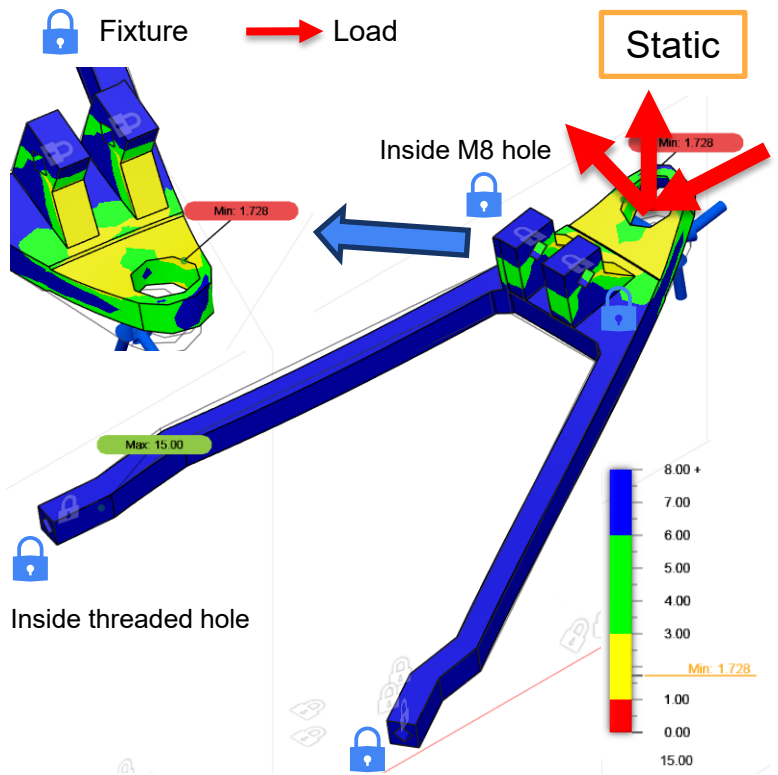
Component Design Overview TM01+

Component Name	System Name	Date
Rear Upper A-arm	Rear suspension	July 12th 2025

FAE Result



Loading condition, result analysis

Loading Condition:

Vertical force due to bumping

- (Assumption) Vehicle weighs 400kg and rear carries 60%.
- (Assumption) Bumping force is 3g. (g = 9.81m/s^2)
- Bumping force of **3530N** at **spherical bearing opening**, directed **upward**.

Braking force

- (Assumption) Acceleration during braking is -30km/h^2 (-8.33m^2).
- Braking force of **1000N** at the spherical bearing opening, directed **rearward**.

Cornering force

- (Assumption) Max cornering force is 1g. (g = 9.81m/s^2)
- Cornering force of **1177N** on the tire rod.

Minimum FoS:

- **1.728** at the root of protruding section for pushrod mounting.

Result analysis

- Minimum FoS greater than required FoS of 1.5.
- Weak points between spherical bearing and pushrod mounting point.

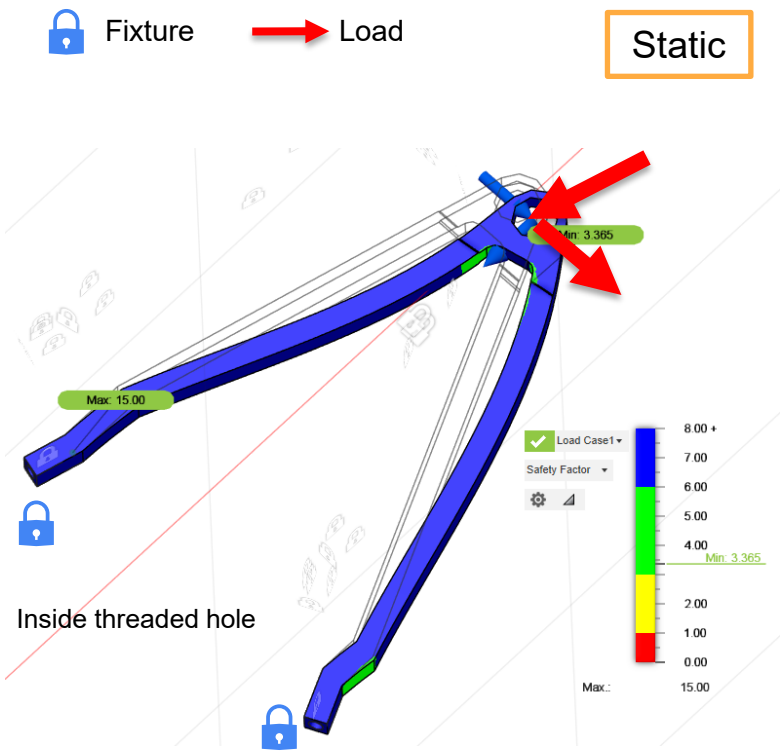
Impact Analysis

- Bending of A-arm breaks suspension geometry and excessively increases camber angle. This will significantly undermine overall vehicle performance.
- Fracture will break link between sprang / unsprang mass and car will be unable to drive.

Component Design Overview TM01+

Component Name	System Name	Date
Rear Lower A-arm	Rear suspension	July 12th 2025

FAE Result



Loading condition, result analysis

Loading Condition:.

Braking force

- (Assumption) Acceleration during braking is -30km/h^2 (-8.33m^2).
- Braking force of **1000N** at the spherical bearing opening, directed **frontward**.

Cornering force

- (Assumption) Max cornering force is 1g. (g = 9.81m/s^2)
- Cornering force of **1177N** on the tire rod.

Minimum FoS:

- **3.36** at the root of protruding section for pushrod mounting.

Result analysis

- Minimum FoS greater than required FoS of 1.5.
- Weak points at inner fillet, around spherical bearing opening.

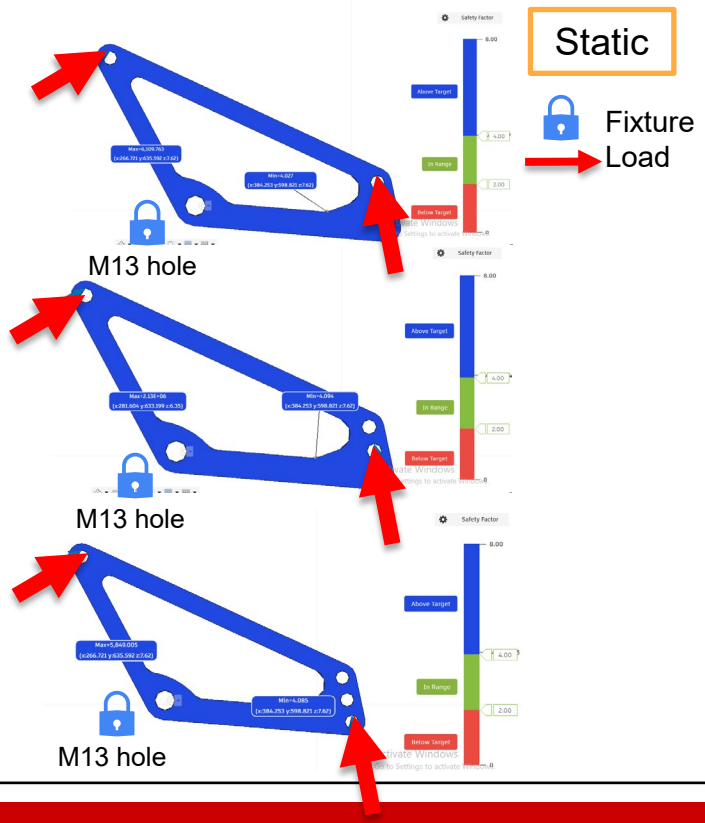
Impact Analysis

- Lower A-arm will not carry a lot of force compared to Upper A-arm. However, it still carries cornering and braking force so it should certainly made strong.

Component Design Overview TM01+

Component Name	System Name	Date
Front Rocker (2)	Front suspension	August 10th 2025

FAE Result



Loading condition, result analysis

Loading Condition:

- (Assumption) Vehicle weighs 400kg and front carries 40%.
- (Assumption) Bumping force is 3g. (g = 9.81m/s^2)
- Since there are two rocker plates, assuming each carries half of the force, compressive force of **1177N from two outer pivot points.**

Minimum FoS:

- **4.027** at the edge of inner removed geometry.

Result analysis

- Minimum FoS greater than required FoS of 4.0.

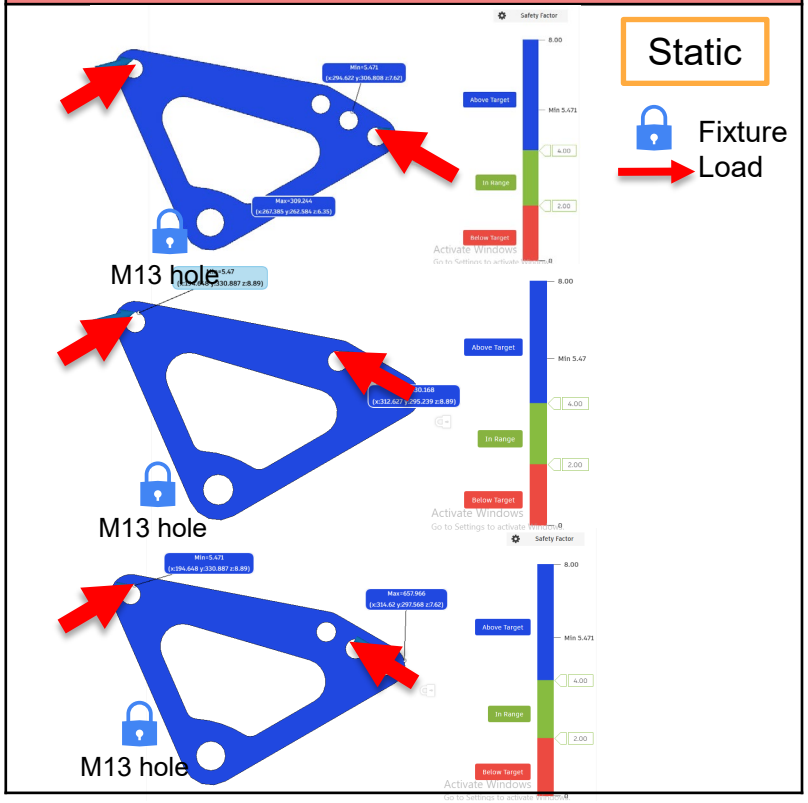
Impact Analysis

- Rocker translates the load from unsprang mass to sprang mass. During run even slight deformation will break the geometry, leading to detrimental effect on the car.
- Therefore, this component is very critical in suspension system and fracture is never accepted.

Component Design Overview TM01+

Component Name	System Name	Date
Rear Rocker (2)	Front suspension	August 10th 2025

FAE Result



Loading condition, result analysis

Loading Condition:

- (Assumption) Vehicle weighs 400kg and front carries 40%.
- (Assumption) Bumping force is 4.2g. (g = 9.81m/s^2)
- Since there are two rocker plates, assuming each carries half of the force, compressive force of **2471N from two outer pivot points.**

Minimum FoS:

- **5.47** at the edge of inner removed geometry.

Result analysis

- Minimum FoS greater than required FoS of 4.0.

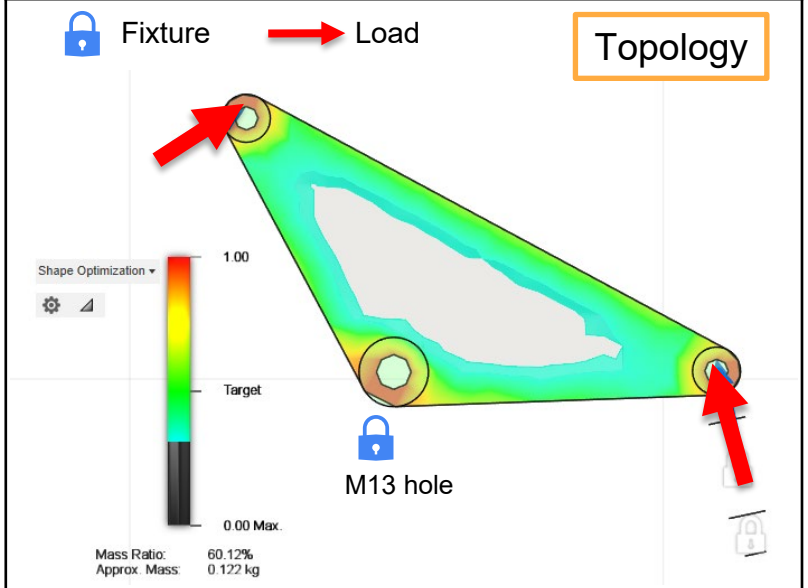
Impact Analysis

- Rocker translates the load from unsprang mass to sprang mass. During run even slight deformation will break the geometry, leading to detrimental effect on the car.
- Therefore, this component is very critical in suspension system and fracture is never accepted.

Component Design Overview TM01+

Component Name	System Name	Date
Front Rocker (1)	Front suspension	July 12th 2025

FAE Result



Loading condition, result analysis

Loading Condition:

- (Assumption) Vehicle weighs 400kg and front carries 40%.
- (Assumption) Bumping force is 3g. (g = 9.81m/s^2)
- Since there are two rocker plates, assuming each carries half of the force, compressive force of **1177N from two outer pivot points.**

Result analysis

- The shape could be optimized by removing mass around center. The shape should be removed while frequently running FEA to see when FoS becomes below 4.0.
- More load concentrates at the end of triangle, thus mass should not be removed from there.

Impact Analysis

- Rocker translates the load from unsprang mass to sprang mass. During run even slight deformation will break the geometry, leading to detrimental effect on the car.
- Therefore, this component is very critical in suspension system and fracture is never accepted.

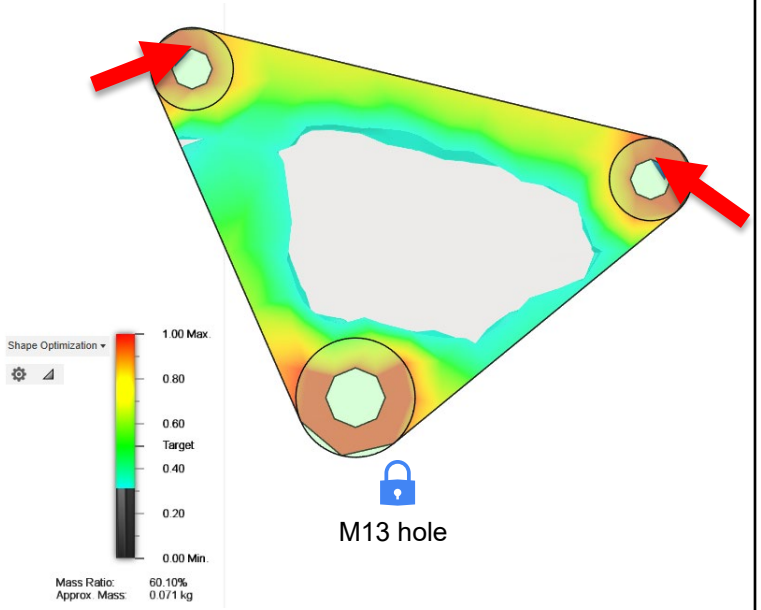
Component Design Overview TM01+

Component Name	System Name	Date
Rear Rocker (1)	Rear suspension	July 12th 2025

FAE Result

Fixture → Load

Topology



Loading condition, result analysis

Loading Condition:

- (Assumption) Vehicle weighs 400kg and rear carries 60%.
- (Assumption) Bumping force is 3g. (g = 9.81m/s^2)
- Since there are two rocker plates, assuming each carries half of the force, compressive force of **1765N from two outer pivot points.**

Result analysis (same as Front Rocker)

- The shape could be optimized by removing mass around center. The shape should be removed while frequently running FEA to see when FoS becomes below 4.0.
- More load concentrates at the end of triangle, thus mass should not be removed from there.

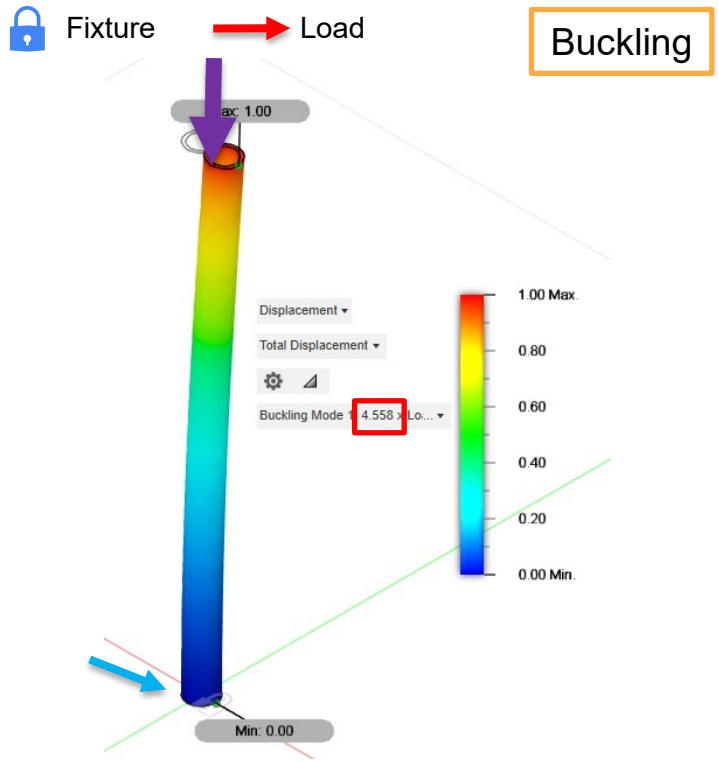
Impact Analysis

- Rocker translates the load from unsprang mass to sprang mass. During run even slight deformation will break the geometry, leading to detrimental effect on the car.
- Therefore, this component is very critical in suspension system and fracture is never accepted.

Component Design Overview TM01+

Component Name	System Name	Date
Rear Tire Rod	Rear suspension	July 12th 2025

FAE Result



Loading condition, result analysis

Loading Condition:

- (Assumption) Vehicle weighs 400kg and rear carries 60%.
- (Assumption) Max cornering force is 1g. (g = 9.81m/s^2)
- Cornering force of **1177N** on the tire rod.

Minimum Load Factor:

- **4.558** (Structure will buckle at the 4.558 x applied load)

Result analysis

- Load factor greater than required Load factor of 4.0.
- Hence, no need to change outer diameter of rear tire rod.

Impact Analysis

- Rear tire rod prevents the rear wheel from steering by accident. Fracture / bending will lead to unpredictable behavior of the rear wheels by changing rear toe angle.
- Therefore even slight bending is not acceptable.