity, it was necessary to fulfill this customer delivery requirement through the optimized capacity of the assembly shop, with target of Zero Quality complaints..

An assembly plant was planned with limited machine capacity, with around 15 main assembly stations. It was challenging to respond in an agile way so that opportunities are not missed out.



Target set to improve productivity & capacity of assembly plant from 25 days per machine to 10 days per machine through systematic approach. [breakthrough improvement of almost double the plant capacity for better utilization of assembly plant]

3 **Solution generation, Innovation and Complexity.**

To increase the productivity of the plant we have to control 4M [Man, Method, Material, Machine / Equipment/tools]. For productivity improvement, each "M's" detailed study was done and alternative solutions were developed as sub-project.

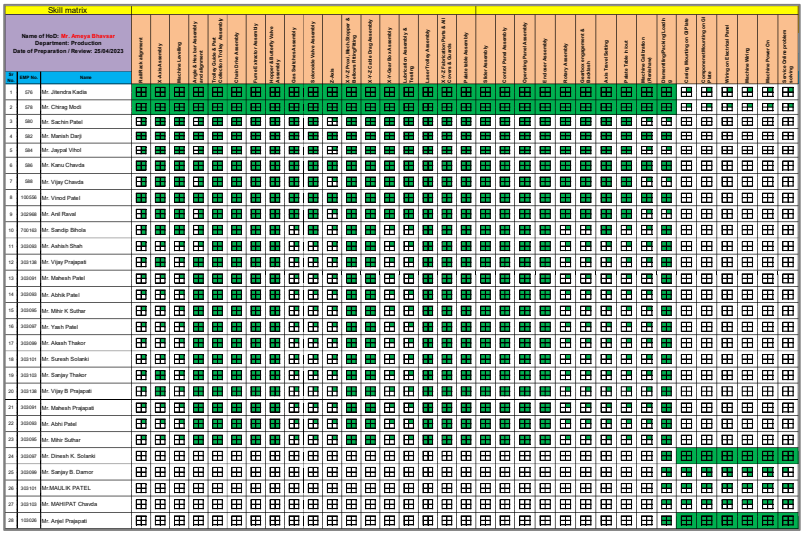
M = Men

Due to the attrition of skilled manpower, the plant faced challenges in productivity and high-quality defects. Machine assembly is manual assembly and thus it always depends on skilled manpower, resulting in decline of productivity.

- Machine assembly is manual assembly and thus the skill set of associates becomes vital for the efficiency of the plant.
- For any organization skilled Manpower is at the center.
- Skill development via training and constant evaluation of it helps for continuous improvement
- As the assembly team was new, thus the product knowledge and assembly training was required
- To make the training more effective and impactful, the machine was divided into sub-assemblies and assembly blocks.
- Accordingly training modules prepared and training was imparted.
- This will also help to reduce the learning curve as the content of the training will be less compare to whole machine
- This will also help in increase quality output of associates, resulting in increased flexibility
- We have tools using versatility and flexibility matrix.
- Whole machine was divided into the following stages,
    1. Y-axis assembly
    2. X-axis assembly
    3. Z-axis assembly
    4. Lubrication & Gas assembly
    5. Pallet
    6. Chain Drive assembly
    7. Control Panel(CP) / Operating Panel (OP) assembly
    8. Machine Wiring
    9. Enclosure assembly [Full / Half]
- For each stage the training module was planned on-floor along with inspection checklist.
- Inspection checklist was also divided into two categories,

1. I make, I check *[only certified and qualified associates are allowed to work in assembly operations]*
2. 2nd step verification by Quality Inspector

- **Below is the data for before training and after training**



Based on manpower available in the plant the technical plant capacity was 15 machines per month, against an average of 10 machines per month was actual production:

The following were major losses observed for capacity loss:

1. Machine assembly sequencing
2. Too much manpower movement
3. Too much material handling
4. Time loss in material searching
5. Time loss for tools and equipment searching
6. SOP not available
7. Quality issues mainly due to poor material handling
8. Lack of Material availability

In industry, manpower shifting will always take place, and thus to make the production system strong, one must need to skilled manpower flexibility to avoid dependency on manpower. Also, process and assembly process documentation is also an essential part of the production system.

All new manpower was having no skills. Thus it was one of the big challenge for team to level up new associates to increase the productivity of the plant. And get quality output from the associates. For this the skill set development cell was developed.

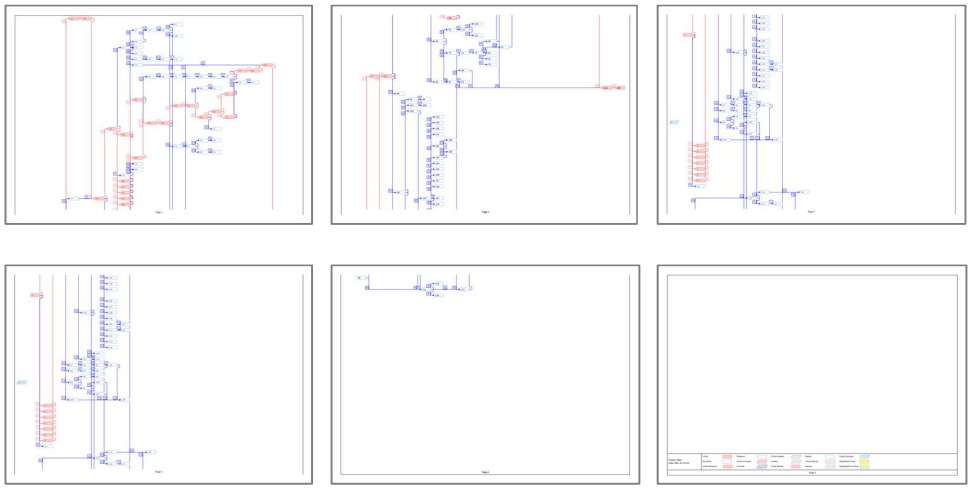
M = Method

Assembly Method and Sequencing:

To define and determine the optimized assembly operation sequence, whole machine assembly process study was done with respect to each item code and activity carried-out on it to do assembly.

Activity No	Part Code	Qty	Item Type	Activity to do	Precedence	ON/OFF Station	Assembly Dependency	Total Approx Time	No. Of Person	Total Man Hours	Activity Performed ? (Yes/No)	Actual Start Time hh:mm:ss	Actual end Time hh:mm:ss	Actual Time hh:mm:ss	No. Of Person	Total Man Hours hh:mm:ss	Remarks
1	M701200018	01	PFAB	BODY PLACE ON LOCATION BY USING FORK LIFT and also place foundation pad-8 set	00	On Station	Y-Axis Assembly	15	2	30	Yes						
2	MBGPFT017B	01	BOI	Place foundation pad FP-1	01	On Station	Y-Axis Assembly	02	1	2	IP Camera1_umang patel_umang patel_20221228095954_20221228120000_190632	10:07:00	10:25:59	00:18:59	2	00:37:58	(1) Fesibility to lift the body through jack instead of fork Lift. (2) 10 Mins Tea Break
3	MBGPFT017B	01	BOI	Place foundation pad FP-2	01	On Station	Y-Axis Assembly	02	1	2	Yes	10:35:21	10:39:40	00:04:19	2	00:08:38	
4	MBGPFT017B	01	BOI	Place foundation pad FP-3	01	On Station	Y-Axis Assembly	02	1	2	Yes	-	-	-	-	-	
5	MBGPFT017B	01	BOI	Place foundation pad FP-4	01	On Station	Y-Axis Assembly	02	1	2	Yes	-	-	-	-	-	
6	MBGPFT017B	01	BOI	Place foundation pad FP-5	01	On Station	Y-Axis Assembly	02	1	2	Yes	-	-	-	-	-	
7	MBGPFT017B	01	BOI	Place foundation pad FP-6	01	On Station	Y-Axis Assembly	02	1	2	Yes	-	-	-	-	-	
8	MBGPFT017B	01	BOI	Place foundation pad FP-7	01	On Station	Y-Axis Assembly	02	1	2	Yes	-	-	-	-	-	
9	MBGPFT017B	01	BOI	Place foundation pad FP-8	01	On Station	Y-Axis Assembly	02	1	2	Yes	-	-	-	-	-	
10	M701200018	01	PFAB	Cleaning of rail rack-bracket+tie bar mounting area cleaning. & Rustolin Filling	01	On Station	Y-Axis Assembly	25	1	25	Yes	10:45:16	11:03:03	00:17:47	2	00:35:34	(1) Proper Tool need to identify for fast operation (2) Cleaning Material need to indentify (3) Man-2 Came 5 Minutes late into the activity
11	M701200018	01	PFAB	Levelling	2,3,4,5,6,7,8,9	On Station	Y-Axis Assembly	30	2	60	Yes	11:47:16	11:56:45	00:09:29	2	00:18:58	(1) 12 Minutes time for straight edge setup
12	MBBRGR126B	01	BOI	LM assembly (By Using Dawait) and Levelling Table placed left side	11	On Station	Y-Axis Assembly	10	2	20	Yes	11:14:15	11:22:43	00:08:28	2	00:16:56	(1) Man-2 is idle due to Hikoki Gun unavailibility
13	MBBRGR126B	01	BOI	LM assembly (By Using Dawait) and Levelling Table placed Right side	11	On Station	Y-Axis Assembly	10	2	20	Yes	-	-	-	-	-	
14	MBBRGR126B	01	BOI	Left Rail allingn w.r.t.(Machining and straightadgel-1 set	12	On Station	Y-Axis Assembly	70	1	70	Yes	14:43:41	15:48:00	01:04:19	2	02:08:38	(1) Critical Operation - Need to see alternate option if available
15	MBBRGR126B	01	BOI	RH Rail Align (w.r.t Left Rail)	13,14	On Station	Y-Axis Assembly	30	2	60	Yes	15:48:01	16:43:50	00:55:49	2	01:51:38	(1) Critical Operation - Need to see alternate option if available
16				Button Fitting	15	On Station	Y-Axis Assembly	20	1	20	Yes						
17	MBBRRB142B	04	BOI	Runner Block Mount on LH&RH Rail	16	On Station	Y-Axis Assembly	05	1	5	Yes						

Based on the activity mapping and sequencing, also Critical path was identified in MS Project.

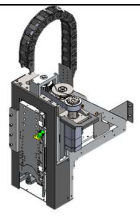
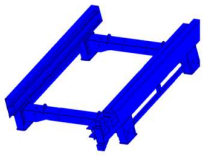


Based on CPM the assembly sequence and off-station assembly was identified.

Each sub-assembly was take as sub-project to work further for Work Station Design, Tools / Equipment required for increasing assembly efficiency and SOP.

Machine Assembly Sequencing and Sub-assembly station

- The assembly of whole machine was done on one station only
- First all required material for machine was loaded on respective station, afterwards assembly person will collect material with respect to sub-assembly and will do assembly separately.
- This was resulting in higher occupancy time of each assembly station
- Also the man and material movement was high
- This was directly affecting inventory level and increased inventory turn-around
- The assembly process study was done and following sub-assemblies were identified which can be done off-station
- Also the sequence of the assembly was not standardized, thus setting priority and tracking assembly progress of each station was not possible
- Following sub-assemblies were identified as off-station;
    1. Z-axis assembly
    2. X-axis assembly
    3. Gear Box assembly
    4. Pneumatic assembly
    5. Gas assembly
    6. Part collection trolley
    7. Pallet assembly
    8. Pallet changer assembly
    9. Control Panel assembly
- For above defined sub-assembly based on ergonomics work station was designed and implemented
- For each sub-assembly SOP was created and implemented

Z-axis Assembly	Gear Box Assembly	Pallet Changer Assembly	Pallet Assembly
			

M = Material Shortages [Levelling based on Monthly plan]

Levelling is essential for manufacturing as it helps to bring harmony in production system, as customer demand will always fluctuate. And this fluctuation can directly affect regular production, and to avoid such fluctuations levelling is important.

Strategies to do levelling are as following;

- Realization of multiple production planning concepts (MTO, ATO, MTS) within one value stream to meet delivery time expectation while maintaining low stock and 100% deliver time performance.
- Leveling generally based on part number families. Families are built to create value through leveling.
- Leveling of actual and firm customer orders. Deviation in planning can be necessary to meet 100% delivery (based on defined rules)
- Capacity reserves are necessary to be able to react to short term call-up spikes to maintain 100% delivery performance (delivery time beats leveling benefit).

- For material shortages, each station wise provision given in ERP to track list of items which are shortages

Shortage list station wise from ERP system:

work_station	main_prod_id	main_item_id	bom_production_id	reference_prod	item_id	item_name	item_groupid	estimated_qty	onhand_q_ty	reserve_q_ty	shortage_qty	u	warehouse	costcenter	start_date	start_quantity	shortage_production_id	shortage_project	shortage_date	required_date	bom_date	bom_id	finished_appr_ox_date
St. 6A	Prod_23_62292	FGLCFB0699	Prod_23_62292	Prod_23_62292	E69900000B	ELECTRICAL ASSEMBLY FOR PRIME (3X1_S) Fuji+Cypcut+Dual Pallet	SFG_MainAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	10-03-2023	1	Prod_23_62292	699	27-04-2023	31-03-2023	10-03-2023		30-03-2023
St. 9A	Prod_23_66237	FGLCFB0699	Prod_23_66237	Prod_23_66237	E69900000B	ELECTRICAL ASSEMBLY FOR PRIME (3X1_S) Fuji+Cypcut+Dual Pallet	SFG_MainAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66237	699	27-04-2023	14-04-2023	31-03-2023		14-04-2023
St. 9A	Prod_23_66266	E69900000B	Prod_23_66266	Prod_23_66237	E69906000B	CONTROL PANEL ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66266	699	27-04-2023	14-04-2023	31-03-2023	E69900000B	14-04-2023
St. 10A	Prod_23_50355	E76900000B	Prod_23_50355	Prod_23_50345	E69906001B	CONTROL PANEL ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	03-01-2023	1	Prod_23_50355	769	27-04-2023	26-01-2023	03-01-2023	E76900000B	25-01-2023
St. 8B	Prod_23_64114	E71800000B	Prod_23_64114	Prod_23_64094	E69906001B	CONTROL PANEL ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64114	718	27-04-2023	08-04-2023	22-03-2023	E71800000B	07-04-2023
St. 3A	Prod_23_64140	E71800000B	Prod_23_64140	Prod_23_64120	E69906001B	CONTROL PANEL ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64140	718	27-04-2023	13-04-2023	22-03-2023	E71800000B	12-04-2023
St. 10A	Prod_23_50355	E76900000B	Prod_23_50355	Prod_23_50345	E69900000B	OPERATING PANEL ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	03-01-2023	1	Prod_23_50355	769	27-04-2023	26-01-2023	03-01-2023	E76900000B	25-01-2023
St. 8B	Prod_23_64114	E71800000B	Prod_23_64114	Prod_23_64094	E69900000B	OPERATING PANEL ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64114	718	27-04-2023	08-04-2023	22-03-2023	E71800000B	07-04-2023
St. 3A	Prod_23_64140	E71800000B	Prod_23_64140	Prod_23_64120	E69900000B	OPERATING PANEL ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64140	718	27-04-2023	13-04-2023	22-03-2023	E71800000B	12-04-2023
St. 9A	Prod_23_66266	E69900000B	Prod_23_66266	Prod_23_66237	E69900000B	OPERATING PANEL ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66266	699	27-04-2023	14-04-2023	31-03-2023	E69900000B	14-04-2023
St. 10A	Prod_23_50355	E76900000B	Prod_23_50355	Prod_23_50345	E69910000B	X-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	03-01-2023	1	Prod_23_50355	769	27-04-2023	26-01-2023	03-01-2023	E76900000B	25-01-2023
St. 8B	Prod_23_64114	E71800000B	Prod_23_64114	Prod_23_64094	E69910000B	X-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64114	718	27-04-2023	08-04-2023	22-03-2023	E71800000B	07-04-2023
St. 3A	Prod_23_64140	E71800000B	Prod_23_64140	Prod_23_64120	E69910000B	X-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64140	718	27-04-2023	13-04-2023	22-03-2023	E71800000B	12-04-2023
St. 9A	Prod_23_66266	E69900000B	Prod_23_66266	Prod_23_66237	E69910000B	X-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66266	699	27-04-2023	14-04-2023	31-03-2023	E69900000B	14-04-2023
St. 10A	Prod_23_50355	E76900000B	Prod_23_50355	Prod_23_50345	E69925000B	Y-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	03-01-2023	1	Prod_23_50355	769	27-04-2023	26-01-2023	03-01-2023	E76900000B	25-01-2023
St. 8B	Prod_23_64114	E71800000B	Prod_23_64114	Prod_23_64094	E69925000B	Y-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64114	718	27-04-2023	08-04-2023	22-03-2023	E71800000B	07-04-2023
St. 3A	Prod_23_64140	E71800000B	Prod_23_64140	Prod_23_64120	E69925000B	Y-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64140	718	27-04-2023	13-04-2023	22-03-2023	E71800000B	12-04-2023
St. 9A	Prod_23_66266	E69900000B	Prod_23_66266	Prod_23_66237	E69925000B	Y-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66266	699	27-04-2023	14-04-2023	31-03-2023	E69900000B	14-04-2023
St. 10A	Prod_23_50355	E76900000B	Prod_23_50355	Prod_23_50345	E69930000B	Z-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	03-01-2023	1	Prod_23_50355	769	27-04-2023	26-01-2023	03-01-2023	E76900000B	25-01-2023
St. 8B	Prod_23_64114	E71800000B	Prod_23_64114	Prod_23_64094	E69930000B	Z-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64114	718	27-04-2023	08-04-2023	22-03-2023	E71800000B	07-04-2023
St. 3A	Prod_23_64140	E71800000B	Prod_23_64140	Prod_23_64120	E69930000B	Z-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64140	718	27-04-2023	13-04-2023	22-03-2023	E71800000B	12-04-2023
St. 9A	Prod_23_66266	E69900000B	Prod_23_66266	Prod_23_66237	E69930000B	Z-AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66266	699	27-04-2023	14-04-2023	31-03-2023	E69900000B	14-04-2023
St. 6A	Prod_23_62325	E69900000B	Prod_23_62325	Prod_23_62292	E69940000B	CHAIN DRIVE ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	10-03-2023	1	Prod_23_62325	699	27-04-2023	31-03-2023	10-03-2023	E69900000B	30-03-2023
St. 9A	Prod_23_66266	E69900000B	Prod_23_66266	Prod_23_66237	E69940000B	CHAIN DRIVE ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66266	699	27-04-2023	14-04-2023	31-03-2023	E69900000B	14-04-2023
St. 8B	Prod_23_64094	FGLCFB0718	Prod_23_64094	Prod_23_64094	E71800000B	ELECTRICAL ASSEMBLY FOR INTEGRAX	SFG_MainAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64094	718	27-04-2023	08-04-2023	22-03-2023	FGLCFB0718	07-04-2023
St. 3A	Prod_23_64120	FGLCFB0718	Prod_23_64120	Prod_23_64120	E71800000B	ELECTRICAL ASSEMBLY FOR INTEGRAX	SFG_MainAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	22-03-2023	1	Prod_23_64120	718	27-04-2023	13-04-2023	22-03-2023	FGLCFB0718	12-04-2023
St. 7A	Prod_23_66444	FGLCFB0737	Prod_23_66444	Prod_23_66444	E73700000B	ELECTRICAL ASSEMBLY FOR NEW INDEPENDENT TUBE CUTTING MACHINE-	SFG_MainAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66444	737	27-04-2023	10-04-2023	31-03-2023	FGLCFB0737	12-04-2023
St. 7A	Prod_23_66511	E73700000B	Prod_23_66511	Prod_23_66444	E73706000B	CONTROL PANEL ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66511	737	27-04-2023	10-04-2023	31-03-2023	E73700000B	12-04-2023
St. 7A	Prod_23_66511	E73700000B	Prod_23_66511	Prod_23_66444	E73709000B	OPERATING PANEL ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66511	737	27-04-2023	10-04-2023	31-03-2023	E73700000B	12-04-2023
St. 7A	Prod_23_66511	E73700000B	Prod_23_66511	Prod_23_66444	E73710000B	X- AXIS ASSEMBLY	SFG_SubAss	1	0	0	1	E-2	SFGInd-E2	Ind Mac	31-03-2023	1	Prod_23_66511	737	27-04-2023	10-04-2023	31-03-2023	E73700000B	12-04-2023

Lead time analysis for BOI items:

Critical BOI items lead time was analyze and the items having higher lead time were list to work on VMI (Vendor managed Inventory). This will help into reduce assembly waiting time.

M = Machine / Equipment / Tools / Material handling trolley

Problem / Issue Observed:

During the machine assembly process time study, it was also observed that material handling should be done on trolley to avoid damages to the parts.

Fabrication parts were also kept on pallet and it was lying one-on-another, due to which parts were getting damaged, which was resulting in increased quality issues.

Associates were doing assembly with allen key and it was observed some time person needs to walk for searching allen-key. Also the assembly time of bolt can be reduced with help of power tools.

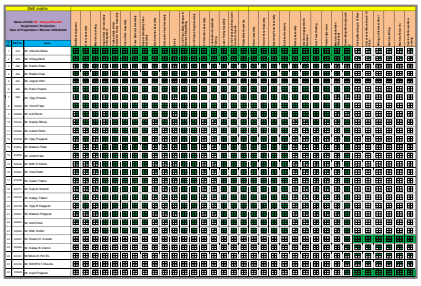
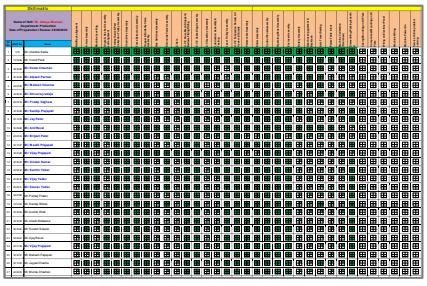
- Based on observation in time study video analysis, team decided to work on following aspects;
    1. Material should have loaded on specific trolley only not on pallet
    2. For fabrication parts, special trolley should be designed to avoid damages even during transportation.
    3. Power tools should be used and given to each associates for assembly.

4 Implementation.

Manpower Skill Matrix:

Manpower skill matrix created to analyze and targets were taken to increase the flexibility and versatility in assembly process, resulting in reduction of dependency on particular person. To make the system more transparent also the visual API (Assembly Process Instruction) was created to train the new manpower and increase the skill set for particular assembly.

Manpower Skill Matrix:

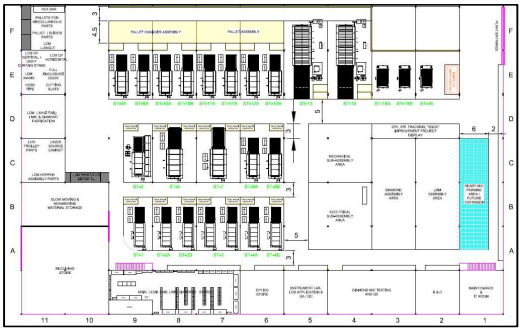
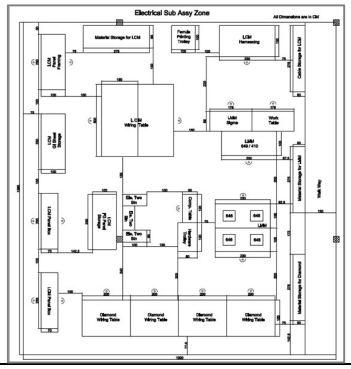
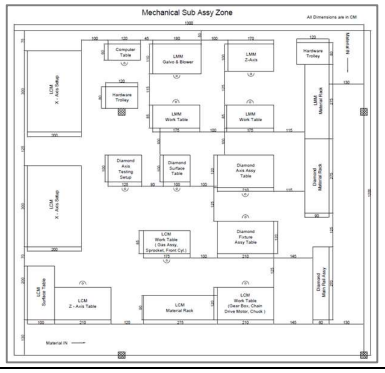
BEFORE	AFTER
	

Plant Layout based on material flow and sub-assembly zone:

Plant layout was changed to adapt new assembly strategy, also the sub-assembly zone was created. In sub-assembly area the workstation was arranged to accommodate material flow and on all workstations visual management system was kept to increase the progress of each production order. Also to increase visibility on main machine assembly, stage wise board was kept on each main machine assembly station.

On main machine assembly station, material loading area was also identified and marked on the floor.

Plant Layout based on material flow and sub-assembly zone:

BEFORE	AFTER
	
Ele. Sub-assembly area	**Mech sub-assembly area**
	

Based on video analysis, NVA (Non Value Added) activities were identified, and also activities were identified where with help of special tools and tackles the assembly time can be reduced.

Following were the actions taken to reduce assembly time meanwhile increasing safety and ergonomics during the machine assembly.

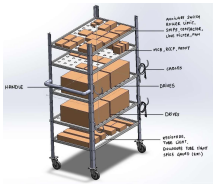
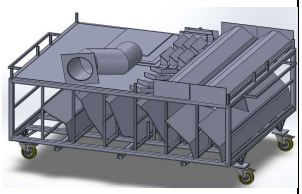
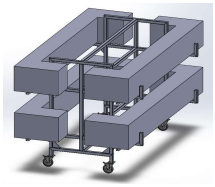
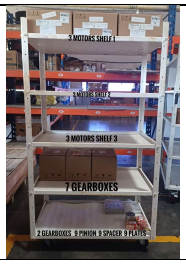
- Y-structure levelling pad assembly – to reduce the setting time during levelling set-up
- Implementation of portable crane for X-axis loading and L-angle loading on main machine
- Redesign of X-axis cable tray bracket
- Provision of hard stopper for right angle alignment for axis

VMI:

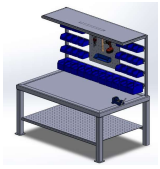
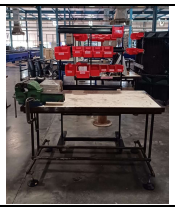
Based on critical BOI items, we established the VMI for items having higher lead time and thus we worked with our business parts to establish procurement cycle.

Supplier wise specific policies based on commercial terms and lead time.

Material Handling Concept and Implementation:

Elec Component Trolley	Hopper Material trolley	X-axis material trolley	Gear box trolley
			

Sub-assembly Work station

Z-axis assembly work station	Gear Box assembly work station	X-axis assembly work station	Gas assembly work station
			

5. **Results / Impact.** (20 points)

Value Creation with Productivity as a focused theme.

Mandatory parameters:	Before	After	Unit of Measurement
1. Station Through-put time	25	12	Avg. nos of days
2. On time Delivery [Monthly Plan Vs Actual]	60%	85%	In percentage
3. Reduction in Rework	12	5	Avg. hrs / machine
4. Manpower OT	83	43	Avg OT hrs / machine

Station Through-put time

	FY-2021/22	FY-2022/23
1. Station Through-put time		
Nos of Station	12	14
Nos of days per year	323	323
Nos of m/c Assembled	150	283
Avg Station through-put time	**26**	**16**

On time Delivery:

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
FY-2021/22													
Demand	10	13	11	15	14	19	20	18	15	17	14	21	**187**
Dispatched	7	8	6	11	10	11	12	10	11	9	10	15	**120**
% Achieved	70%	62%	55%	73%	71%	58%	60%	56%	73%	53%	71%	71%	**64%**
FY-2022/23													
Demand	12	16	14	18	16	22	24	20	17	20	17	25	**221**
Dispatched	9	12	11	14	13	17	20	16	15	18	15	23	**183**
% Achieved	80%	78%	79%	75%	80%	78%	82%	81%	85%	88%	90%	92%	**83%**

6. **Business Sustainability and Future Focus (5 Points):**

The new initiatives have shown good results, still there is scope for further improvements. Currently we have worked to incorporate these initiatives in our QMS system & also in ERP system as well to keep close look and sustainability of the solution.

In ERP different milestones of machine is created and respective department needs to fill the milestone in ERP. This will help further in the accuracy of the data and finding sustainable solution.

Following milestones in ERP were generated and user needs to fill respective dates on same day as the operation is completed.

Sr. No	Milestone	Status in ERP	Department Who will add Date
1	Created Date	Already in ERP	Planning
2	Estimated Date	Already in ERP	Planning
3	Operational Scheduling Date	Already in ERP	Planning
4	Start Date	Already in ERP	Planning
5	Machine Loading Date	Need to Add	Planning
6	QC Date	Need to Add	QA
7	Customer inspection Date	Need to Add	Production
8	Packing Clearance Date	Need to Add	Planning
9	Packing Date	Need to Add	Production
10	Invoice/Dispatch Date	Already in ERP	Automatic Fetching

7. **Resource impact. (10 points)**

Parameters:	Before	After	Unit of Measurement
1. Waste Reduction through Packaging improvements (Plastic)	365.85	229.45	Kgs per year
2. Waste Reduction of paper cardboard through packaging improvement from supplier end	109.6	90.7	Kgs per year
3. Waste Reduction of wooden scrap	715.3	455	Kgs per year

8. **Business metrics. (10 points)**

Parameters:	Before	After	Unit of Measurement
1 Sales Volumes (No. of Machine_ Laser Cutting)	120	187	Nos
2 Customer Satisfaction Score (Laser Cutting)			
2.1 Working of our Machine	50	64	% (218 Customer Review Taken)
2.2 Quality and Consistency of our Machine (Highly Satisfied)	45	60	% (196 Customer Review Taken)

9. **Scope for horizontal deployment. (5 points)**

The same concept of block assembly and sub-assembly will be deploy horizontally on Laser Marking and Laser welding value stream.

Also the concept of levelling will be deployed in part production at our fabrication and CNC unit.