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 2024

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: **HERO MOTO CORP**

Address of the Plant / Site location: Plot No.3, Sector-10 Ranipur, IIE-SIDCUL, Roshnabad, Haridwar, Uttarakhand 249403

Tel No.: 01334-238500

Turnover (in Rs. Cr): 5955

No. of employees: 5955

Industry sector (mandatory): Automobile (Two-Wheeler)

2. Name of the project leader: Balwinder Singh

Designation: Section Head

Mobile No.: 8006355178

Email ID: Balwinder.singh@heromotocorp.com

Alternate contact person: Ranjit Singh

Designation:

Mobile No.: 9760019482

Email ID: yn.shanmukha@heromotocorp.com

3. Project implementation

Start date: April'22

End date: March'23 , 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 publicizing our case study in their programs / website and other event promotional collaterals.

Name: __ Mr.Yashpal Sardana
(Head of Company/Business Unit / Division)
Designation: _Plant Head – HM3H Electronic Signature: Yashpal Sardana
Date: 30.04.2024

IMTMA-ACE MICROMATIC PRODUCTIVITY CHAMPIONSHIP

Annexure: B

AWARDS 2024

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**

4. ☑ Primarily driven by the costs involved
   ☐ Based on financial benefits, gains
   ☐ Based largely on adoption by peer's/ Industry standard

Project focus:

5.
- ☐ Manufacturing System Redesign (MSR) ☐ Better Asset Utilization (BAU)
- ☐ Productivity Through Quality improvement (PTQ) ☐ Optimizing Metal working Process (OMP)
- ☐ Digital Manufacturing & I 4.0 ☐ Total Productive Maintenance (TPM)
- ☐ Total Quality Management (TQM) ☐ Green & Clean
- ☑ Other innovation (Please specify) 4I for material productivity improvement

6. **Quality / Analytical tools:** Please tick If you have used any of the tools listed below for developing productivity improvement solutions.

7.
- ☐ Statistical Process Control (SPC) ☐ Design of Experiments (DOE)
- ☐ Eight Disciplines of problem solving (8D) ☐ Root Cause Analysis (RCA)
- ☐ Standard problem solving tool ☐ Theory of Constraints (TOC)
- ☐ Six Sigma ☑ 7 QC Tools ☐ Lean
- Others (Please specify) ……

Project implementation includes
- ☑ All activities within the organization
- ☐ Upstream and Downstream partners/ suppliers

Productivity improvement includes: ☑ Enhanced output ☐ Reduced inputs Manpower Rationalization ☐
Others.

1.Brief Description of the Project:

Objective: To improve the **material productivity** of export operations for the expansion of global business by adopting World Class manufacturing methodologies.

Scope: This Project articulates the essential for a Cost Competitive global business with **Productivity improvement** as the primary objective and applies to all the processes of the export section.

Context Setting: Hero Haridwar Plant established exports with capacity of 100 vehicles and started the operations from Sept'20 onwards. Since then, market demand is fulfilled as per the forecasted demand. So, to grow productivity with fluctuation in market demand, we need to optimize the resources by identifying & eliminating waste in our processes.

Challenges: Major challenges includes increase in export packaging and logistic costs due to **market inflation** and **currency depreciation** at distributor end.

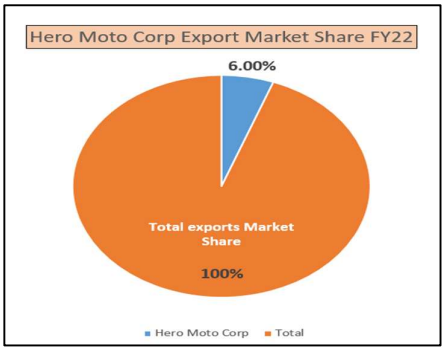
Principal aim of the project is to improve productivity and reduce the costs involved in export by 20%.

2.Trigger for the Project:

2.1 Trigger-1: Competitive Advantage

Following the company's mandate to **be a market leader**, we have to become a leader in export market for which we significantly need to increase our export market share.

To achieve the same, we will have to be cost competitive in comparison to our competitors.



2.2Trigger-2:BusinessNeed

Through Hoshin Kanri (Policy Deployment) Refer Fig.2(a) - Enabling profit maximization by reducing **export packaging cost (Rs /vehicle)** emerged as a business need which was cascaded from Plant Head to all the Department Head as **top-down approach.**

Figure: 2 (a) Policy Deployment Assembly

2.2 Trigger-3: Customer requirement

Export process in Haridwar plant involves two types of costs – one is packaging and others is logistics cost. Logistics cost is further bifurcated into Inland Logistic cost and ocean logistics cost. Ocean logistics cost is beared by distributors and Inland cost is beared by HMCL. Due to market inflation and currency depreciation, cost to customer increased which made **our customer unhappy.**

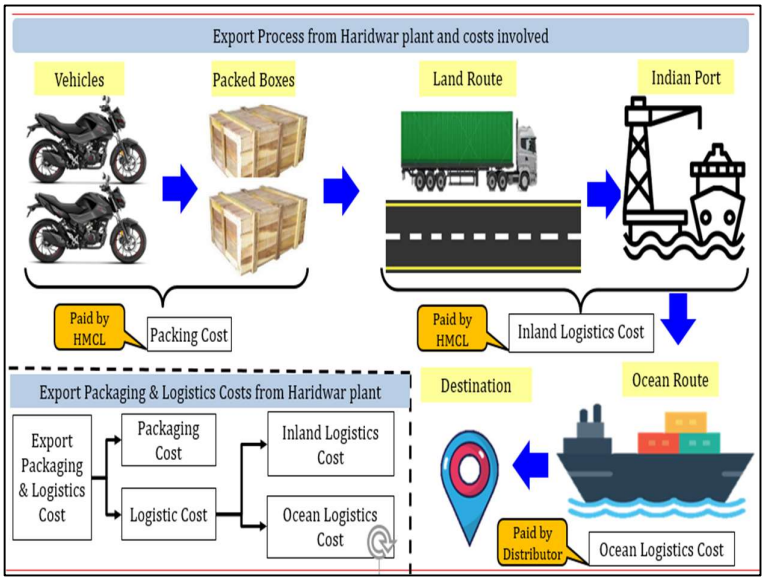


Figure: 2 (b) Export process

From Hero-MotoCorp Haridwar plant, HUNK160 R model is exported to 4 Continents and 17 countries based on the requirement and facilities equipped at dealer's end in the form of CBU (Complete build Unit), CKD (Complete Knock-down) & SKD (Semi Knock Down).
Out of 17 countries, in 11 countries SKD packaging is used as per facilities equipped at dealer's end.

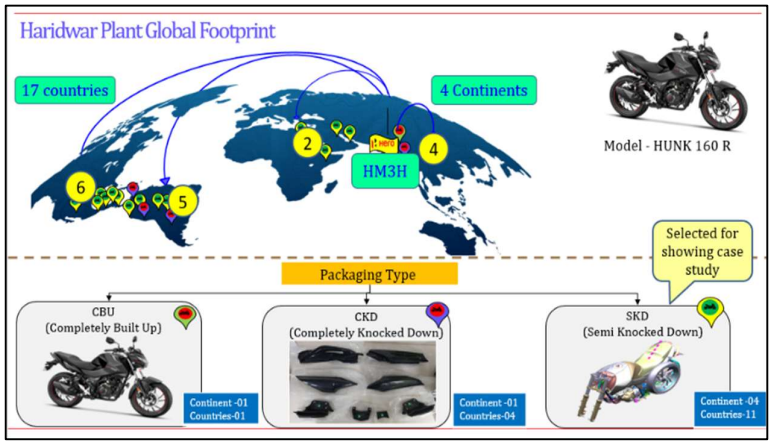


Figure: 2 (c) Packaging types used in export

As contribution of SKD was around 65%, so we analyzed detailed costs involved in SKD and found that the logistics costs were contributing to 76% of total export costs.
After finalizing the project from the above trigger points, we listed down the below parameters that are to be fulfilled by this project. To reduce the cost, we needed to **improve our productivity by increasing no. of vehicle per container.**

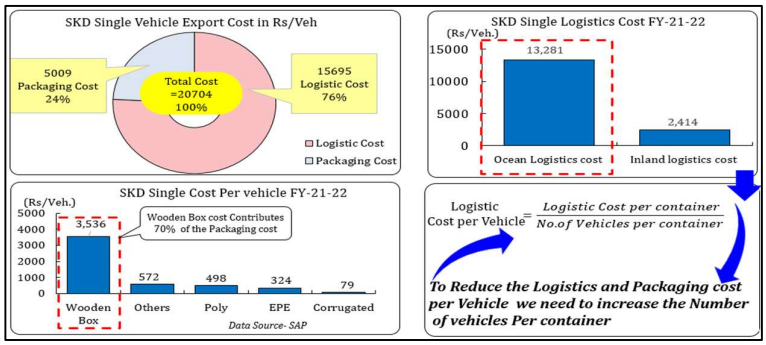


Figure: 2 (d) Export cost break-up

Expected Fulfilments:

S No	Parameter	UOM	% Improvement
1	Total Cost	Index (X)	X-20%

3.Solution generation, Innovation and Complexity:

Based on our learnings and studies regarding **Material Productivity improvement**, we have developed **"4I" model** which comprises of Improving Space utilization of /Box/Carton, incorporating alternate material/technology, increasing container weight utilization and Improving volumetric efficiency of container as per the scope of Production shown in Figure 3(a).

1.Improving Volumetric efficiency of container: **Volumetric efficiency** is defined as the volume used of container by boxes divided by the total volume of the container.

2.Improving space utilization of box: **Space utilization** of the box is defined as volume used of box divided by total volume of the box.

3.Incorporate alternate material/technology: Explore for **alternate material** which have lesser weight and more sustainable to environment.

4.Increasing Container Weight Utilization: Container **weight utilization** is defined as the weight of the container with boxes divided by permissible weight.

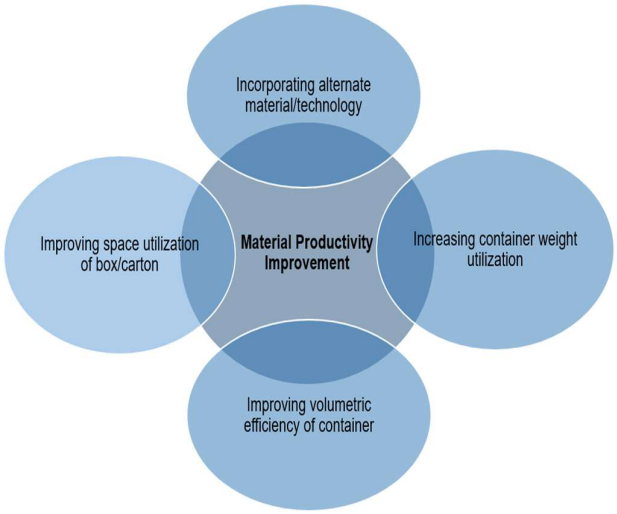
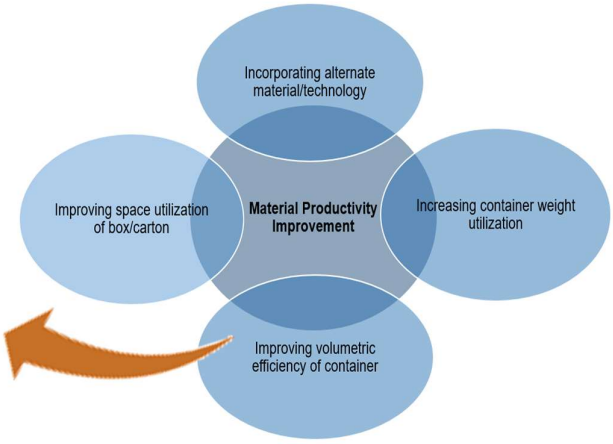
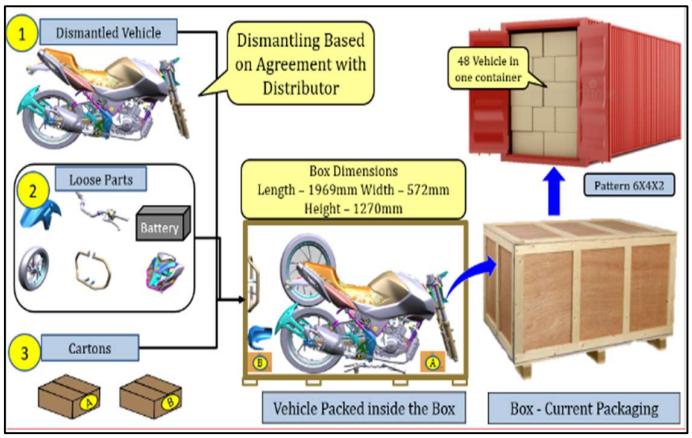


Figure: 3 (a) 4I model for material productivity

3.1 Improving Volumetric efficiency of Container:

To maximize the container utilization, we started exploring for the solutions to maximize the capacity utilization of container in terms of box/container. As of current scenario, we are loading 48 boxes/vehicles in one container as shown in fig.3(b)





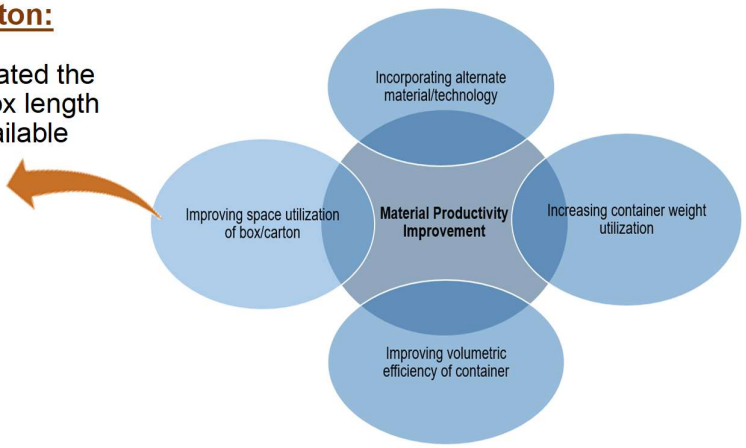
Size of the container is 12040x2377x2591mm and box size is which is 1969x 572x1270 mm. Considering the volume of container we can load maximum 51 vehicles/boxes in container based on box dimensions at 100% utilization.

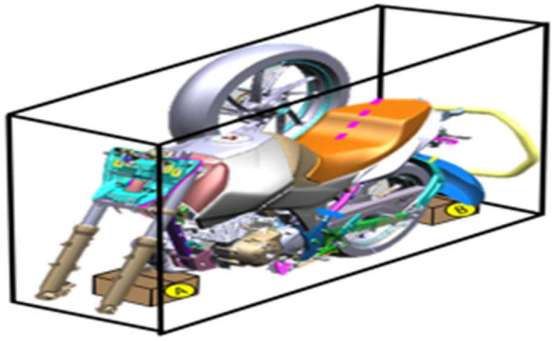
Figure: 3 (b) Container loading

With the same box size, we will not be able to improve the Volumetric efficiency of the container as we are already utilizing 92% of volume of container.
To accommodate more no. of vehicles/boxes we will have to reduce the box size.

3.2 Improving Space Utilization of box/carton:

To improve the space utilization of box, we evaluated the empty space inside the box and found that the box length is fully utilized where as there is ample space available With respect to width and height.





Further, to reduce the length we discussed a proposal with distributor to reduce the length of vehicle and dismantle 5 more parts for better utilization of the space available inside the box as shown in fig.3(c)

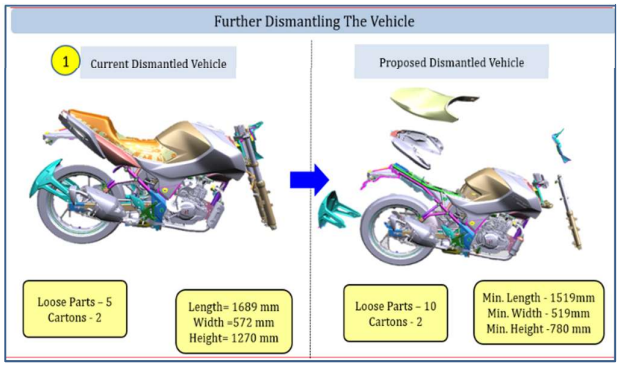
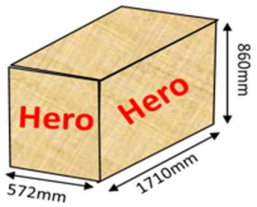


Figure: 3 (c) Further Dismantling Proposal

After getting approval from distributor, we proposed new box size of 1710x572x860mm. This size of box is calculated based on the new length of dismantled vehicle. With the new dimensions of the box, we will be able to store 84 vehicles in one container instead of 48. Refer fig. 3(d) for container capacity calculation as per new proposed boxes.



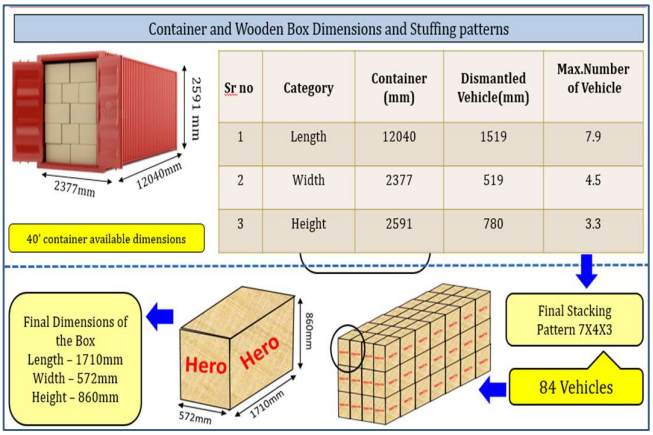
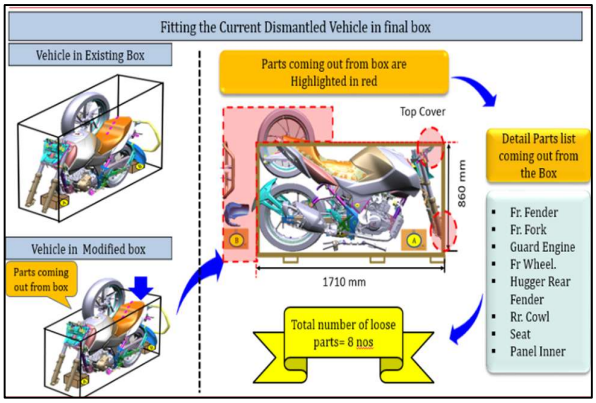


Figure: 3 (d) Container capacity Calculation

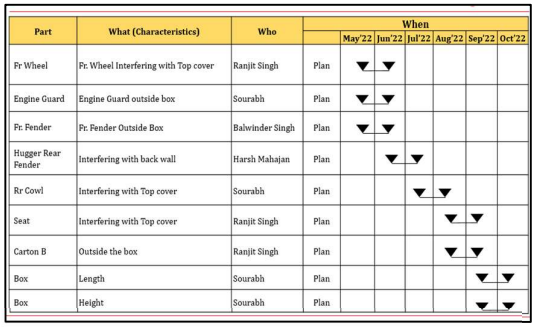
After concluding the box size, we tried to fit existing dismantled vehicle in box and enlisted the parts which were coming out of the box as shown in fig. 3(d)



S. No	Part	Condition in Modified Box
1	Fr Wheel	Fr. Wheel Outside the box by 260 mm
2	Hugger Rear Fender	Fouling with Back side wall of the box – 40 mm
3	Fr Fork	Fouling with front wall
4	Engine Guard	Engine guard Outside Box by 210 mm
5	Rr Cowl	54 Mm fouling with top cover
6	Seat	82 mm fouling with to cover of the box
7	Carton B	95 mm outside the box
8	Panel Inner	Outside the Box
9	Fr. Fender	Fr. Fender Outside Box– 170 mm

Figure: 3 (e) List of parts coming out of modified box

After concluding the details, we made a **plan of action** defining responsibilities of all the team members as shown in fig.3(e)



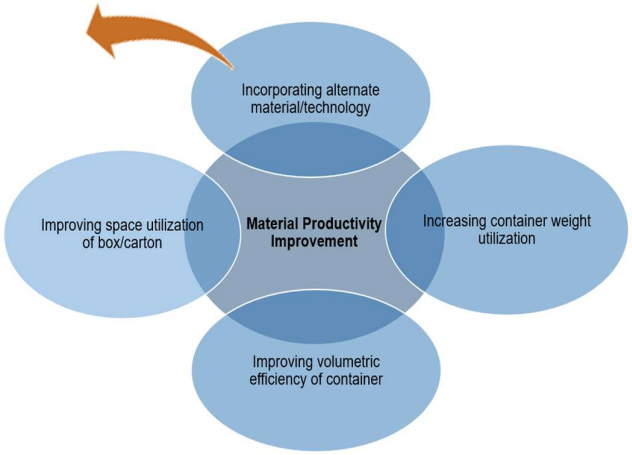
Part	What (Characteristics)	Who	When	May'22	Jun'22	Jul'22	Aug'22	Sep'22	Oct'22
Fr Wheel	Fr. Wheel Interfering with Top cover	Ranjit Singh	Plan						
Engine Guard	Engine Guard outside box	Sourabh	Plan						
Fr. Fender	Fr. Fender Outside Box	Balwinder Singh	Plan						
Hugger Rear Fender	Interfering with back wall	Harsh Mahajan	Plan						
Rr Cowl	Interfering with Top cover	Sourabh	Plan						
Seat	Interfering with Top cover	Ranjit Singh	Plan						
Carton B	Outside the box	Ranjit Singh	Plan						
Box	Length	Sourabh	Plan						
Box	Height	Sourabh	Plan						

Plan of Action: An action plan is a detailed outline that breaks down a larger goal into smaller, manageable chunks. It sets out a timeline, resources needed, and the responsibilities of each team member, ensuring that everyone is on the same page and working towards the same objective.

3.3 Incorporating Alternate Material:

Considering the sustainability needs of the industry we started doing market research and continuously explored for the material which can replace the wood. After the detailed analysis and research, we came to the following conclusion:

1. Steel crate is better in terms of effectiveness and sustainability.
2. All competitors are using steel crate for Latam countries.
3. Distributor is also preferring steel crate over wooden box as it could be recycled and it is better for sustainability.



After making the drawing and 3D model, we de plan of action to develop the steel crate and defined the responsibilities against each task.

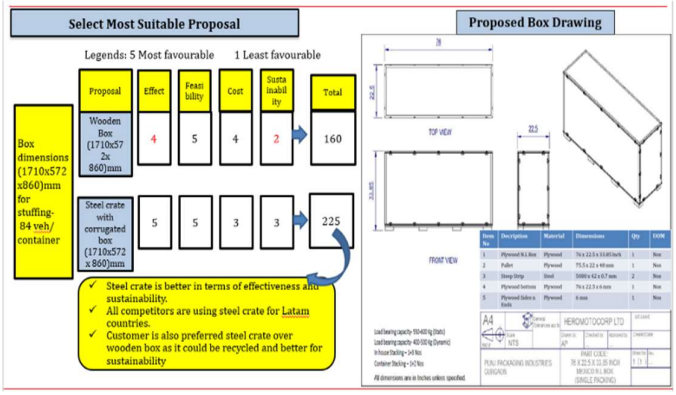


Figure: 3 (f) Steel box frame drawing and 3D model

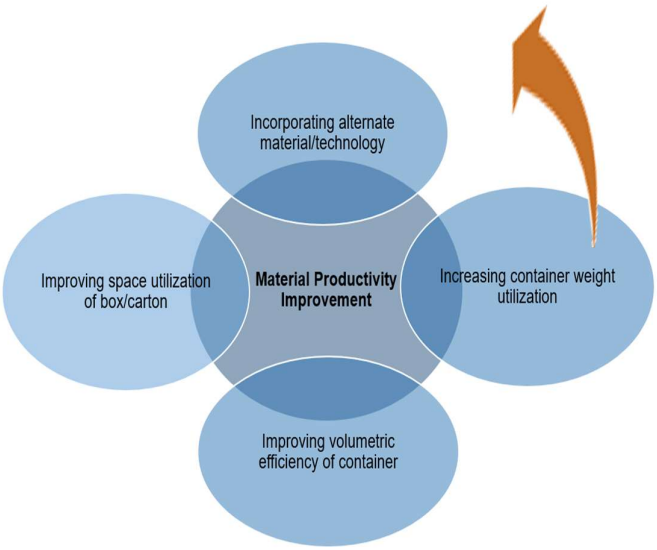
3.4 Increasing Container Weight Utilization:

To check if we are utilizing the permissible weight appropriately, we did following calculations:
Weight of Container = 3840 kg
Permissible Container Weight with vehicles = 28640Kg
Weight of 48 vehicles = 10080 Kg

Weight utilization with 48 vehicles = 48.6%

Weight of 84 vehicles = 14700 Kg

Weight utilization with 84 vehicles = 64.7%
Which is in the permissible limit, so we can go for 84 vehicles.



4.Implementation:

4.1Improving volumetric efficiency of box:

To fill the identified parts in the box we did analysis of the empty space available in the box and tried to fit the parts at available spaces in the box.

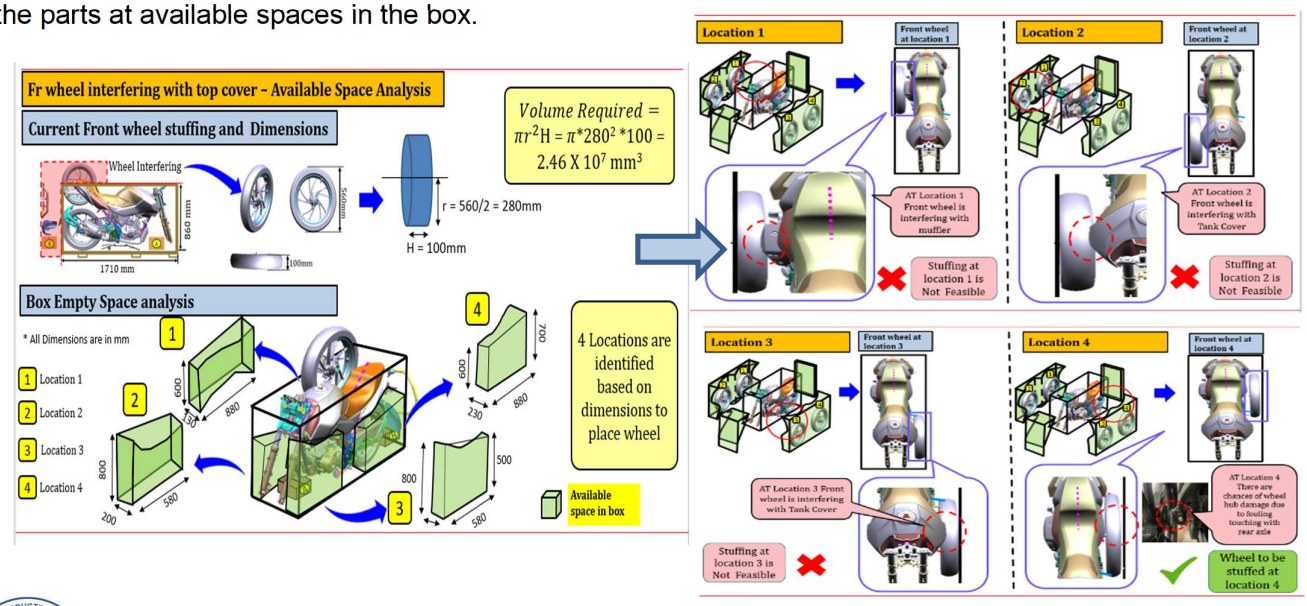


Figure: 4(a) Empty Space analysis and location finalization of front wheel

During implementation, the **challenge** we faced was that at location 4, wheel hub was getting damaged due to fouling with rear axle. To eliminate that rubber cap was provided as shown in fig. 4(b)

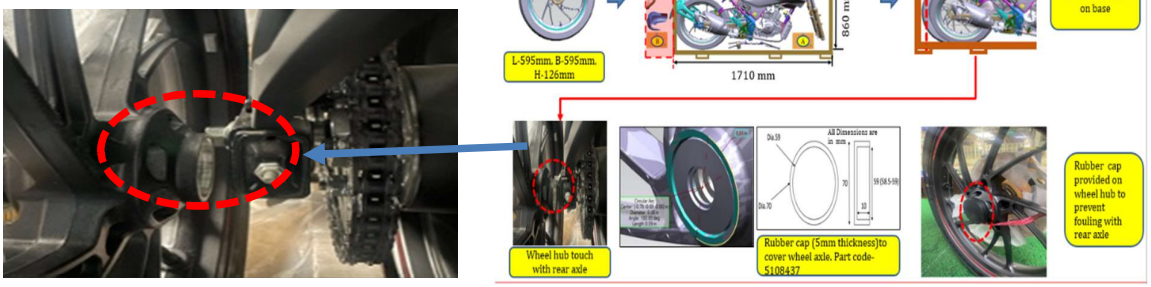


Figure: 4 (b) Rubber cap designed to eliminate fouling

Similarly, we made a list of parts and checked the feasibility constraints of all the parts and identified 11 locations to stuff these11 parts as shown in fig.3(g)

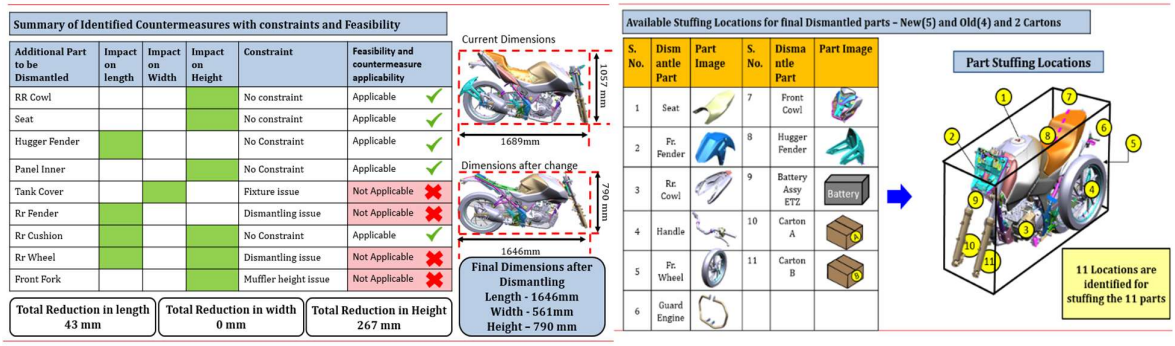


Figure: 4 (c) Empty Space analysis and location finalization

After identifying 11 locations we tried to fit all 11 parts at 11 locations and used permutations and combination to select the best arrangement as shown in fig. 4(d)

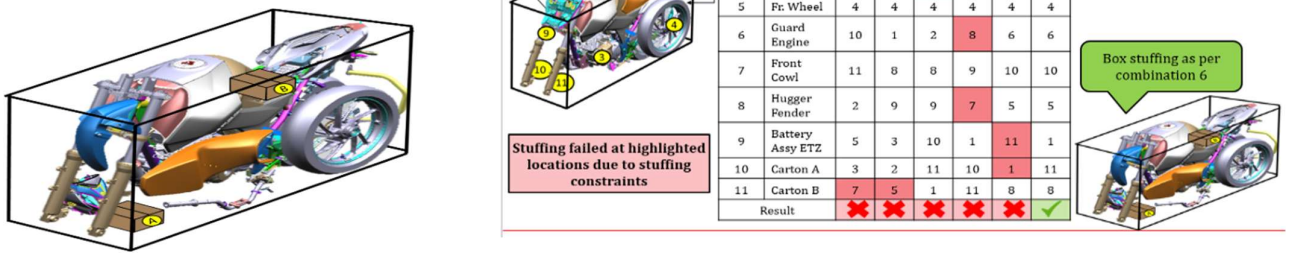


Figure: 4 (d) Permutation and combination for best arrangement

4.2 Implementing Steel crate:

Steel crate developed as per drawing and all the parts stuffed inside the new box as shown in fig. 4(e). To check the effectiveness following tests performed with the new packaging and below observations recorded:

1.Road Test: Test Passed
2.Container Stuffing: Test Passed
3.Drop Test: Test Passed
4.Salt Spray Test: Test Passed
5.Static Load Test: Test Failed

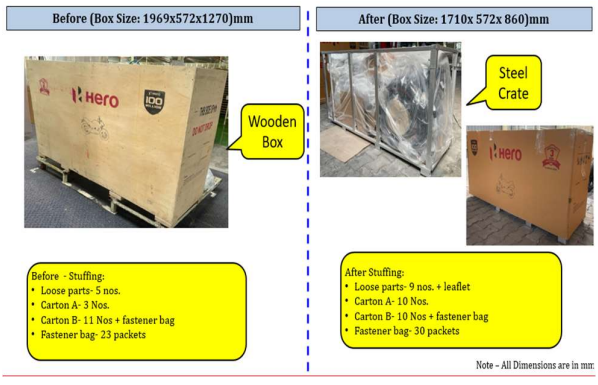
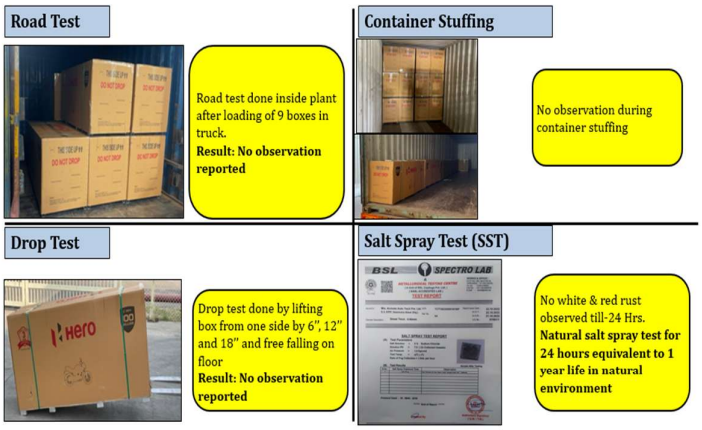


Figure: 4 (e) Steel crate replaced with wood



In static load test, slight bending observed at corners of top cover. To overcome this problem, we did detail stress analysis of the structure and concluded

U channel support to be provided at all corners as shown in fig.4(g)

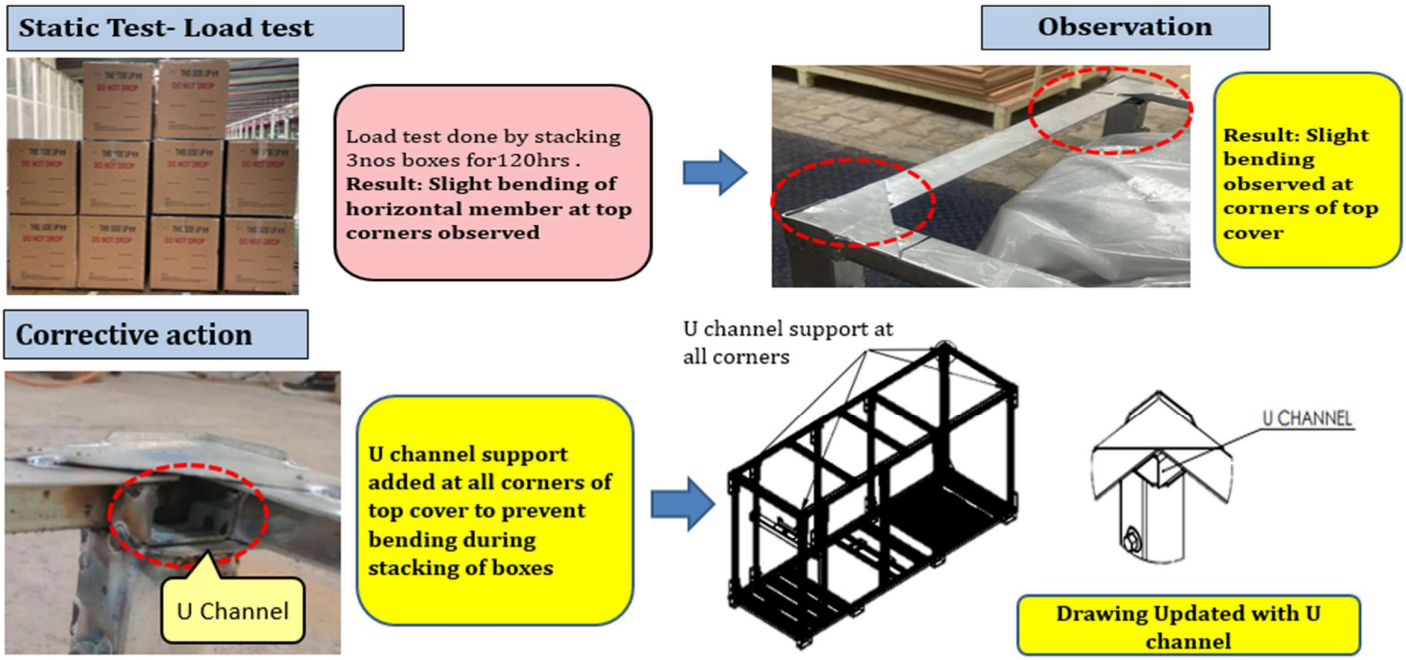
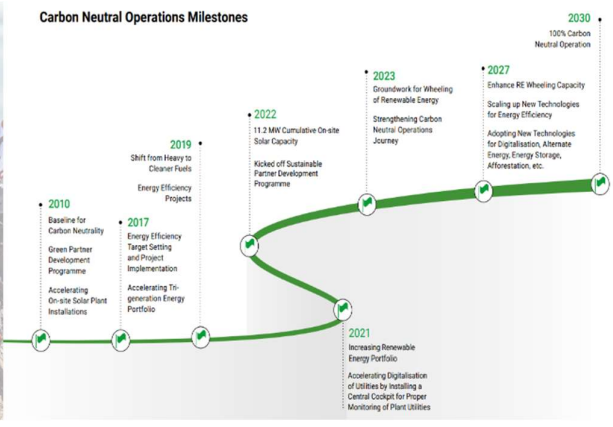


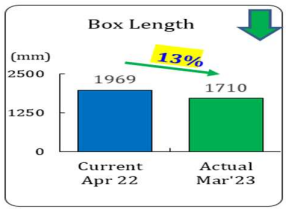
Figure: 4 (g) Different tests performed on new packaging

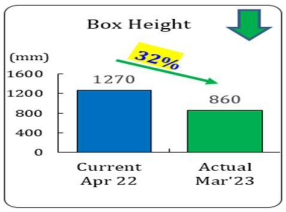
4b. Green as a management Concept:

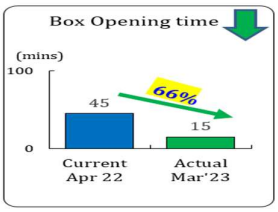
Inline to Hero MotoCorp's Ambitious targets on sustainability (HATS), our Project promoted significant reduction in Carbon footprints by replacing wood with steel. Our company's mile stone is to become 100% carbon neutral operations by 2030.

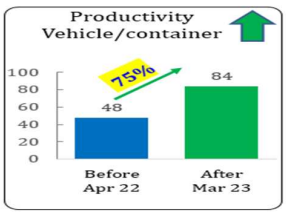


5.Results/ Impact:









6. Business sustainability and future focus:

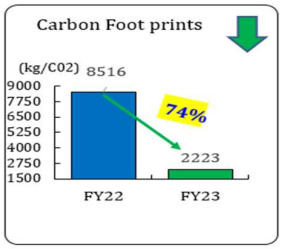
In order to establish a resilient business eco-system, we adopted and implemented the sustainable business practices and focus on improving continual productivity through benchmarking our practices with respect to the competitors

Future focus initiatives:

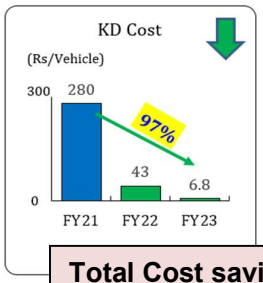
- Creating **Flow Production** through developing Heijunka and Kanban Concepts
- Increase **Innovation & Automation Culture**
- Cost Reduction through adoption of **New technology**

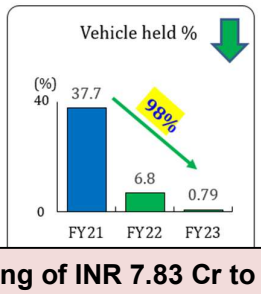
7. Resource Impact:

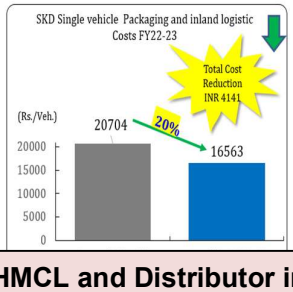
Since the adoption of the Steel crates in our packaging operation for improving the productivity has significantly reduced the Carbon footprint by 6293 Kg/CO2 as shown in graph.



8.Business Metrics:





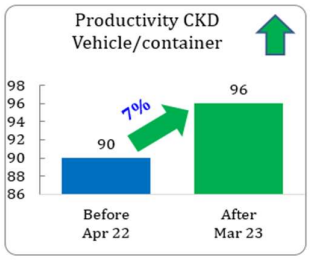


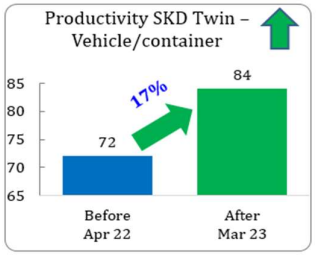
Total Cost saving of INR 7.83 Cr to HMCL and Distributor in FY2023.

- Net Cost saving of INR 1.9 Cr to HMCL
- Net Cost saving of INR 5.93 Cr to Distributor

9.Horizontal Deployment:

We have implemented the same to complete knock down and semi knock down twin vehicle type of packing and improved the volumetric efficiency of the boxes.





10.Laurels of Project:

Awarded 1st Prize at Hero Next

Case Study presented for TPM Special Award