FAKULTÄT FÜR
MASCHINENBAU

Design & Additive Manufacturing Processes

Topology Optimisation of Monitor Wall Mount

Group P

RUSHAL KALKURA - 244618
SHASHANK PAWAR ESHWARA - 244334
ROSHAN PRUTHVISH ASHOKAN – 244381
NITHIN KANIKYASWAMY– 244669
YATHISH NAGARAJ – 244509
YASHWANTH MADHU - 244380

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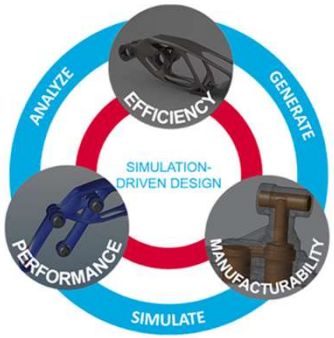
SOFTWARE USED

Altair Inspire is the leading software for innovative design and engineering throughout the entire product development process.
Inspire empowers design engineers to innovate products faster – without the need for expert simulation knowledge. Inspire helps teams to solve design challenges, including system simulation, structural performance, motion and fluid simulations, as well as manufacturability all within a single platform.

Advantages of Altair Inspire



- Increase Quality

Altair Inspire allows users to rapidly explore and assess designs for static loads, normal modes, buckling and motion through an intuitive user experience leveraging its embedded physics engine.

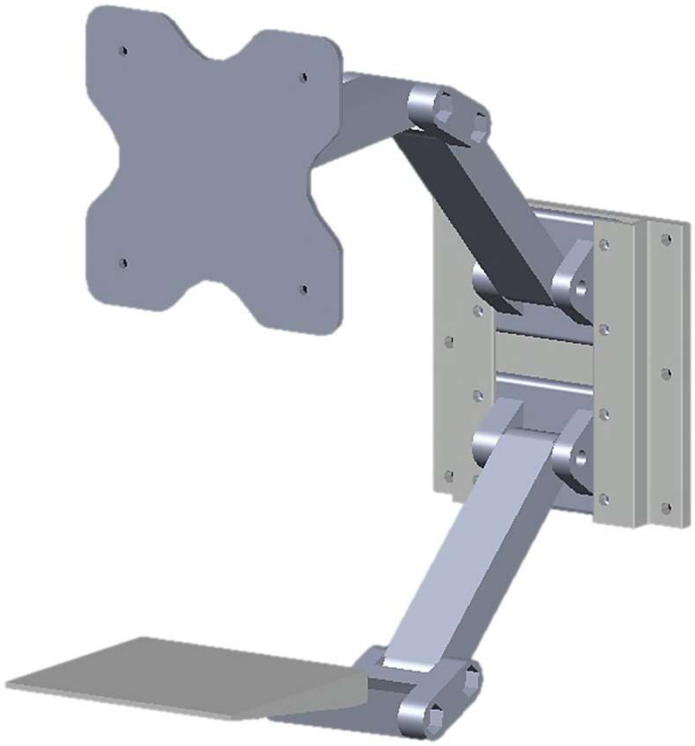
- Reduce Costs

Leveraging simulation-driven design with Inspire early and often in the design process enables costs savings by reducing material usage, re-design iterations, and overall design time.

- Faster Development

Simulation-driven design equips its users with the tools necessary to accelerate their overall design process. Inspire helps them to streamline the production of high-performance, quality parts and products.

ASSEMBLY IMAGE (BEFORE OPTIMISATION)



MONITOR WALL MOUNT

A monitor wall mount is a device that allows a computer monitor to be mounted on a wall, rather than sitting on a desk or other surface. This type of mount can be useful in a variety of settings, such as offices, homes, and classrooms, where space is limited or where it is desired to have a more ergonomic setup.

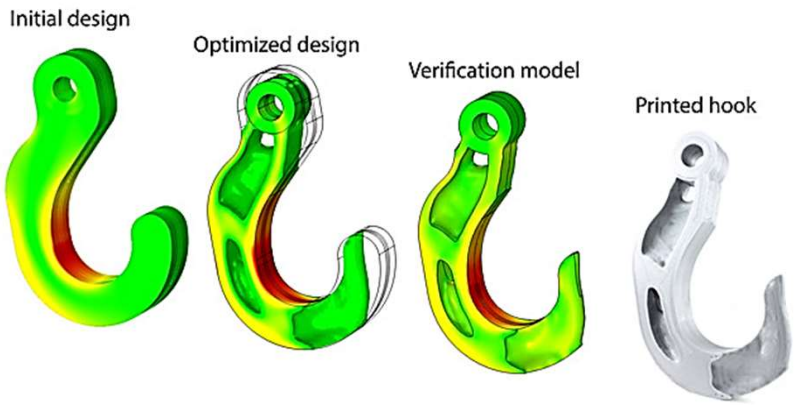
- There are different types of monitor wall mounts available, depending on the size and weight of the monitor and the specific needs of the user.
- When choosing a monitor wall mount, it is important to consider the weight and size of the monitor, as well as the VESA pattern, which is the distance between the mounting holes on the back of the monitor. It is also important to consider the accessibility of the cables and ports on the monitor once it is mounted.
- Additionally, users should make sure the mount is compatible with their wall type, as some mounts require different type of installation for different wall types. Once installed, monitor wall mounts can free up valuable desk space, improve ergonomics, and create a more organized and professional-looking work environment.

ADDITIVE MANUFACTURING OF MONITOR WALL MOUNT

3D PRINTER

- Additive manufacturing, also known as 3D printing, is a technology that allows for the creation of complex, three-dimensional objects by building them up layer by layer. This technology can be used to create a wide range of products, including monitor wall mounts.
- In the case of additive manufacturing of monitor wall mounts, the design of the mount is created using computer-aided design (CAD) software and then the design is fed into a 3D printer. The 3D printer then creates the mount by laying down successive layers of material, such as plastic or metal, until the final product is complete.
- One of the advantages of additive manufacturing for creating monitor wall mounts is that it allows for the creation of complex, custom designs that would be difficult or impossible to achieve using traditional manufacturing methods. Additionally, additive manufacturing can produce parts with a high degree of precision and accuracy.
- Another advantage of additive manufacturing is that it can be used to produce small quantities of parts, which can be useful for prototyping or for creating custom mounts for unique situations.
- However, the cost of 3D printer and the materials used in the process can be high and may not be cost-effective for mass production. Additionally, the strength and durability of the parts may not be as good as those produced using traditional manufacturing methods.
- Overall, additive manufacturing can be a useful tool for creating custom monitor wall mounts, but its use should be evaluated on a case-by-case basis taking into account the specific needs and constraints of the project.

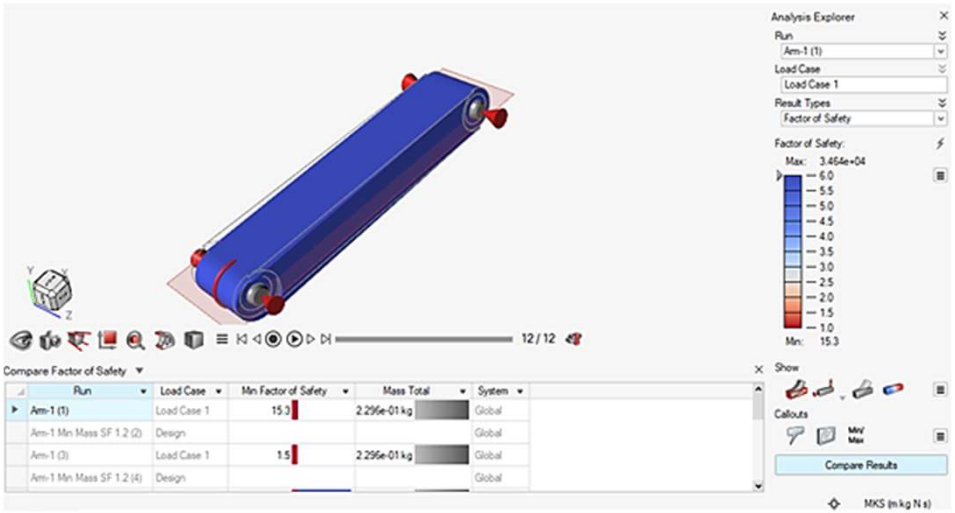
TOPOLOGY OPTIMIZATION

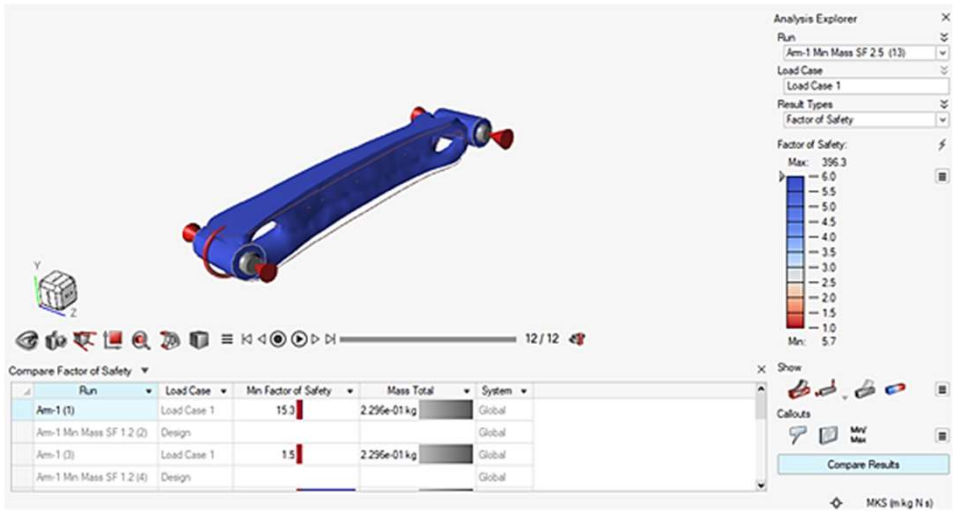


Topology Optimization Workflow

- Topology optimization is a computer-based method used to find the optimal shape and structure of a product or component based on certain design constraints and performance criteria.
- In the case of a monitor wall mount assembly, topology optimization can be used to find the most efficient and effective design for the mount. This could include factors such as weight, strength, stiffness, and cost.
- By using topology optimization, engineers can identify the most important areas of the mount that need to be reinforced or reinforced, and also identify any areas that can be removed or made thinner without compromising the overall structural integrity of the assembly.
- Additionally, topology optimization can also be used to find the best shape and size of the mount to fit a specific monitor while ensuring that all the necessary cables and ports are accessible.
- Furthermore, topology optimization can also be used to optimize the design of the wall mount assembly with respect to the manufacturing process, such as 3D printing or injection moulding. It can identify the most appropriate design for different manufacturing methods based on the specific constraints of the process.
- In summary, topology optimization is done for monitor wall mount assembly to find the most efficient and effective design that meets the performance and cost requirements while taking into account the specific needs and constraints of the project.

ARM TOPOLOGY OPTIMIZATION



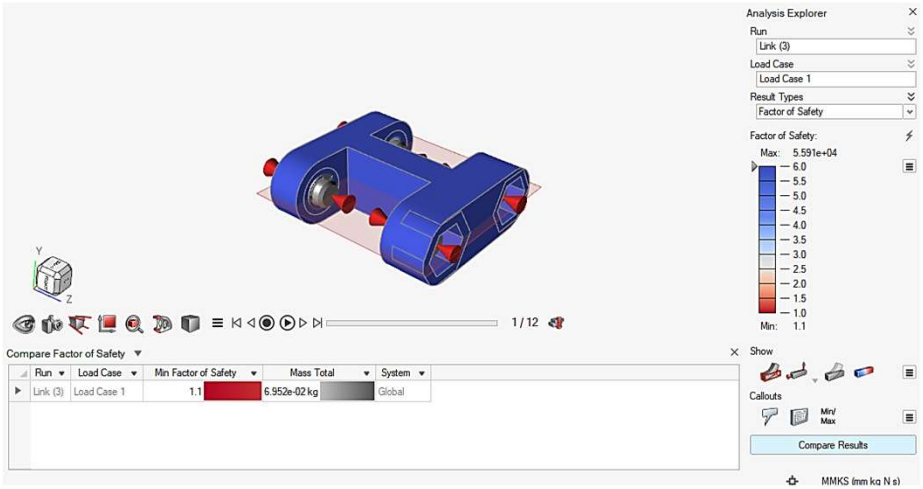


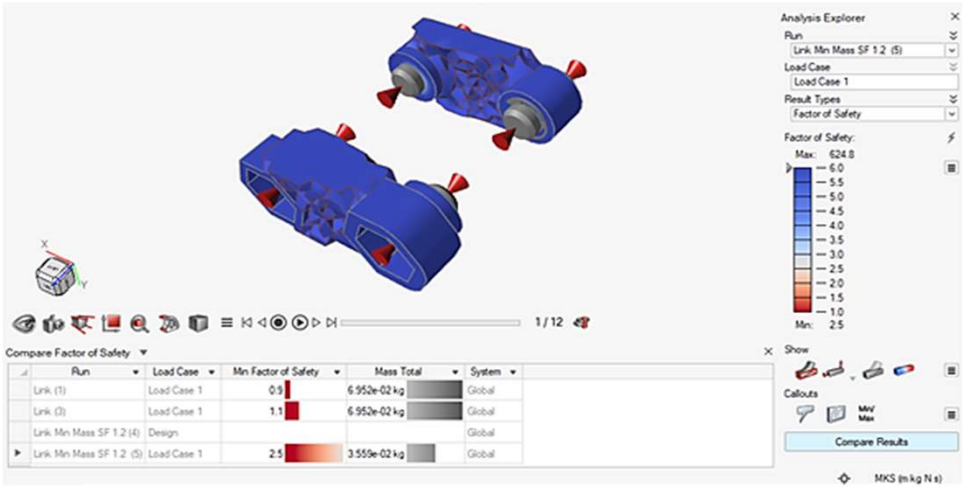
Initial Weight : 229.60g
Material Type : Aluminium 2024

Final Weight : 79.99g
Result After optimization:
Mass Decrease by 65.16%.

RUSHAL KALKURA - 244618

LINK TOPOLOGY OPTIMIZATION



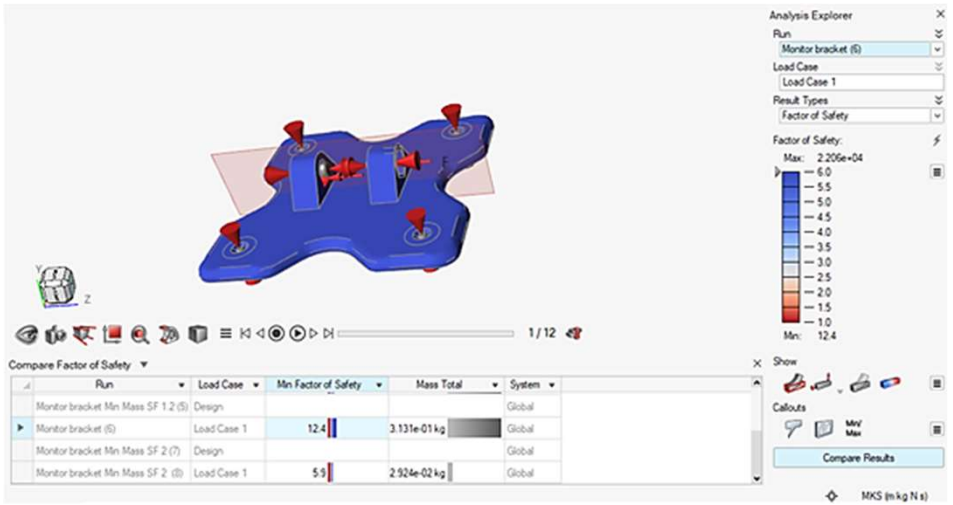


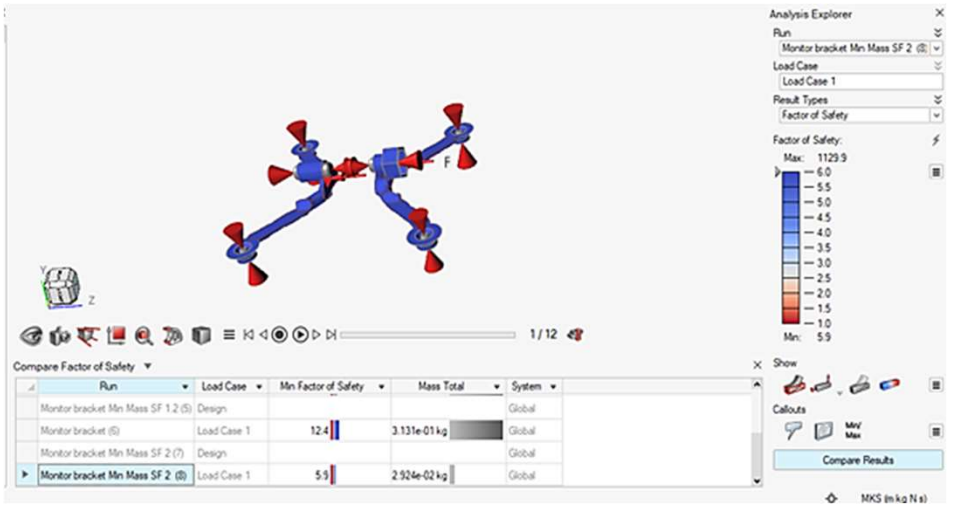
Initial Weight : 69.52g
Material Type : Aluminium 2024 T3

Final Weight : 35.59g
Result After optimization:
Mass Decrease by 48.92%

NITHIN KANIKYASWAMY– 244669

MONITOR MOUNT TOPOLOGY OPTIMIZATION



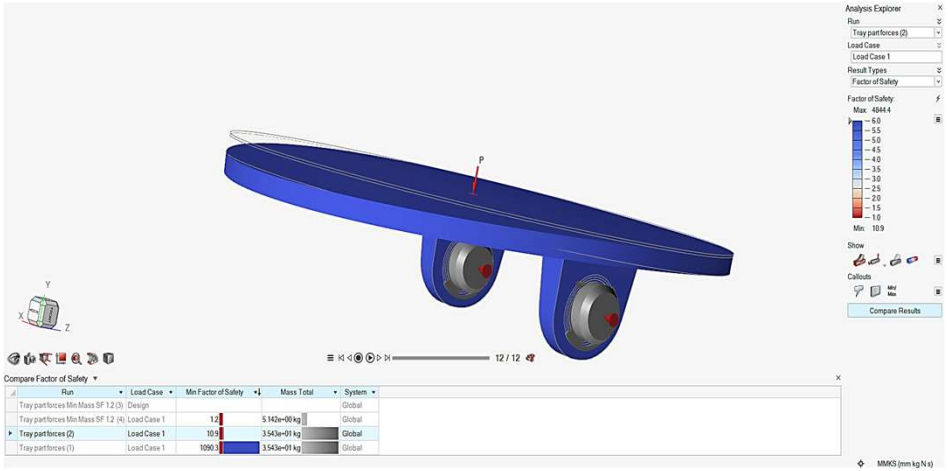


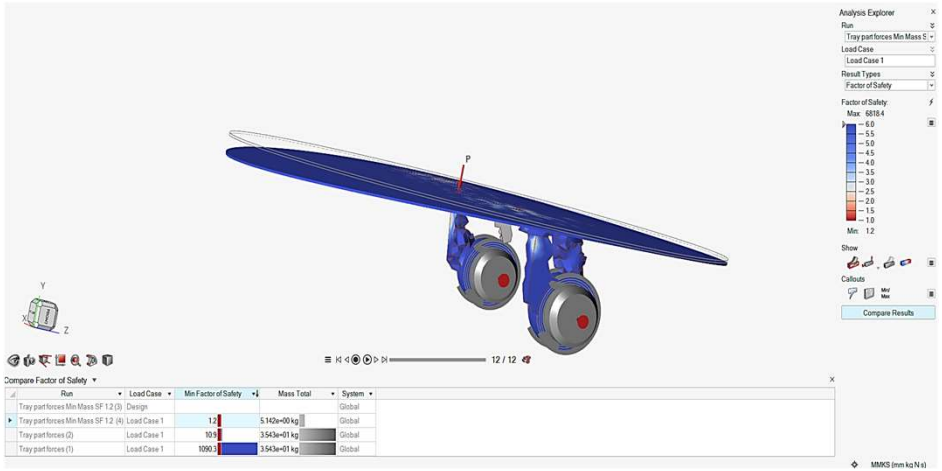
Initial Weight : 313g
Material Type : Aluminium 2024 T3

Final Weight : 29.24g
Result After optimization:
Mass Decrease by 90.65%

ROSHAN PRUTHVISH ASHOKAN – 244381

END TRAY TOPOLOGY OPTIMIZATION



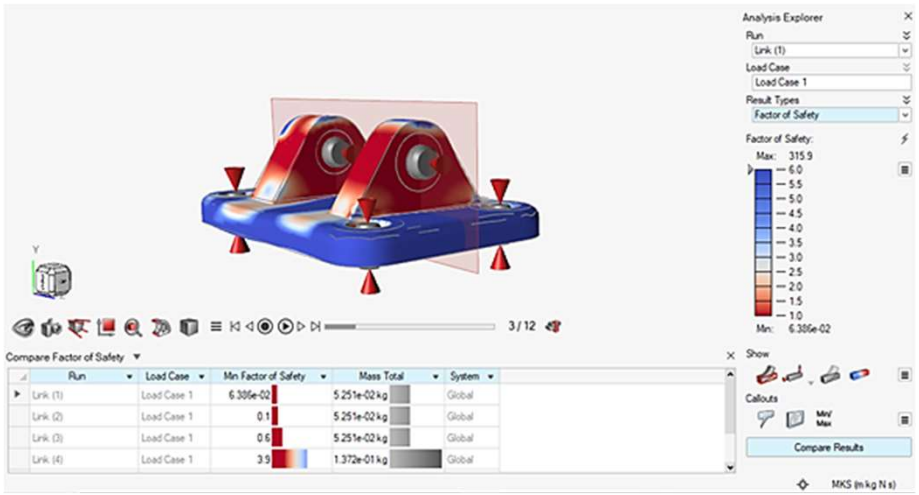


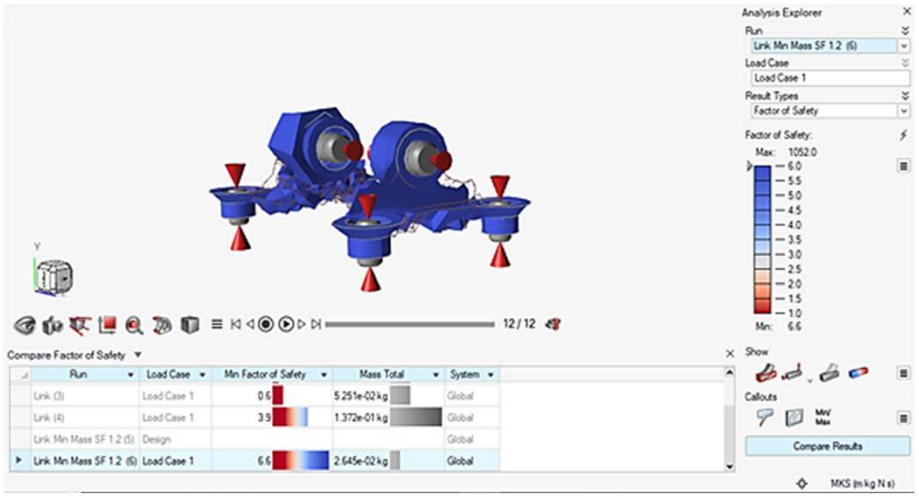
Initial Weight : 3684.21g
Material Type : Aluminium 2024 T3

Final Weight : 673.68g
Result After optimization:
Mass Decrease by 81.71%

YASHWANTH MADHU - 244380

MOUNTING BRACKET TOPOLOGY OPTIMIZATION



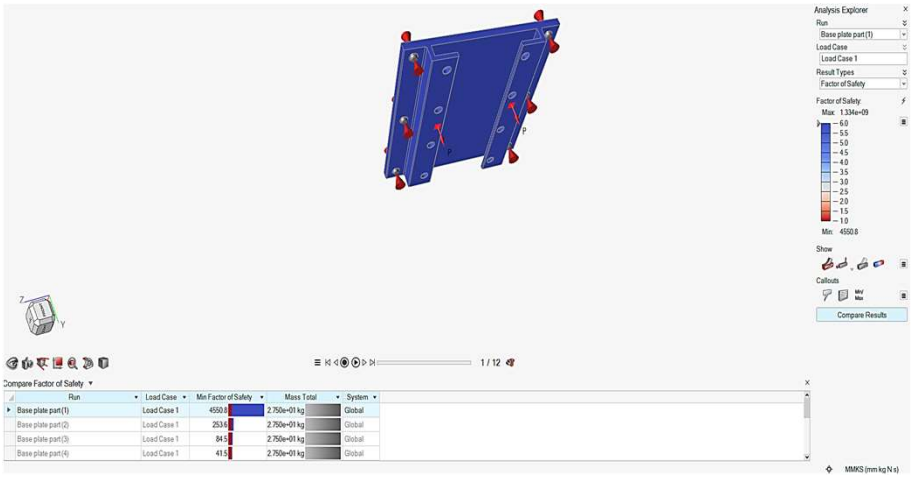


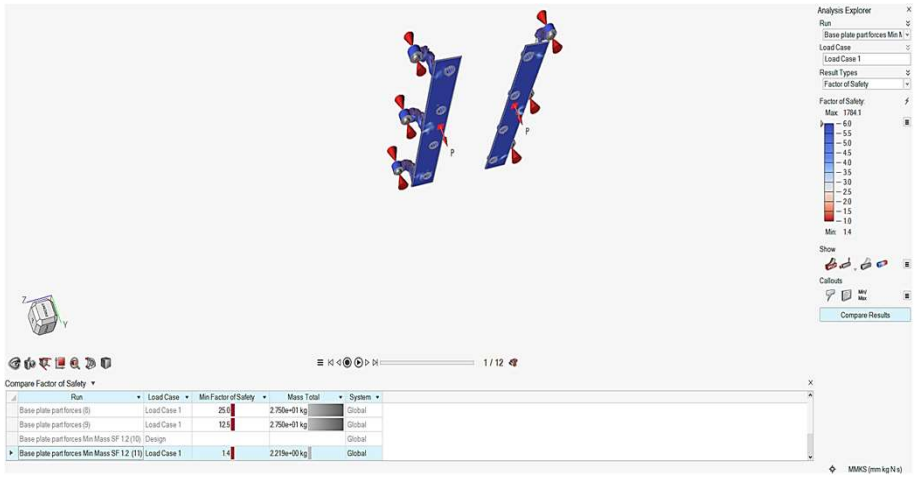
Initial Weight : 52.51g
Material Type : Aluminium 2024 T3

Final Weight : 26.45g
Result After optimization:
Mass Decrease by 49.62%

YATHISH NAGARAJ – 244509

BASE PLATE TOPOLOGY OPTIMIZATION



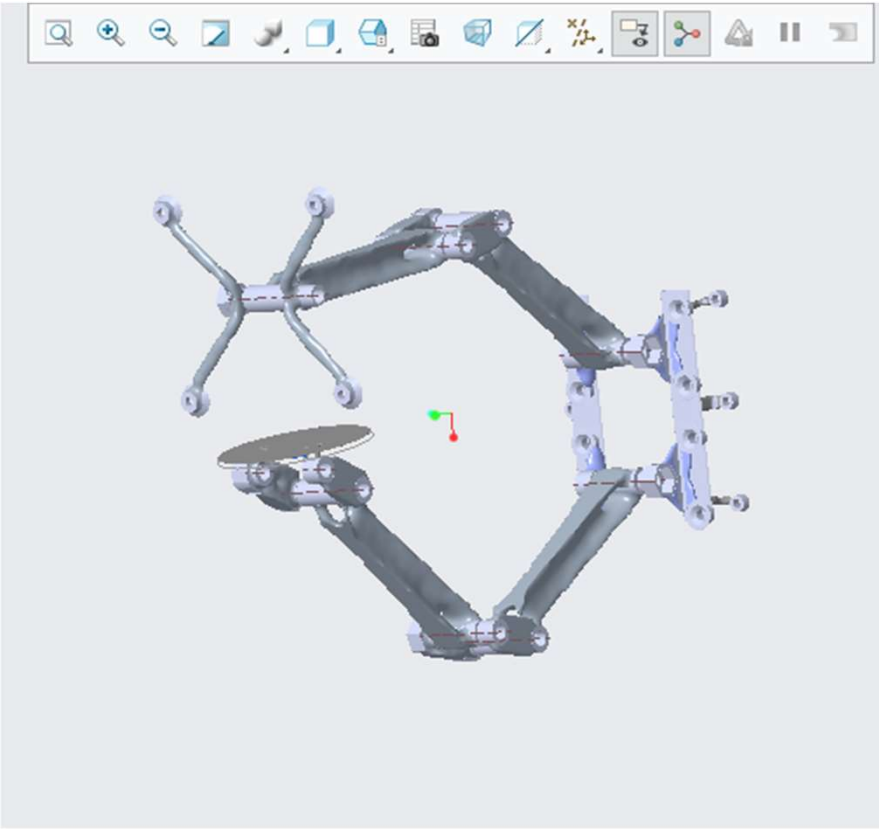


Initial Weight : 2894.73g
Material Type : Aluminium 2024 T3

Final Weight : 232.63g
Result After optimization:
Mass Decrease by 91.96%

SHASHANK PAWAR ESHWARA - 244334

ASSEMBLY (AFTER OPTIMIZATION)

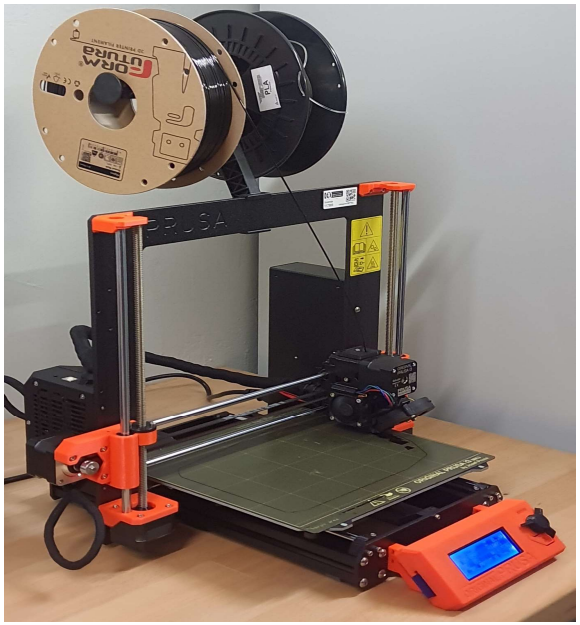


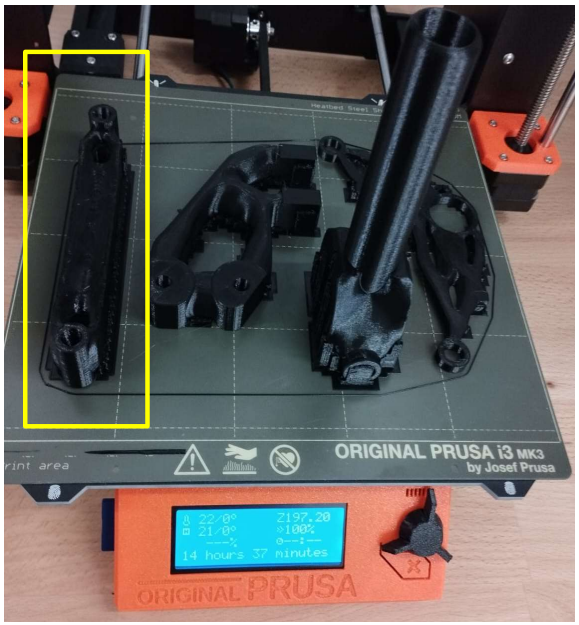
With the help of topology optimization we have been able to optimize and develop an efficient version of the wall mount. Therefore, planning the integration of topology optimization with traditional manufacturing tools will help guide engineering in the right direction.

It is evident that topology optimization and additive manufacturing is the future of the manufacturing industry, faster adoption of these methods only means they give a competitive lead with fellow manufacturers.

8123.92g	1415.18g	82.58%
Initial Mass	Final Mass	Percentage Decrease

3D PRINTING





ORIGINAL PRUSA i3 MK3 used for 3D printing

- 3D printing is a process of creating a three-dimensional solid object from a digital model by laying down successive layers of material.
- ORIGINAL PRUSA i3 MK3 was used for printing our part which is arm.
- The steps in the 3D printing process are :

- Design
- Slicing
- Preparation
- Printing
- Post-processing
- Finishing
- Inspection


DANKE
schön