

# Relatório de análise de tensão - Invólucro Smooth Comum



|                              |   |
|------------------------------|---|
| Arquivo analisado:           | conceito4_SC.ckpt                         |
| Versão do Autodesk Inventor: | 2024.2 (Build 282272000, 272)             |
| Data de criação:             | 13/11/2024, 17:59                         |
| Autor do estudo:             | Fabio P. C.                               |
| Resumo:                      | Forças = 10,6066 N<br>Momentos 2123,2 Nmm |

## Análise estática:1

### Objetivo geral e configurações:

|   |                   |
|---|-------------------|
| Objetivo do projeto                       | Ponto único       |
| Tipo de estudo                            | Análise estática  |
| Data da última modificação                | 13/11/2024, 17:58 |
| Estado do modelo                          | [Principal]       |
| Detectar e eliminar modos de corpo rígido | Não               |

## iProperties

### Resumo

|       |             |
|-------|-------------|
| Autor | Fabio P. C. |
|-------|-------------|

### Projeto

|                 |              |
|-----------------|--------------|
| Nº da peça      | conceito4_SC |
| Projetista      | Fabio P. C.  |
| Custo estimado  | R\$ 0,00     |
| Data da criação | 15/01/2022   |

### Status

|                   |                 |
|-------------------|-----------------|
| Estado do projeto | TrabalhoEmCurso |
|-------------------|-----------------|

### Física

|                     |   |
|---------------------|---|
| Material            | Smooth Comum                                  |
| Densidade           | 2,458 g/cm <sup>3</sup>                       |
| Massa               | 0,418945 kg                                   |
| Área                | 88987,2 mm <sup>2</sup>                       |
| Volume              | 170442 mm <sup>3</sup>                        |
| Centro de gravidade | x=20,7446 mm<br>y=19,8263 mm<br>z=-23,8947 mm |

Nota: os valores físicos podem ser diferentes dos valores físicos utilizados por FEA indicados a seguir.

### Configurações de malha:

|  |      |
|--|------|
| Tamanho médio dos elementos (fração do diâmetro do modelo) | 0.25 |
| Tamanho mínimo dos elementos (fração do tamanho médio)     | 0.2  |

|                                |         |
|--------------------------------|---------|
| Fator de nivelamento           | 1.5     |
| Ângulo máximo de giro          | 60 grau |
| Criar elementos de malha curva | Sim     |

## Materiais

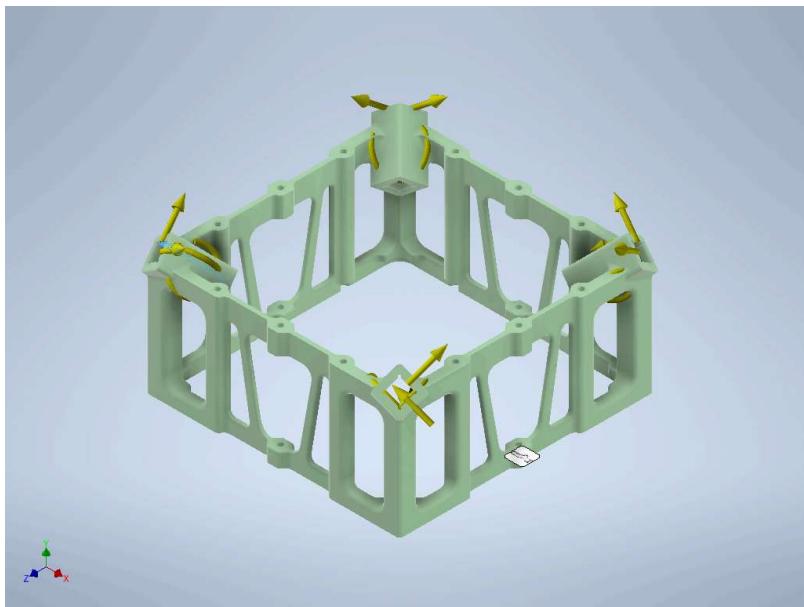
|                 |                             |                         |
|-----------------|-----------------------------|-------------------------|
| Nome            | Smooth Comum                |                         |
| Geral           | Densidade de massa          | 2,458 g/cm <sup>3</sup> |
|                 | Resistência à escoamento    | 17,95 MPa               |
|                 | Resistência máxima à tração | 17,95 MPa               |
| Tensão          | Módulo de Young             | 1,1883 GPa              |
|                 | Coeficiente de Poisson      | 0,47 s_m                |
|                 | Módulo cortante             | 0,404184 GPa            |
| Nome(s) de peça | conceito4_SC.ckpt           |                         |

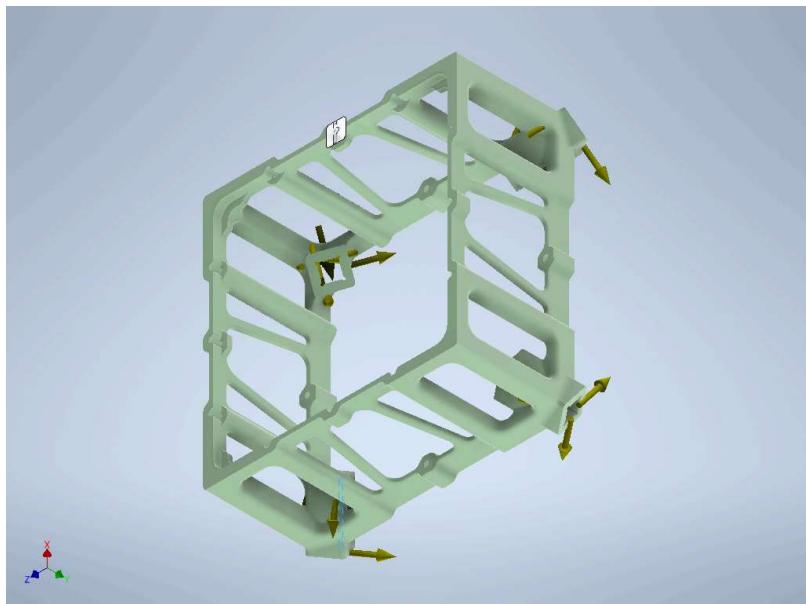
## Condições de funcionamento

### Momento:1

|               |                |
|---------------|----------------|
| Tipo de carga | Momento        |
| Magnitude     | 2123,200 N mm  |
| Vetor X       | -448,685 N mm  |
| Vetor Y       | 1225,830 N mm  |
| Vetor Z       | -1674,515 N mm |

### Faces selecionadas

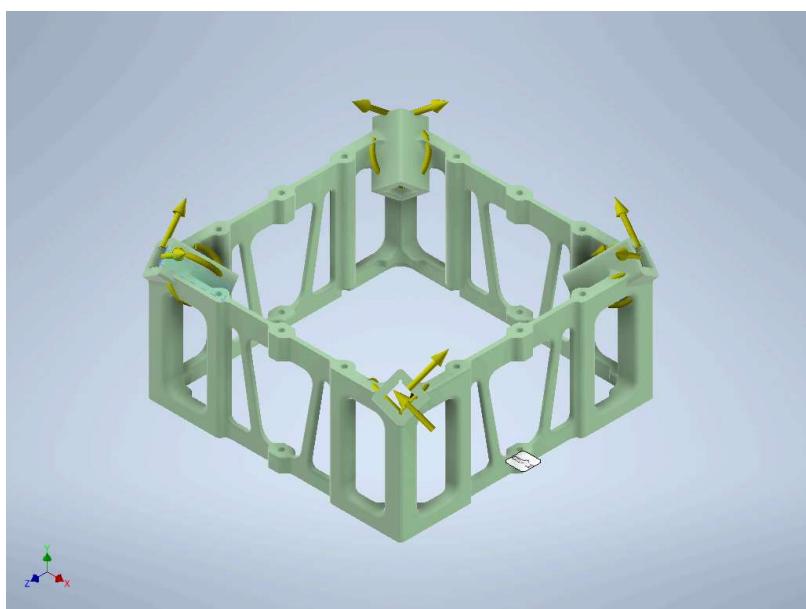


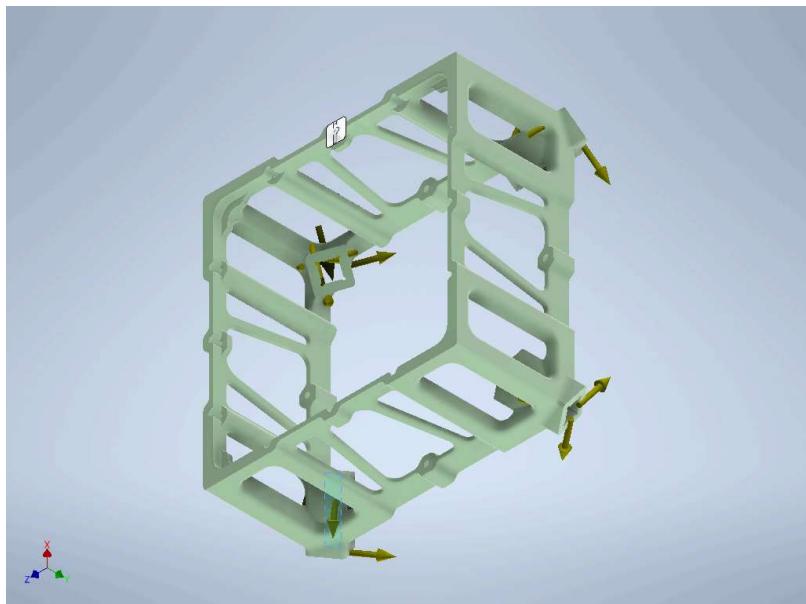


### Momento:2

| Tipo de carga | Momento        |
|---------------|----------------|
| Magnitude     | 2123,200 N mm  |
| Vetor X       | -1674,515 N mm |
| Vetor Y       | -1225,830 N mm |
| Vetor Z       | -448,685 N mm  |

### Faces selecionadas

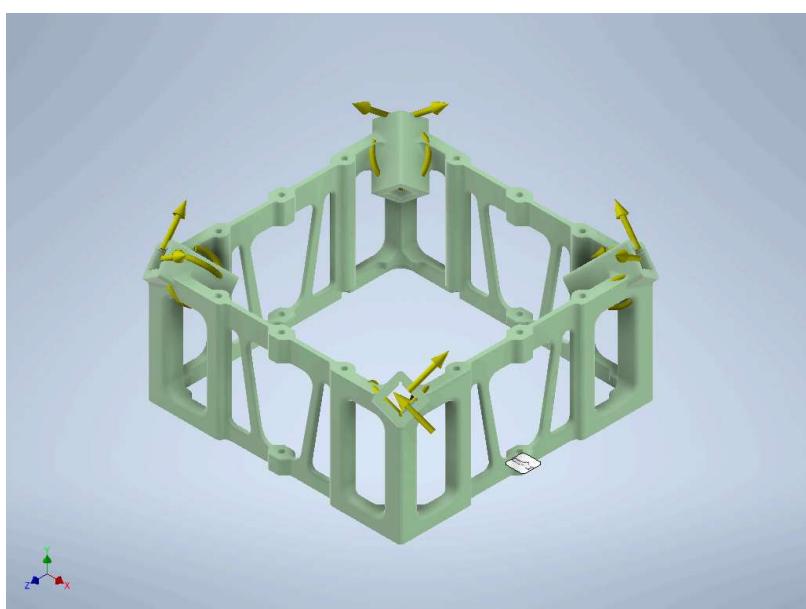




### Momento:3

| Tipo de carga | Momento        |
|---------------|----------------|
| Magnitude     | 2123,200 N mm  |
| Vetor X       | -1674,515 N mm |
| Vetor Y       | 1225,830 N mm  |
| Vetor Z       | 448,685 N mm   |

### Faces selecionadas

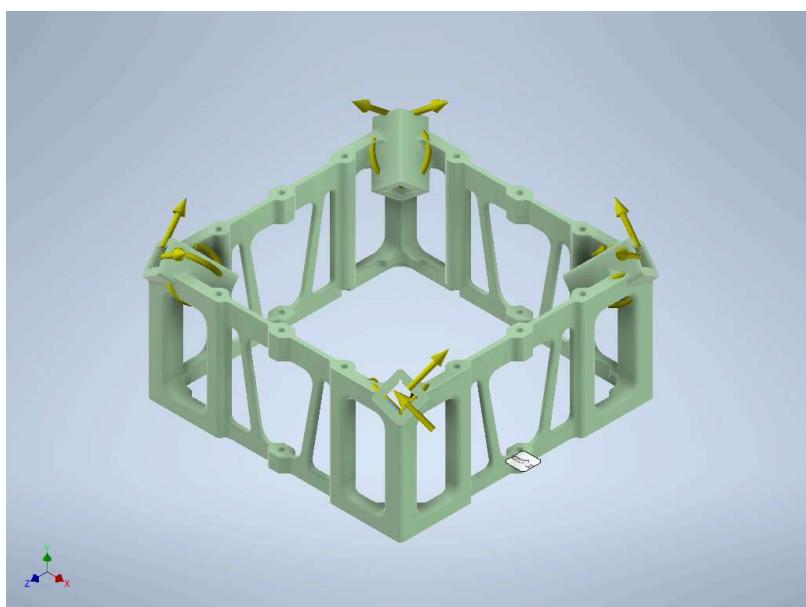


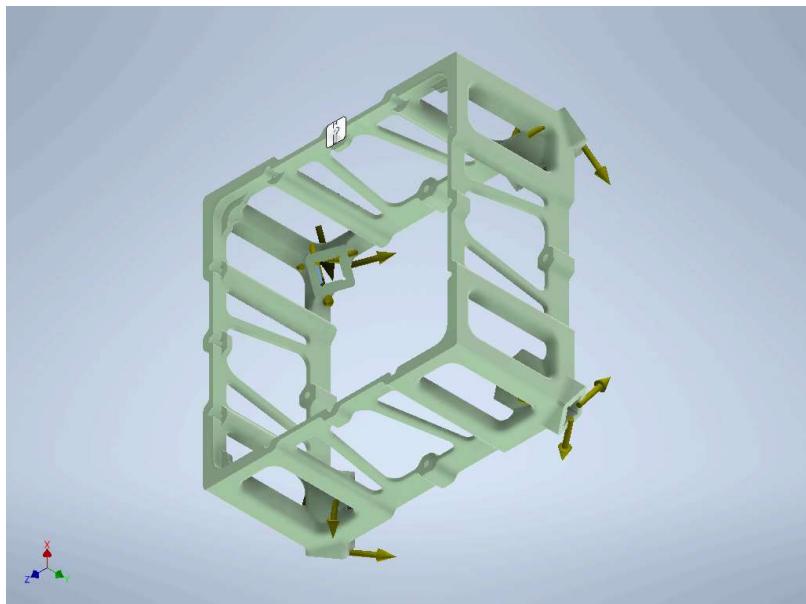


#### Momento:4

| Tipo de carga | Momento        |
|---------------|----------------|
| Magnitude     | 2123,200 N mm  |
| Vetor X       | -448,685 N mm  |
| Vetor Y       | -1225,830 N mm |
| Vetor Z       | 1674,515 N mm  |

#### Faces selecionadas

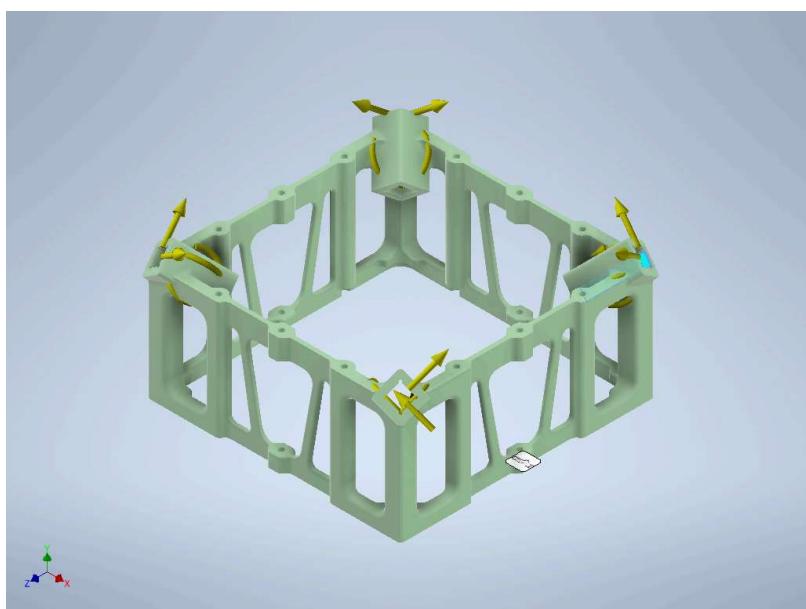


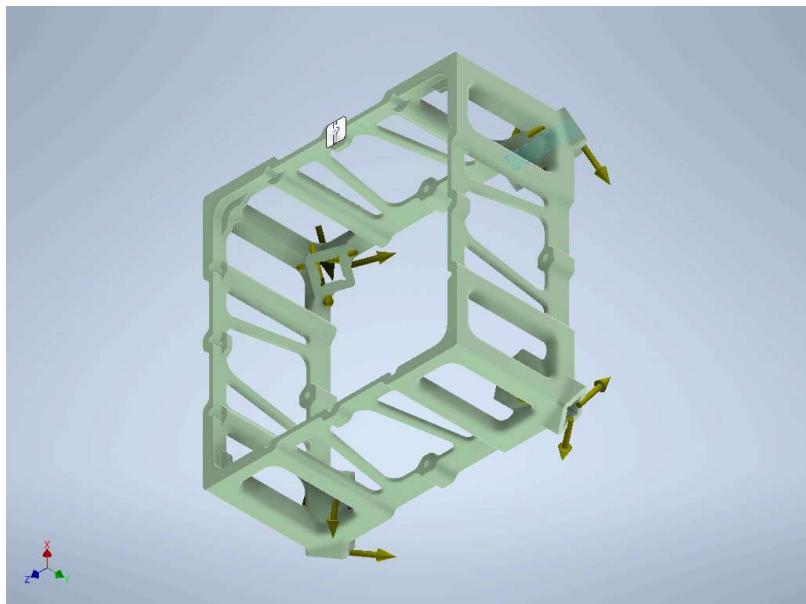


### Momento:5

| Tipo de carga | Momento       |
|---------------|---------------|
| Magnitude     | 2123,200 N mm |
| Vetor X       | 448,685 N mm  |
| Vetor Y       | 1225,830 N mm |
| Vetor Z       | 1674,515 N mm |

### Faces selecionadas

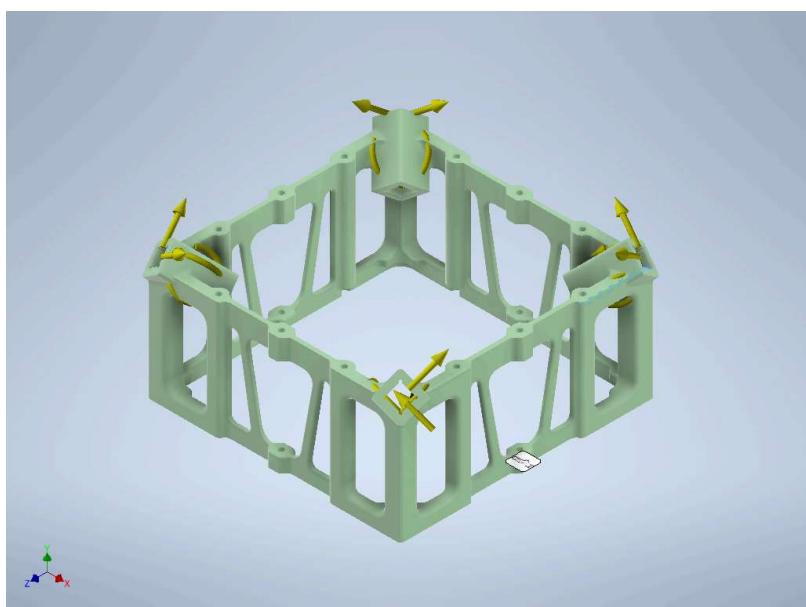




### Momento:6

| Tipo de carga | Momento        |
|---------------|----------------|
| Magnitude     | 2123,200 N mm  |
| Vetor X       | 1674,515 N mm  |
| Vetor Y       | -1225,830 N mm |
| Vetor Z       | 448,685 N mm   |

### Faces selecionadas

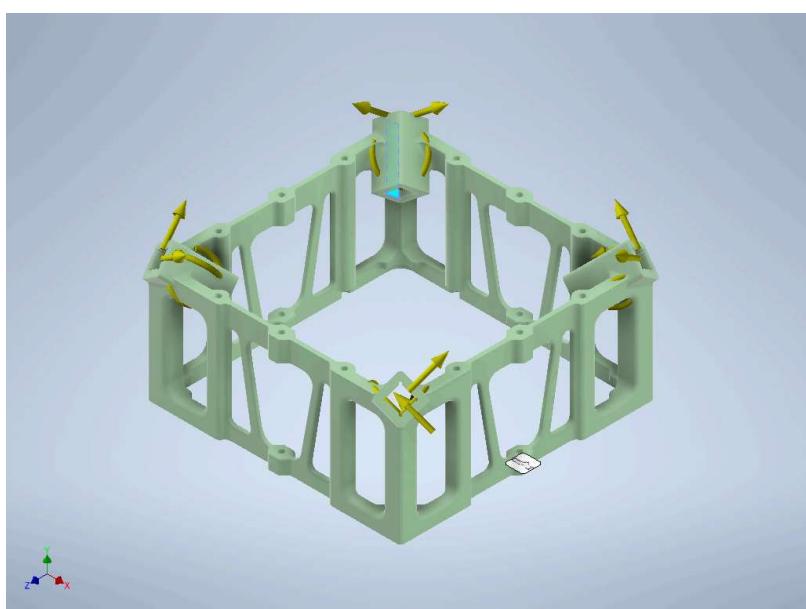




### Momento:7

| Tipo de carga | Momento       |
|---------------|---------------|
| Magnitude     | 2123,200 N mm |
| Vetor X       | 1674,515 N mm |
| Vetor Y       | 1225,830 N mm |
| Vetor Z       | -448,685 N mm |

### Faces selecionadas

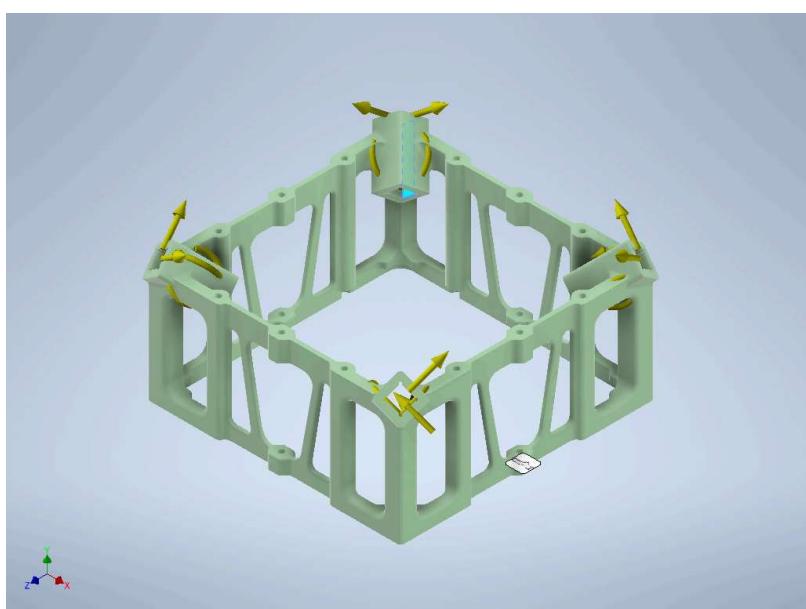


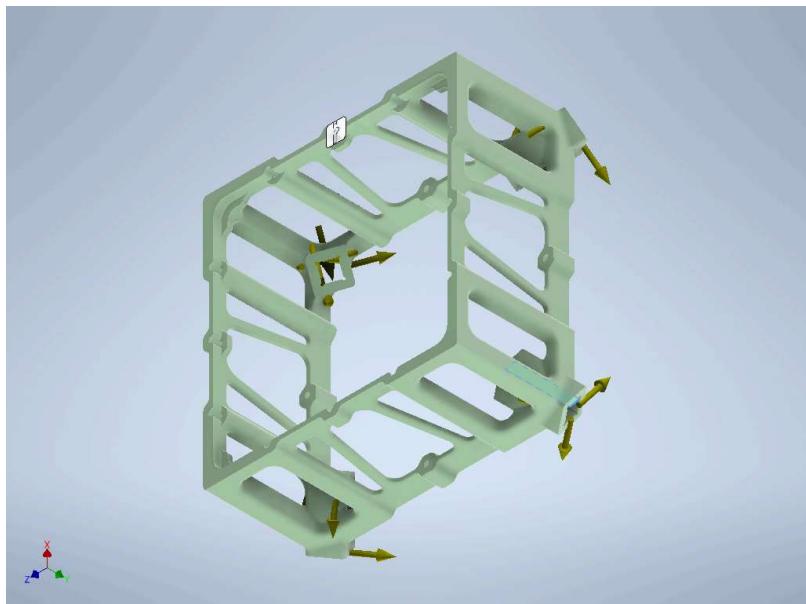


### Momento:8

| Tipo de carga | Momento        |
|---------------|----------------|
| Magnitude     | 2123,200 N mm  |
| Vetor X       | 448,685 N mm   |
| Vetor Y       | -1225,830 N mm |
| Vetor Z       | -1674,515 N mm |

### Faces selecionadas

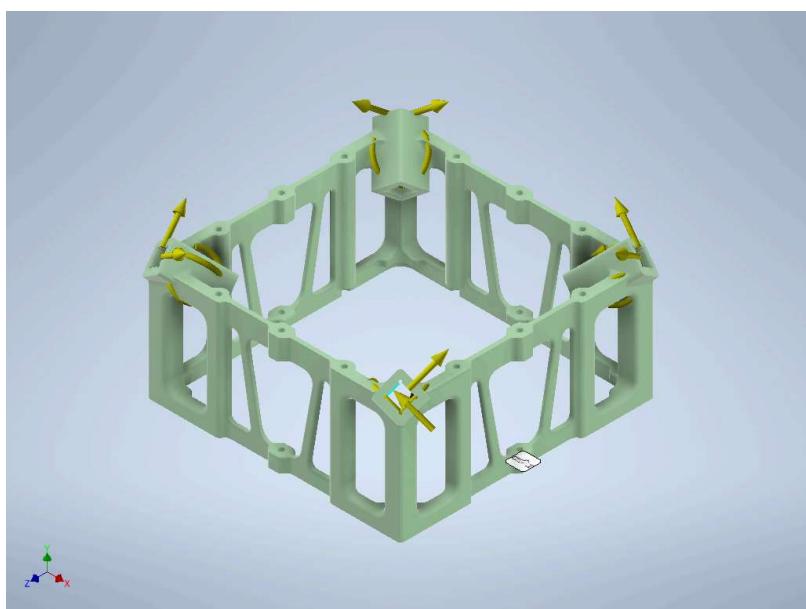


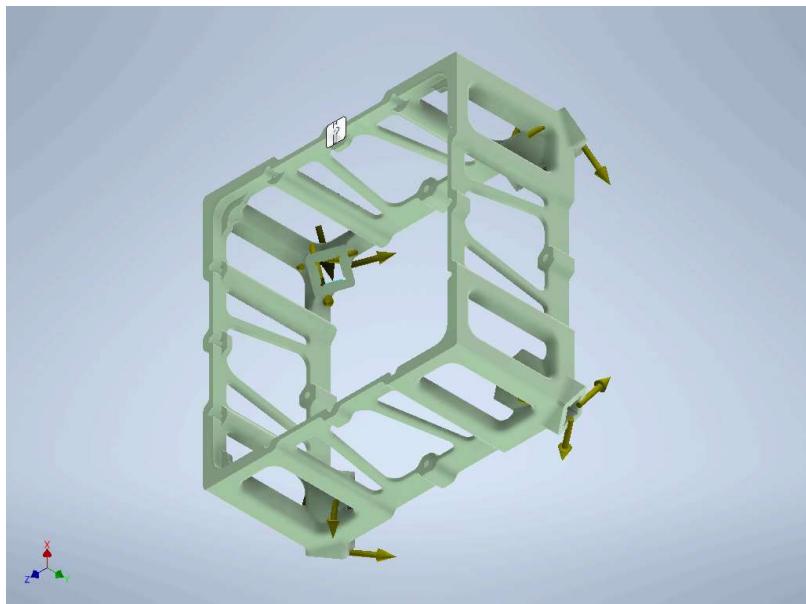


### Força:3

| Tipo de carga | Força    |
|---------------|----------|
| Magnitude     | 10,607 N |
| Vetor X       | -8,365 N |
| Vetor Y       | 6,124 N  |
| Vetor Z       | 2,241 N  |

### Faces selecionadas

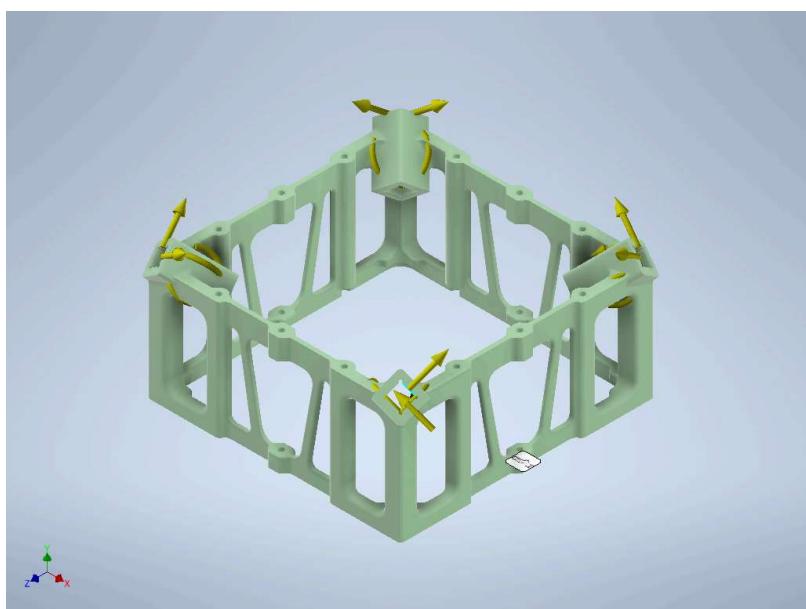


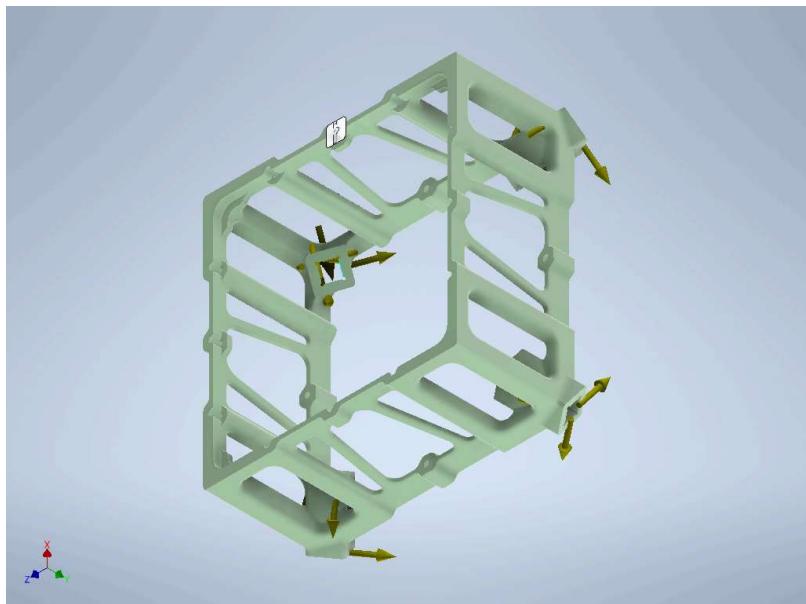


**Força:4**

| Tipo de carga | Força    |
|---------------|----------|
| Magnitude     | 10,607 N |
| Vetor X       | 2,241 N  |
| Vetor Y       | 6,124 N  |
| Vetor Z       | -8,365 N |

**Faces selecionadas**

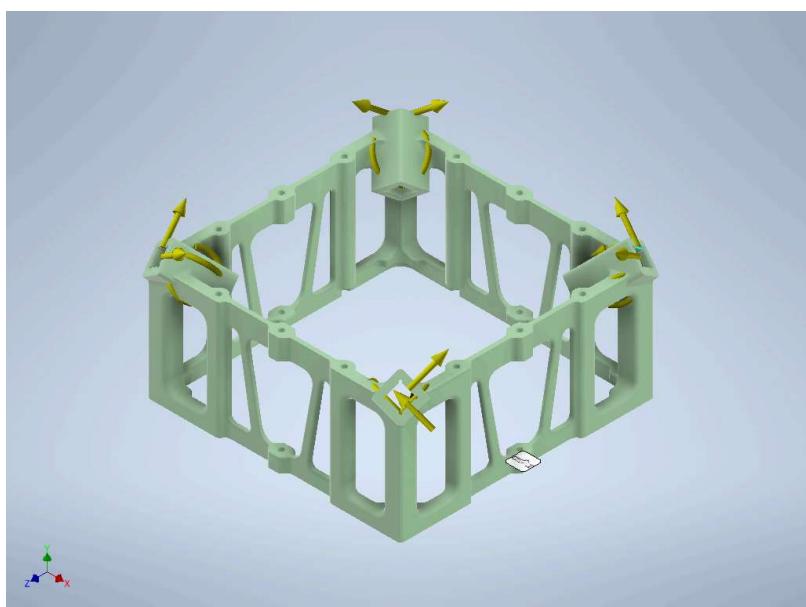


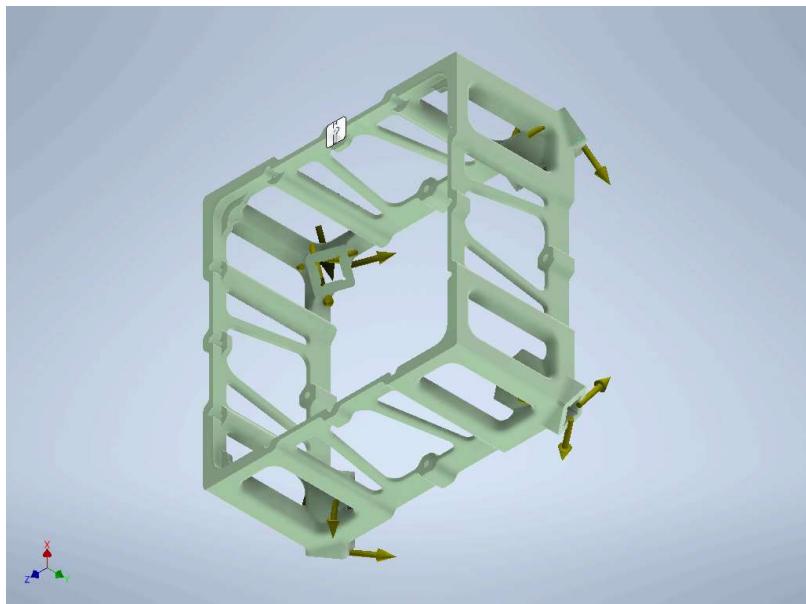


### Força:5

| Tipo de carga | Força    |
|---------------|----------|
| Magnitude     | 10,607 N |
| Vetor X       | -8,365 N |
| Vetor Y       | 6,124 N  |
| Vetor Z       | -2,241 N |

### Faces selecionadas

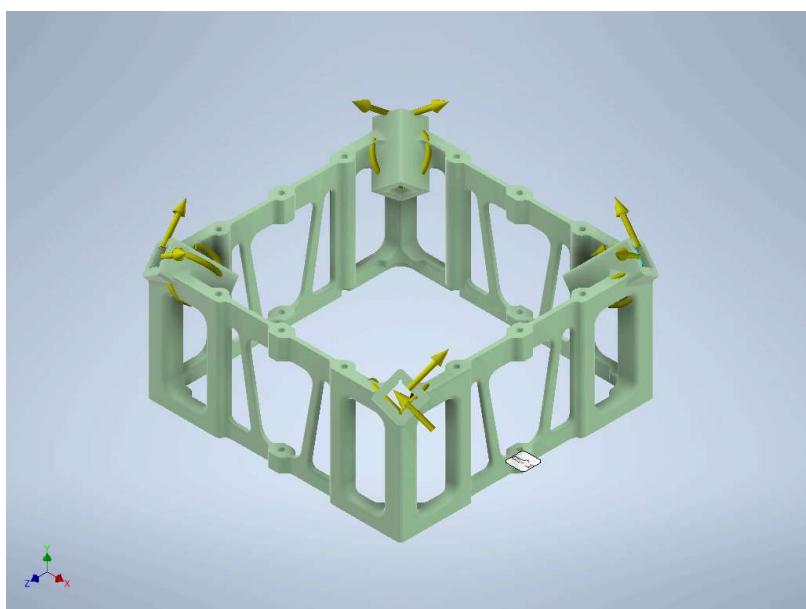


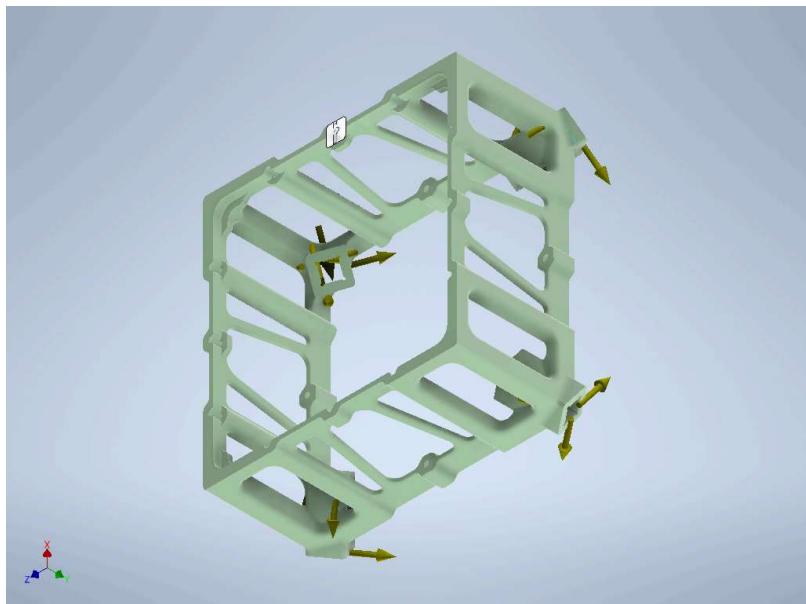


### Força:6

| Tipo de carga | Força    |
|---------------|----------|
| Magnitude     | 10,607 N |
| Vetor X       | 2,241 N  |
| Vetor Y       | 6,124 N  |
| Vetor Z       | 8,365 N  |

### Faces selecionadas

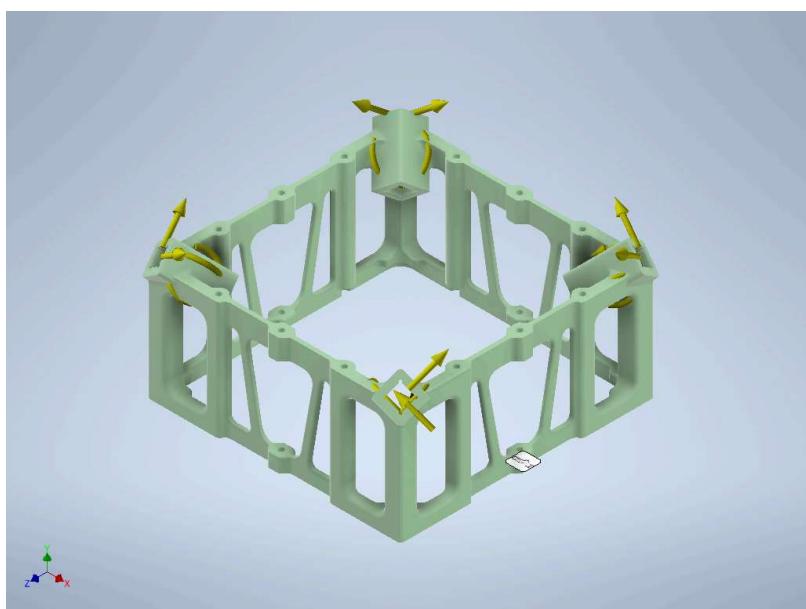




**Força:7**

| Tipo de carga | Força    |
|---------------|----------|
| Magnitude     | 10,607 N |
| Vetor X       | -2,241 N |
| Vetor Y       | 6,124 N  |
| Vetor Z       | 8,365 N  |

**Faces selecionadas**

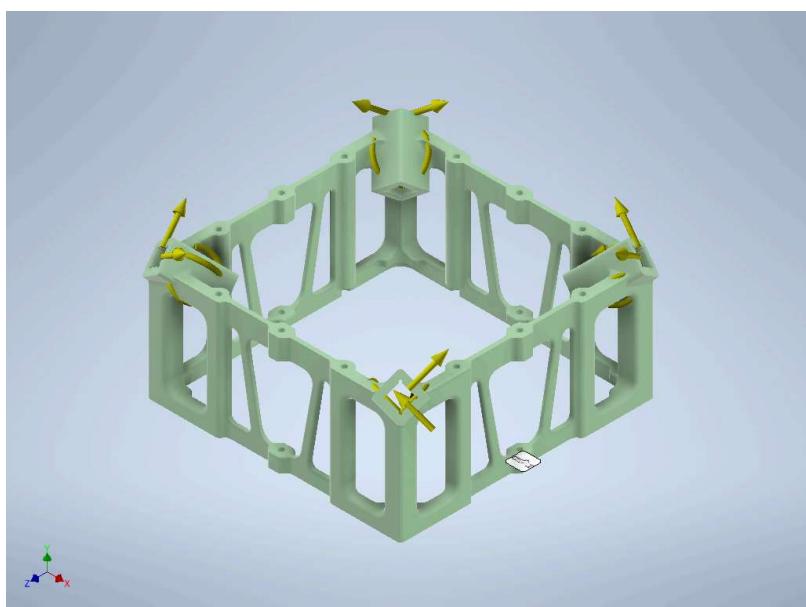


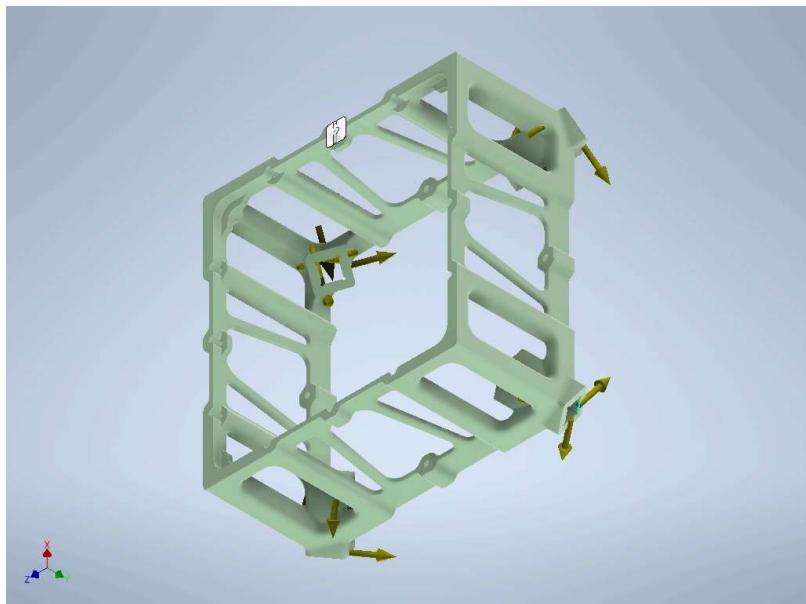


**Força:8**

| Tipo de carga | Força    |
|---------------|----------|
| Magnitude     | 10,607 N |
| Vetor X       | 8,365 N  |
| Vetor Y       | 6,124 N  |
| Vetor Z       | -2,241 N |

**Faces selecionadas**

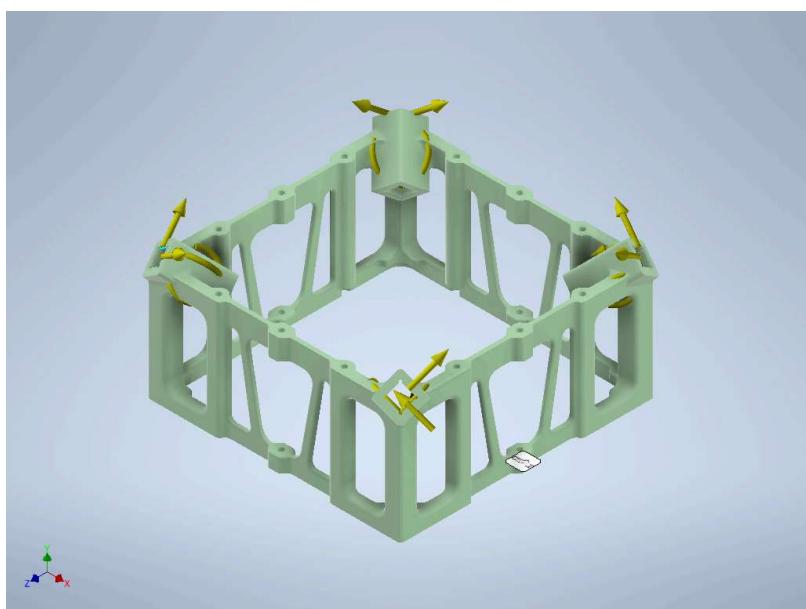




**Força:9**

| Tipo de carga | Força    |
|---------------|----------|
| Magnitude     | 10,607 N |
| Vetor X       | -2,241 N |
| Vetor Y       | 6,124 N  |
| Vetor Z       | -8,365 N |

**Faces selecionadas**

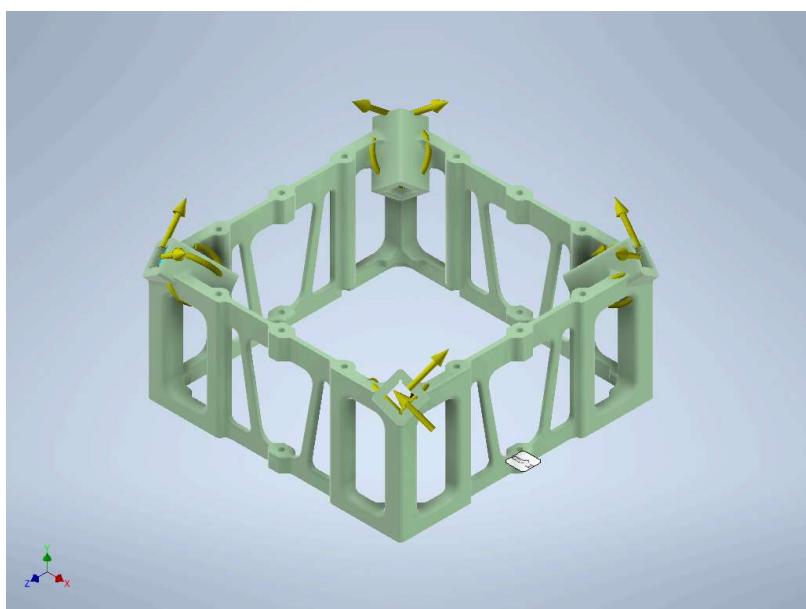




### Força:10

| Tipo de carga | Força    |
|---------------|----------|
| Magnitude     | 10,607 N |
| Vetor X       | 8,365 N  |
| Vetor Y       | 6,124 N  |
| Vetor Z       | 2,241 N  |

### Faces selecionadas

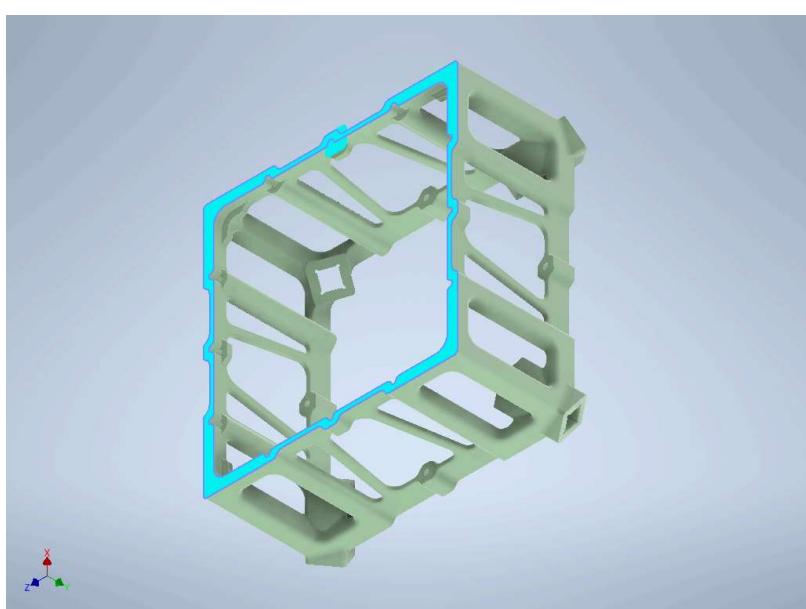
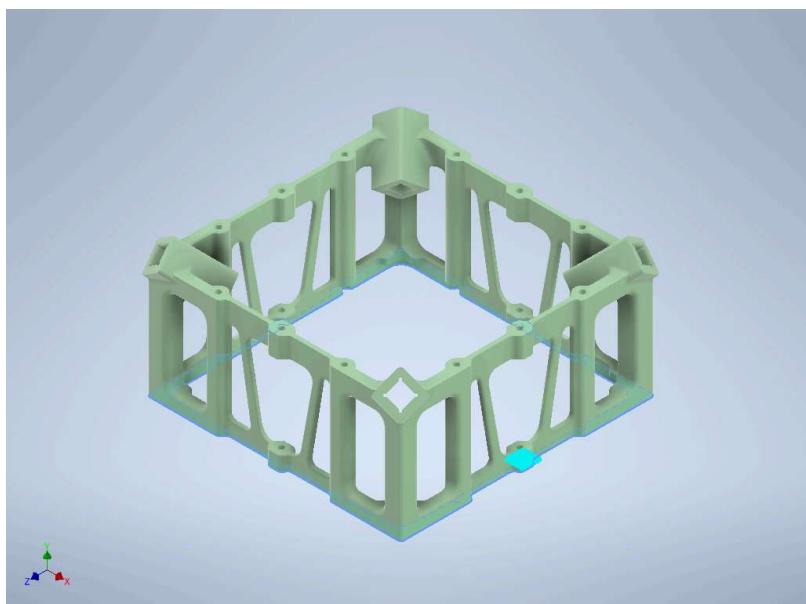




### Restrição fixa:1

Tipo de restrição | Restrição fixa

#### Faces selecionadas



### Resultados

## Força e momento de reação em restrições

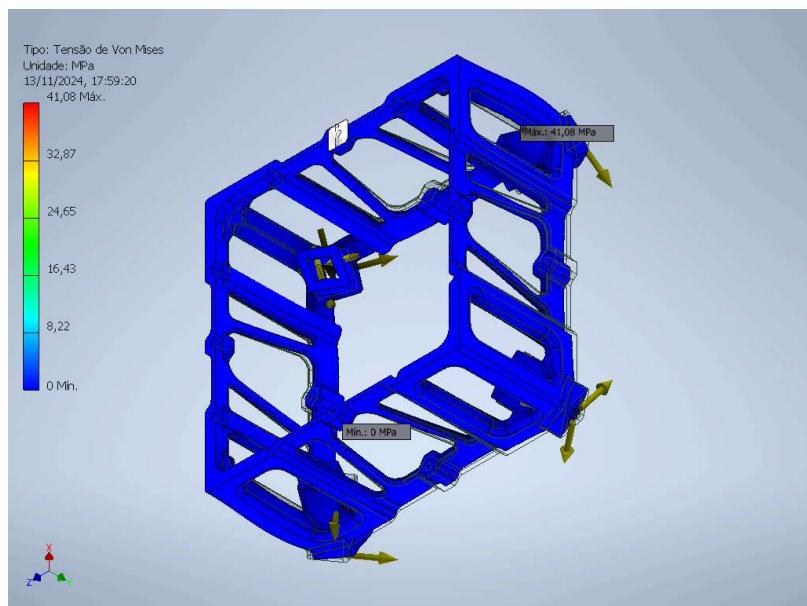
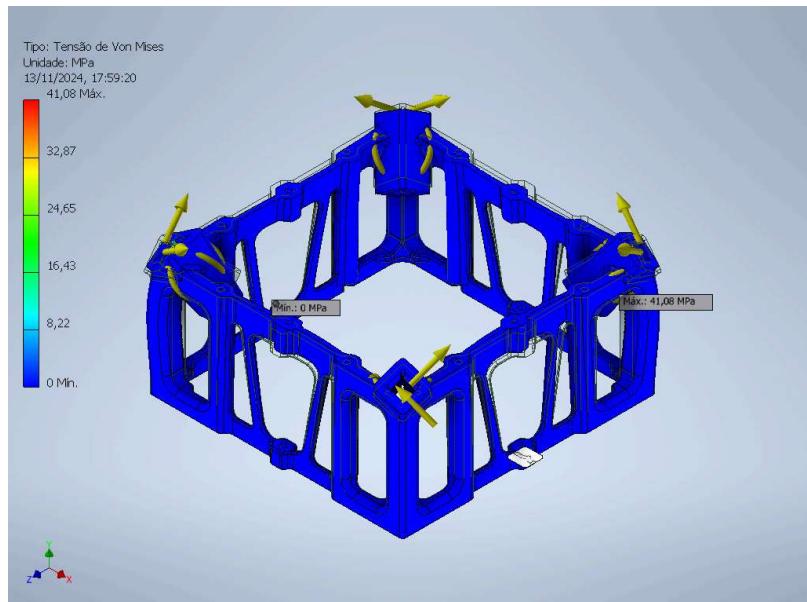
| Nome da restrição | Força de reação |                      | Momento de reação |                      |
|-------------------|-----------------|----------------------|-------------------|----------------------|
|                   | Magnitude       | "Componente (X,Y,Z)" | Magnitude         | "Componente (X,Y,Z)" |
| Restrição fixa:1  | 48,9897 N       | 0 N                  | 0 N m             | 0 N m                |
|                   |                 | -48,9897 N           |                   | 0 N m                |
|                   |                 | 0 N                  |                   | 0 N m                |

## Resumo de resultados

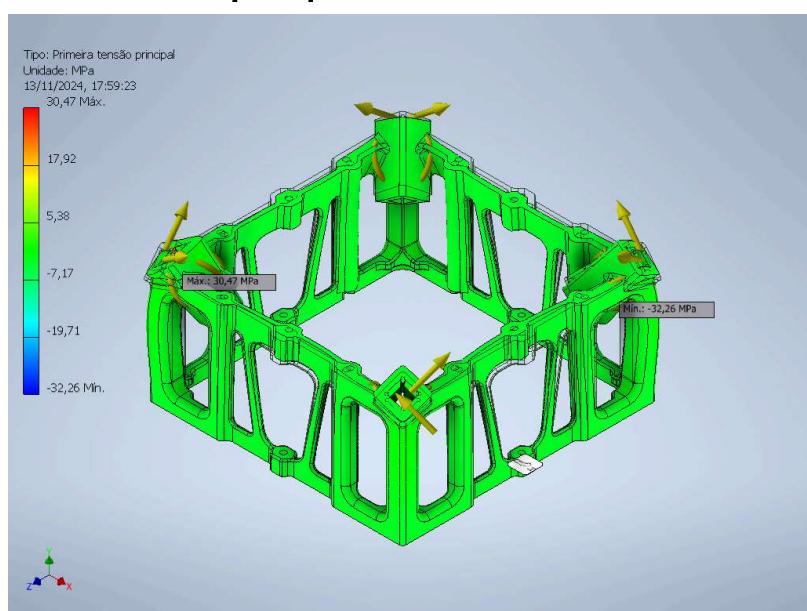
| Nome                          | Mínima                 | Máxima              |
|-------------------------------|------------------------|---------------------|
| Volume                        | 170442 mm <sup>3</sup> |                     |
| Massa                         | 0,418945 kg            |                     |
| Tensão de Von Mises           | 0,00198128 MPa         | 41,0837 MPa         |
| Primeira tensão principal     | -32,2583 MPa           | 30,4678 MPa         |
| Terceira tensão principal     | -74,9694 MPa           | 19,94 MPa           |
| Deslocamento                  | 0 mm                   | 0,485563 mm         |
| Fator de segurança            | 0,436913 s_m           | 15 s_m              |
| Tensão XX                     | -50,8008 MPa           | 20,2466 MPa         |
| Tensão XY                     | -9,26677 MPa           | 14,6492 MPa         |
| Tensão XZ                     | -12,7898 MPa           | 18,6888 MPa         |
| Tensão YY                     | -46,8631 MPa           | 27,4756 MPa         |
| Tensão YZ                     | -11,3927 MPa           | 18,4161 MPa         |
| Tensão ZZ                     | -51,1714 MPa           | 27,1842 MPa         |
| Deslocamento X                | -0,183092 mm           | 0,307288 mm         |
| Deslocamento Y                | -0,483384 mm           | 0,160558 mm         |
| Deslocamento Z                | -0,307643 mm           | 0,182155 mm         |
| Deformação equivalente        | 0,00000168101 s_m      | 0,0340525 s_m       |
| Primeira deformação principal | 0,00000100522 s_m      | 0,0221024 s_m       |
| Terceira deformação principal | -0,0361971 s_m         | -0,000000958151 s_m |
| Deformação XX                 | -0,0105157 s_m         | 0,0109243 s_m       |
| Deformação XY                 | -0,0114636 s_m         | 0,018122 s_m        |
| Deformação XZ                 | -0,0158217 s_m         | 0,0231192 s_m       |
| Deformação YY                 | -0,0189441 s_m         | 0,0127152 s_m       |
| Deformação YZ                 | -0,0140934 s_m         | 0,0227818 s_m       |
| Deformação ZZ                 | -0,0115759 s_m         | 0,011826 s_m        |

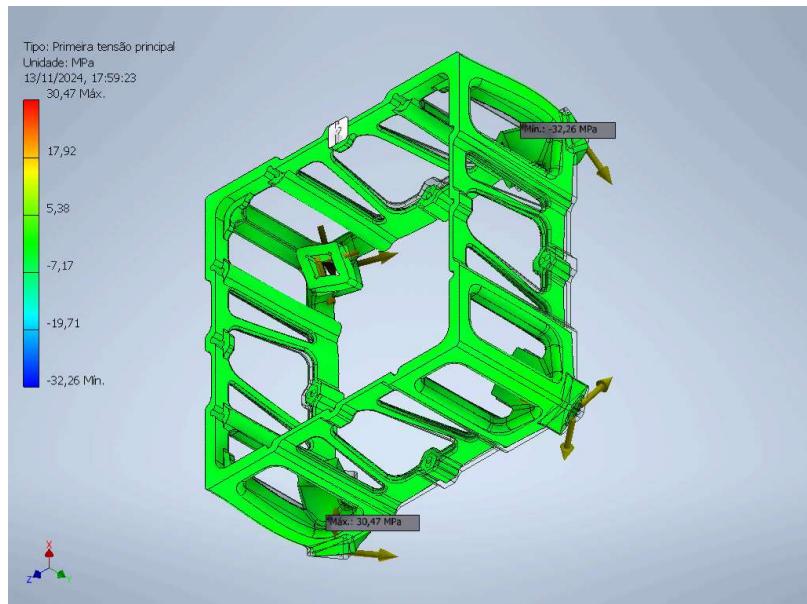
## Figuras

### Tensão de Von Mises

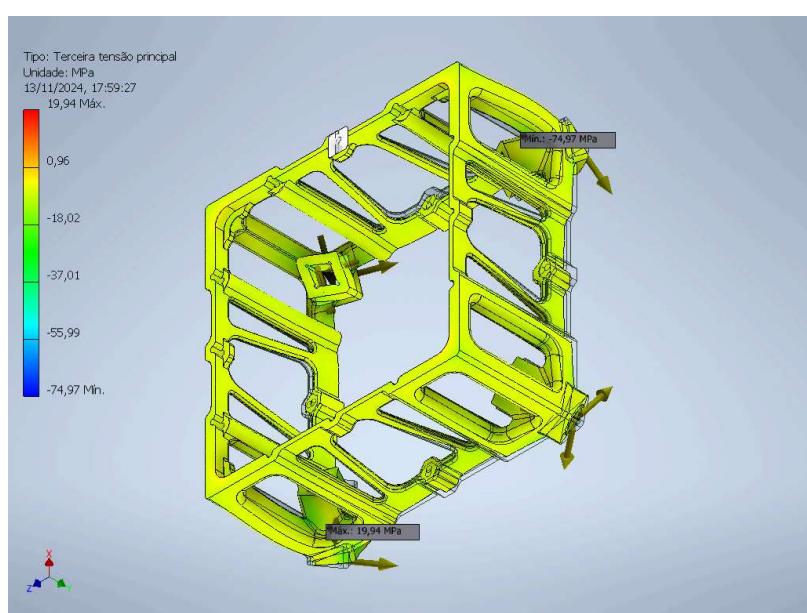
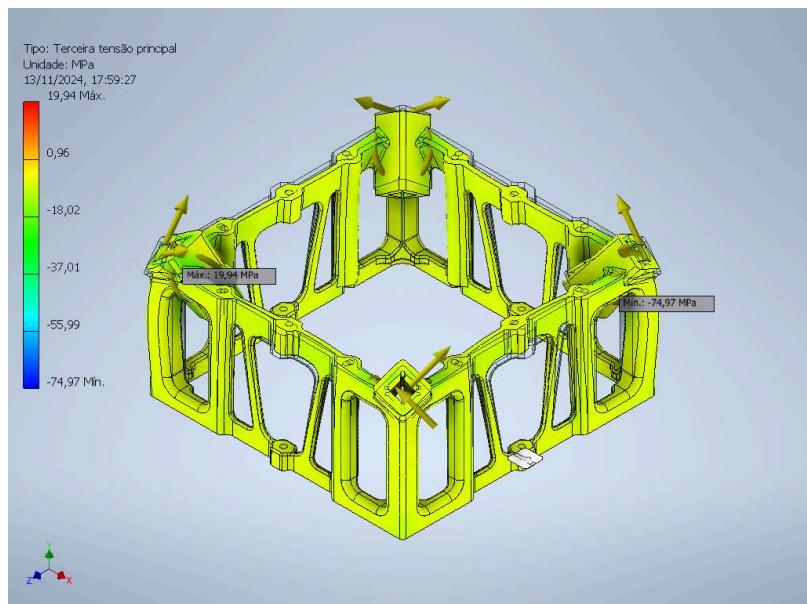


### Primeira tensão principal

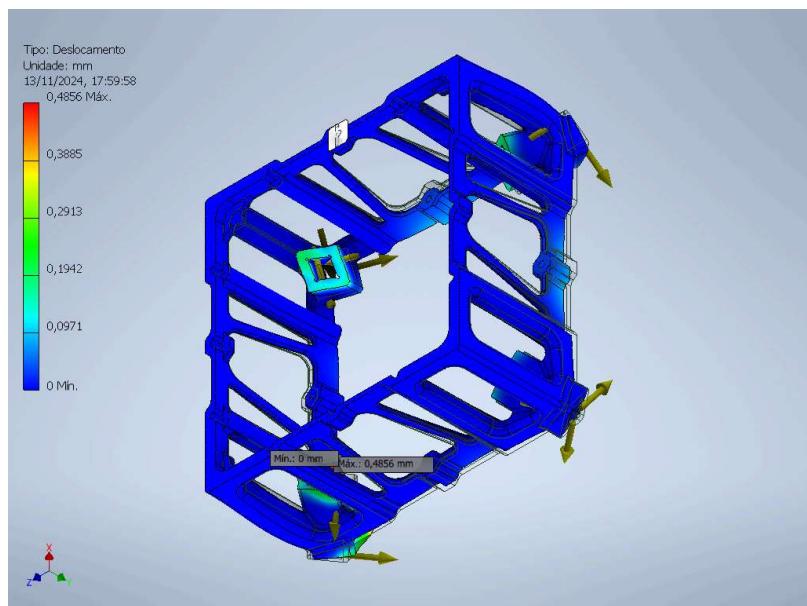
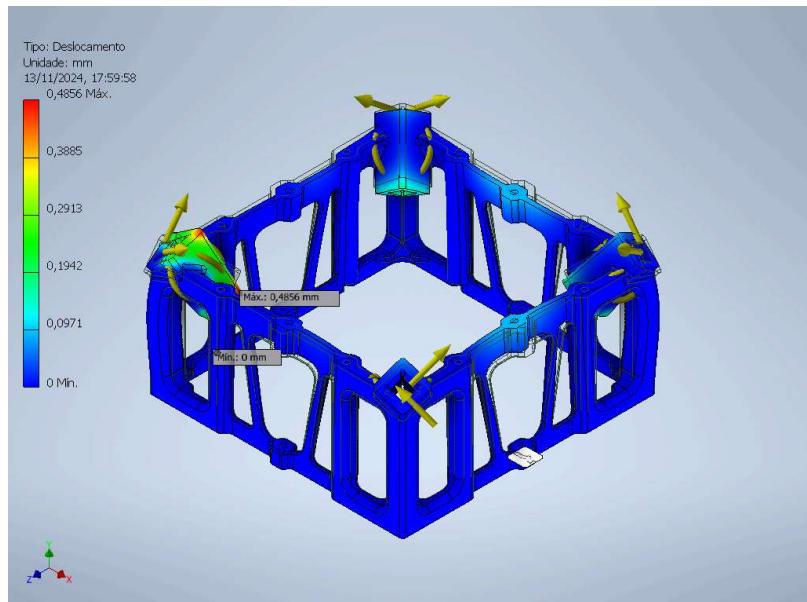




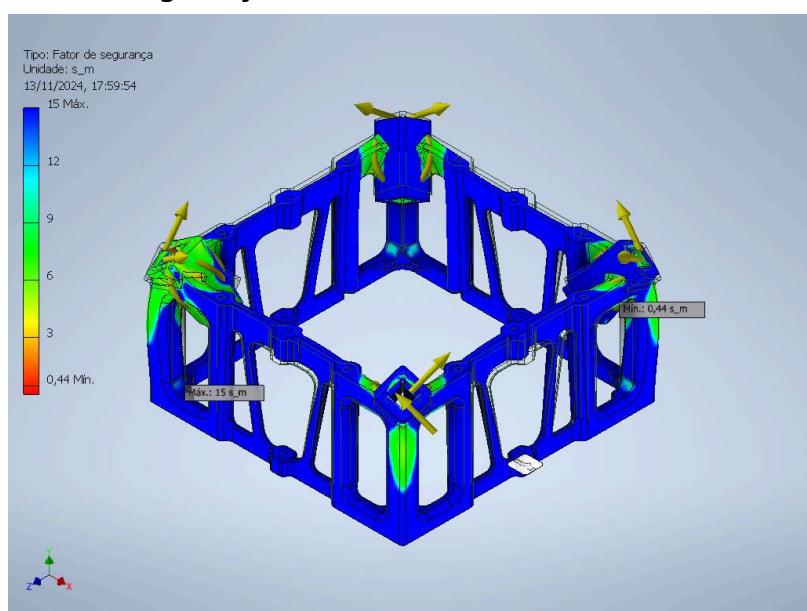
### Terceira tensão principal

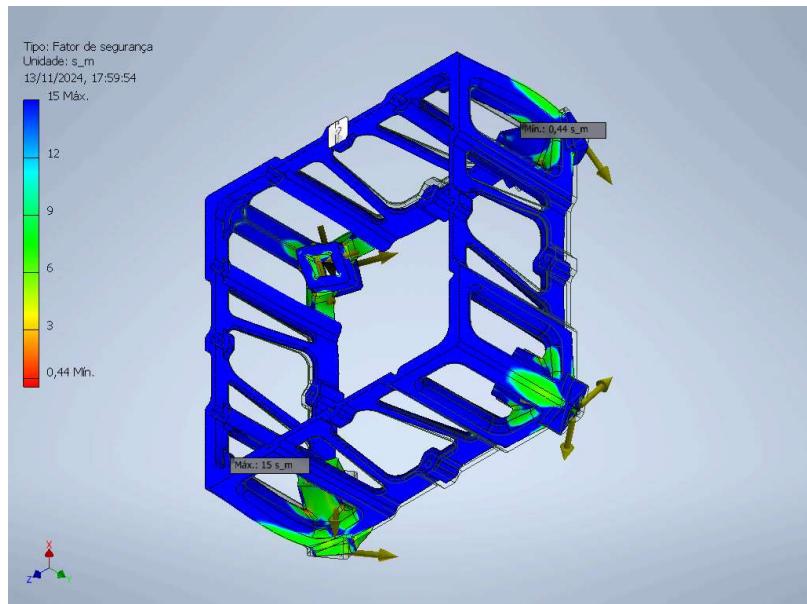


### Deslocamento

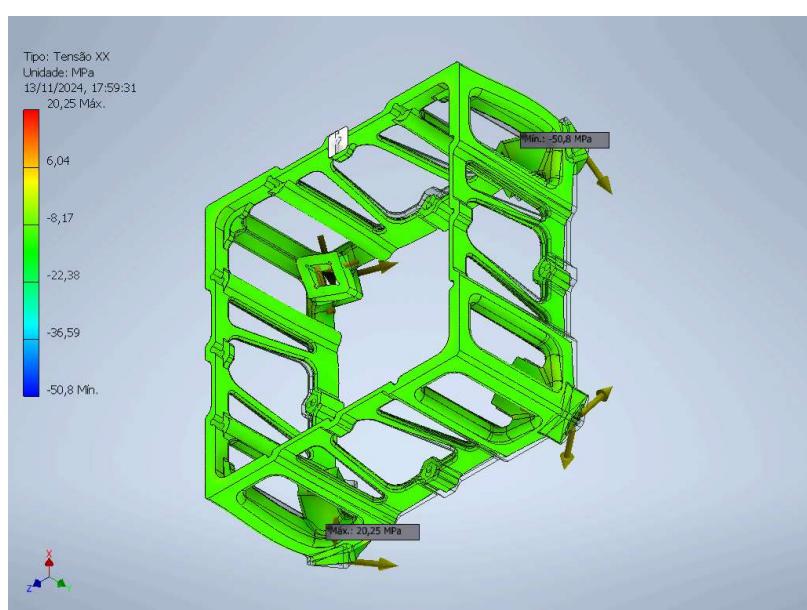
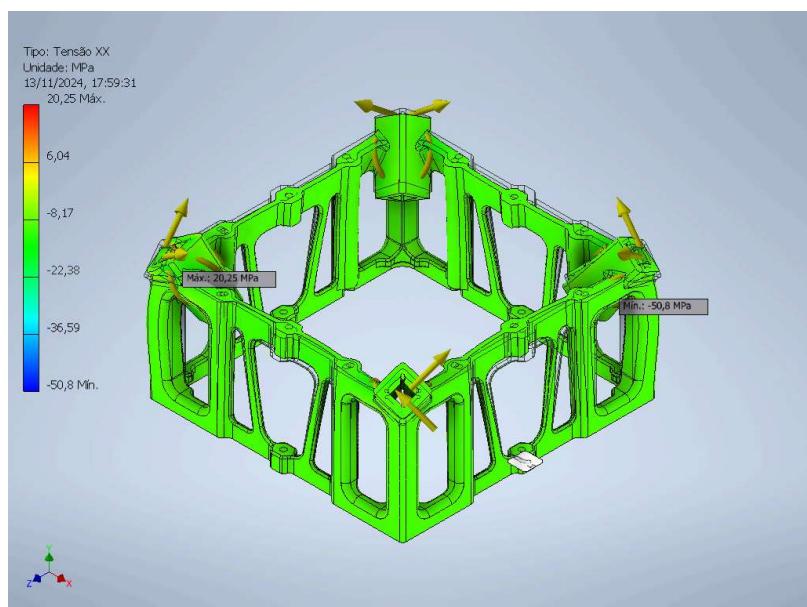


## Fator de segurança

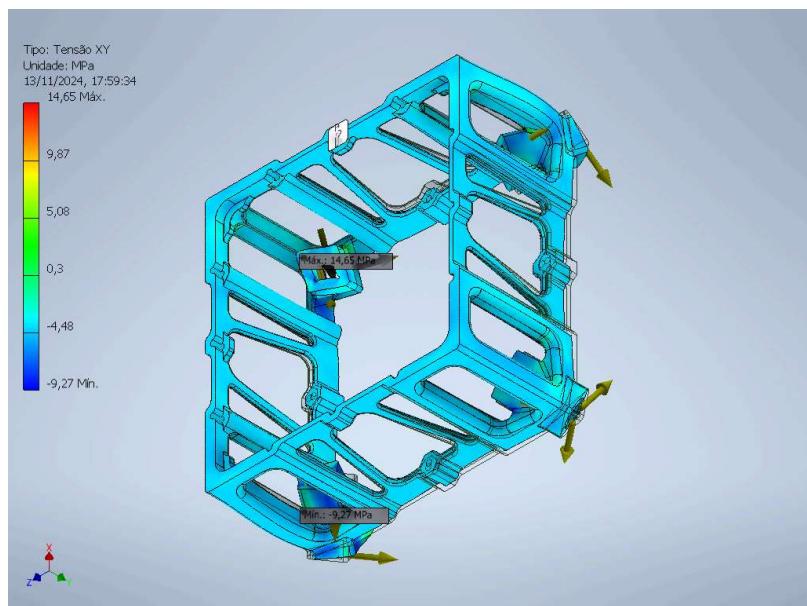
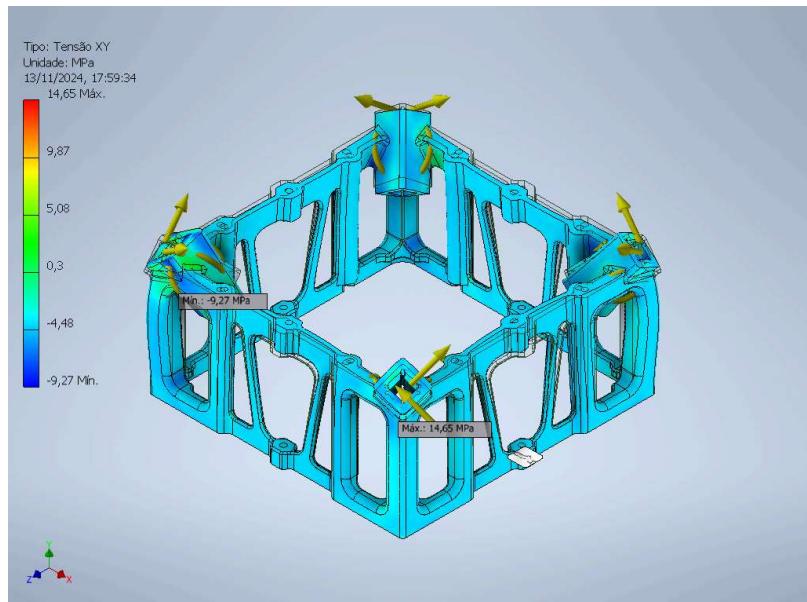




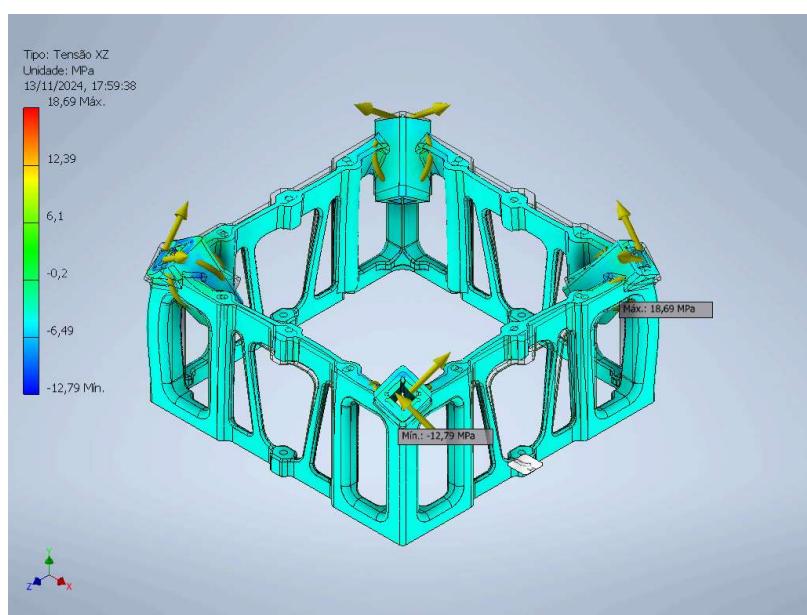
**Tensão XX**

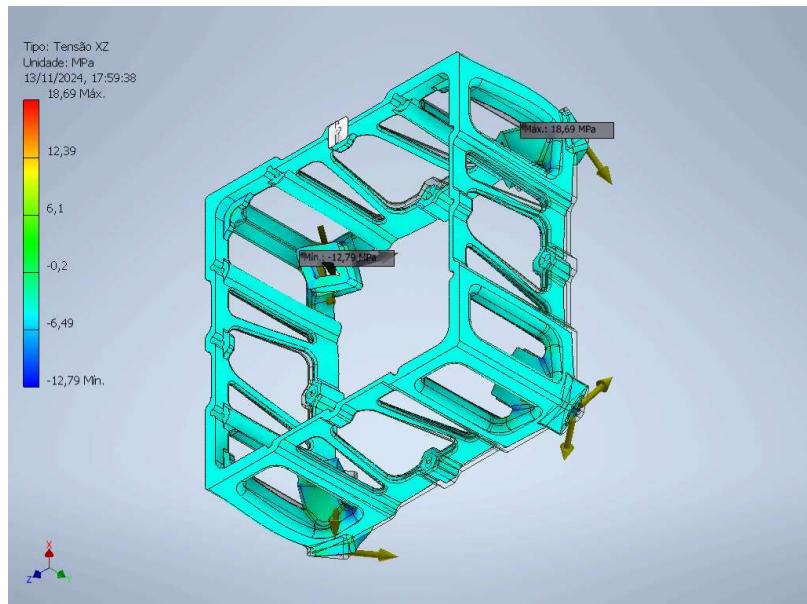


**Tensão XY**

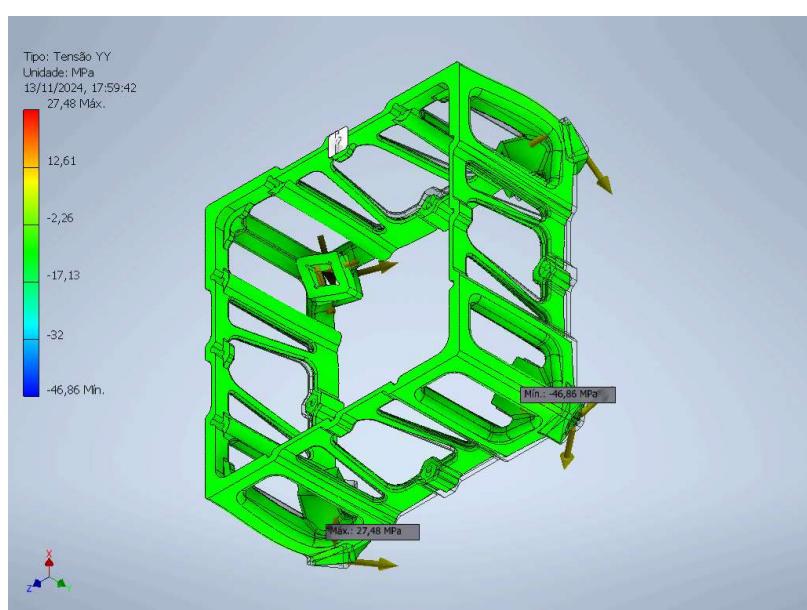
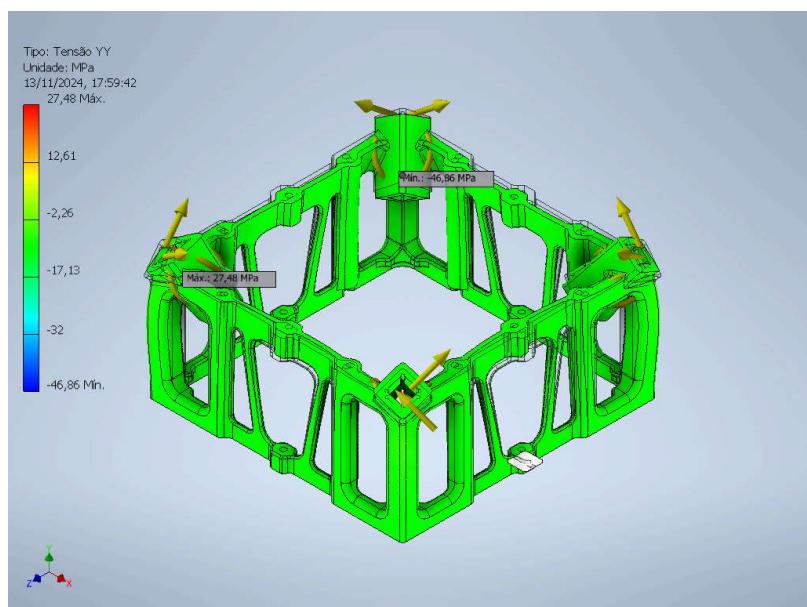


### Tensão XZ

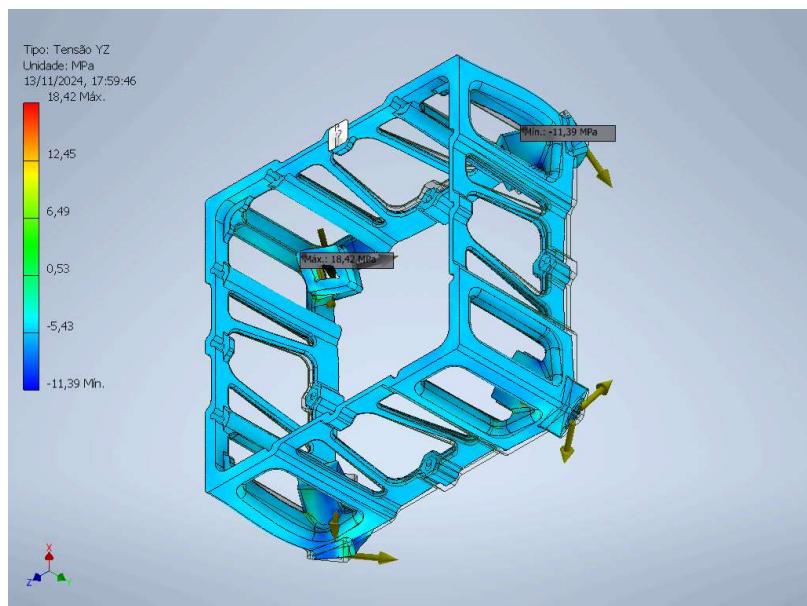
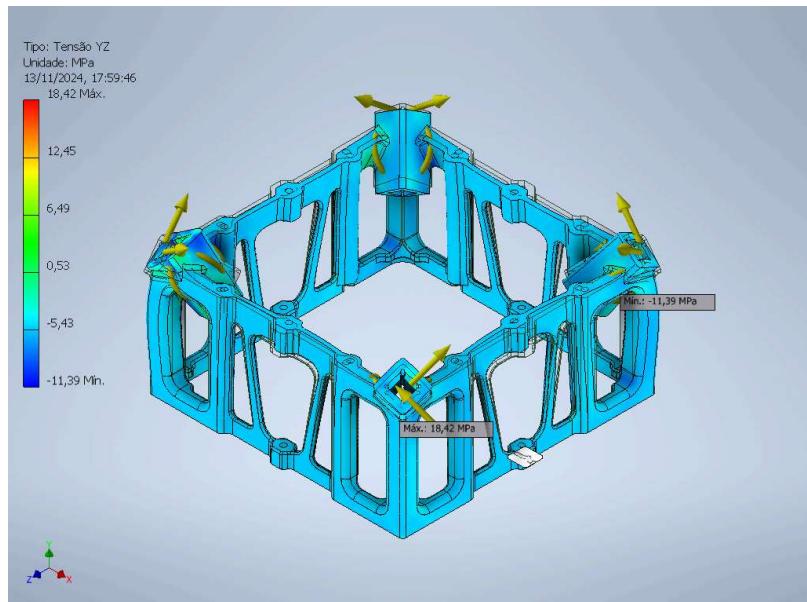




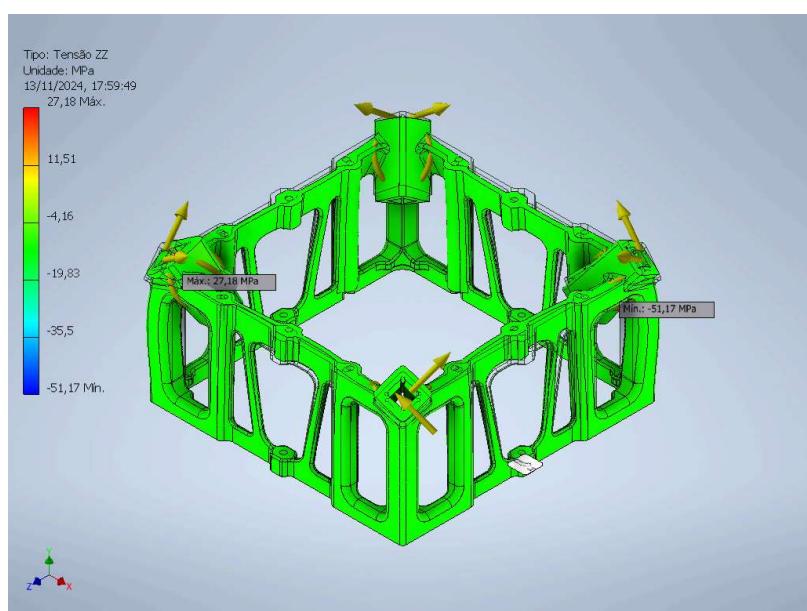
**Tensão YY**

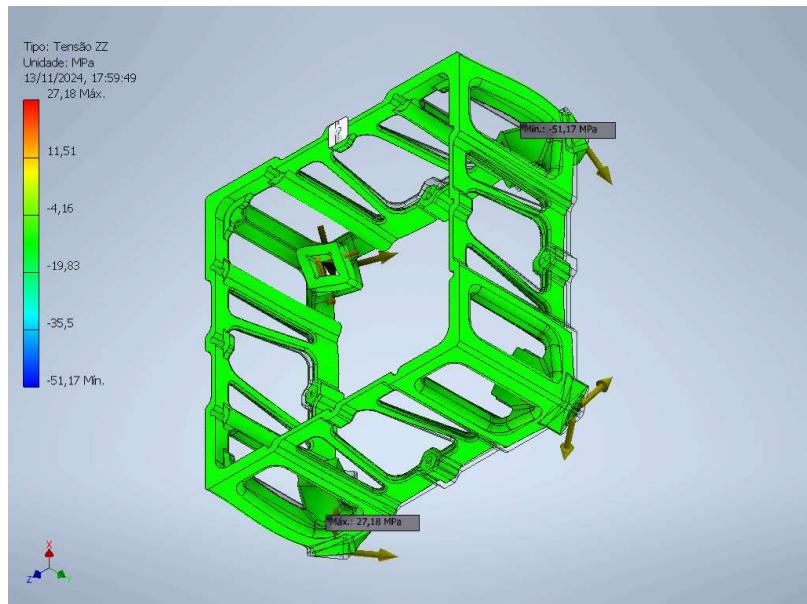


**Tensão YZ**

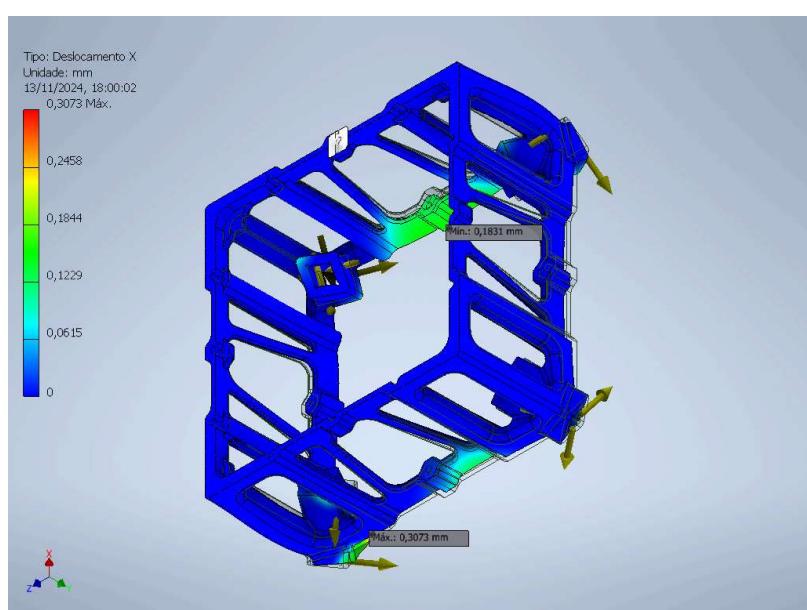
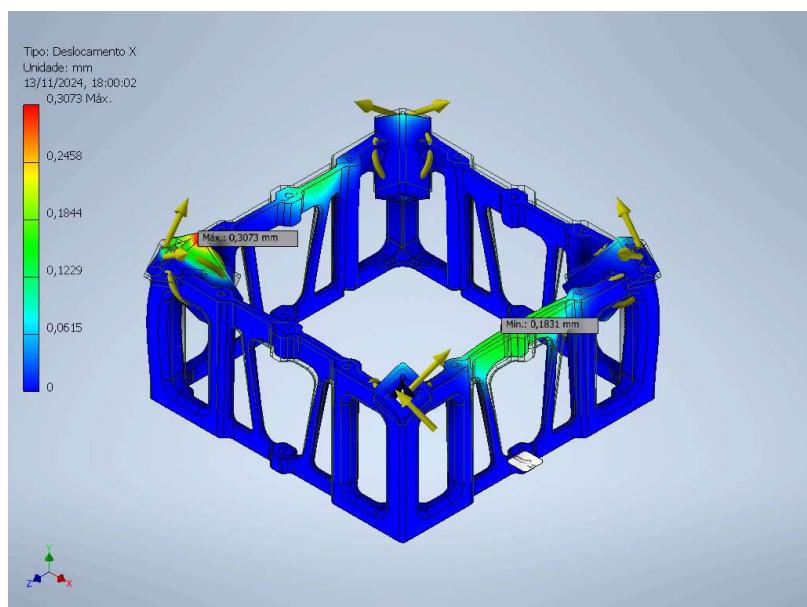


### Tensão ZZ

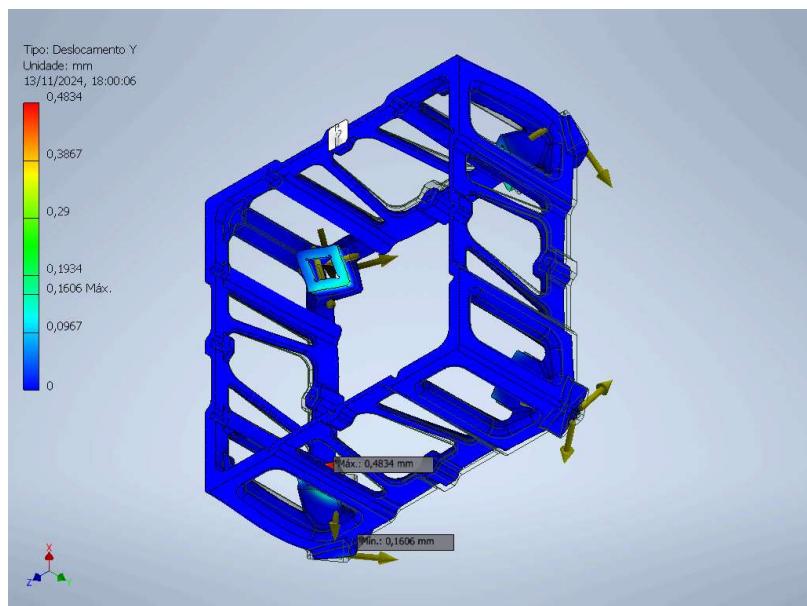
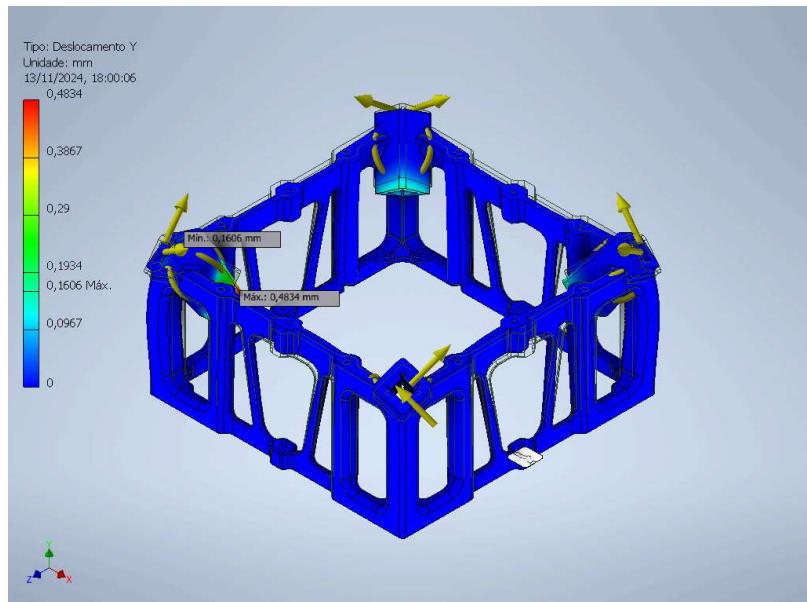




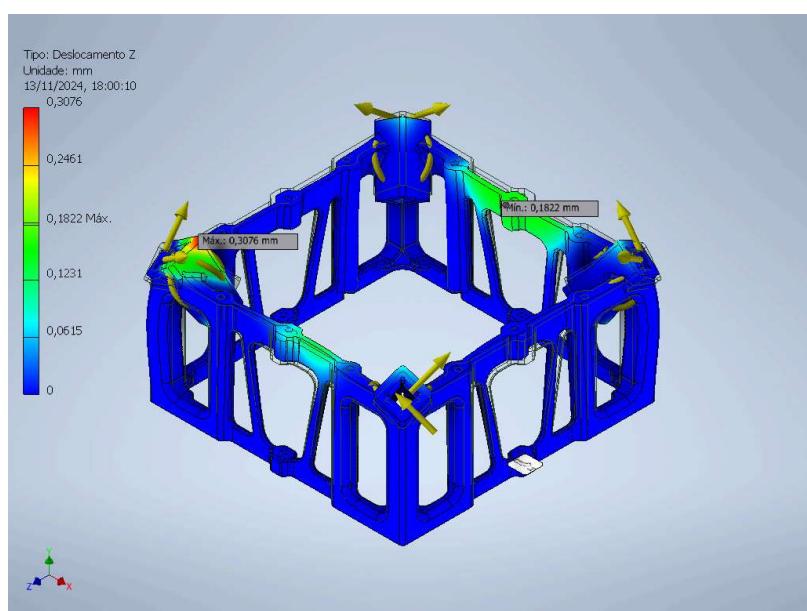
### Deslocamento X

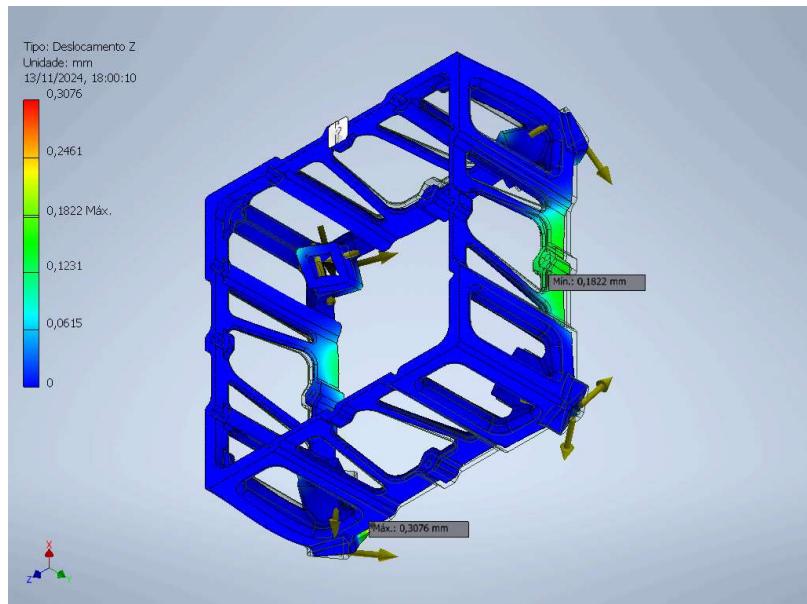


### Deslocamento Y

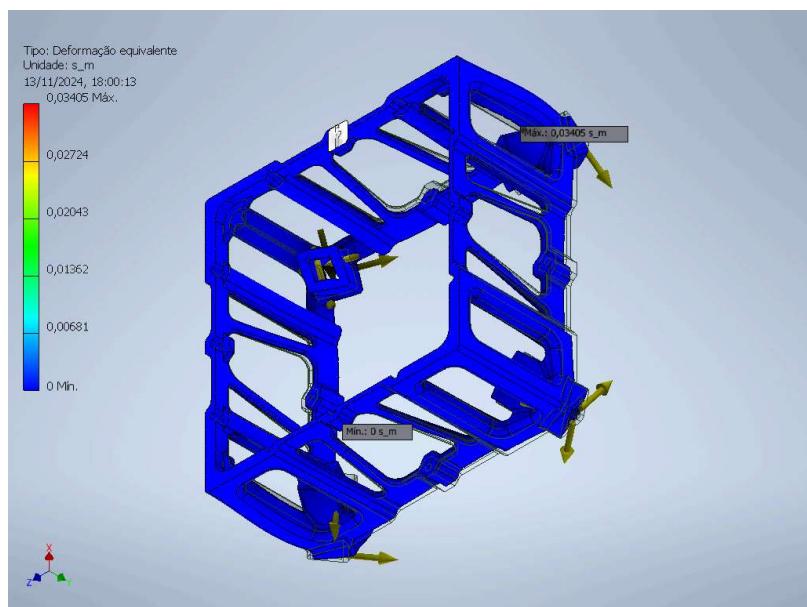
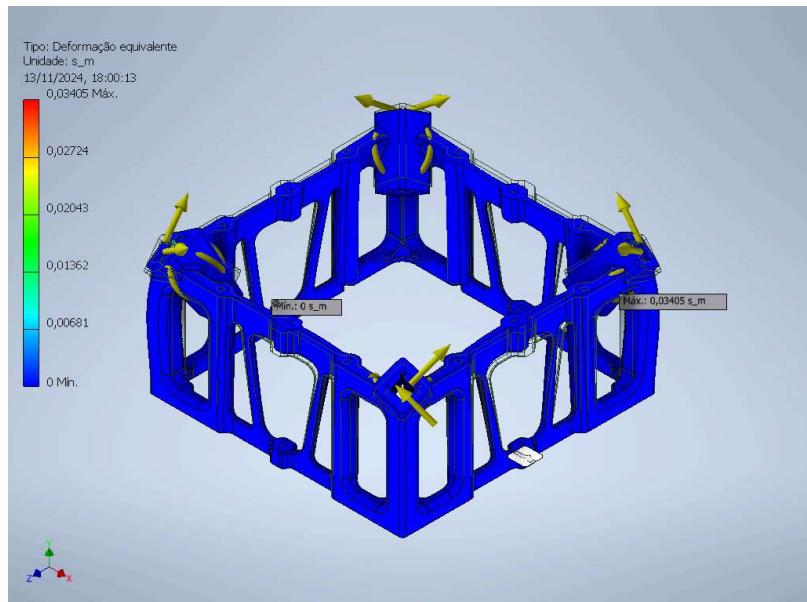


## Deslocamento Z

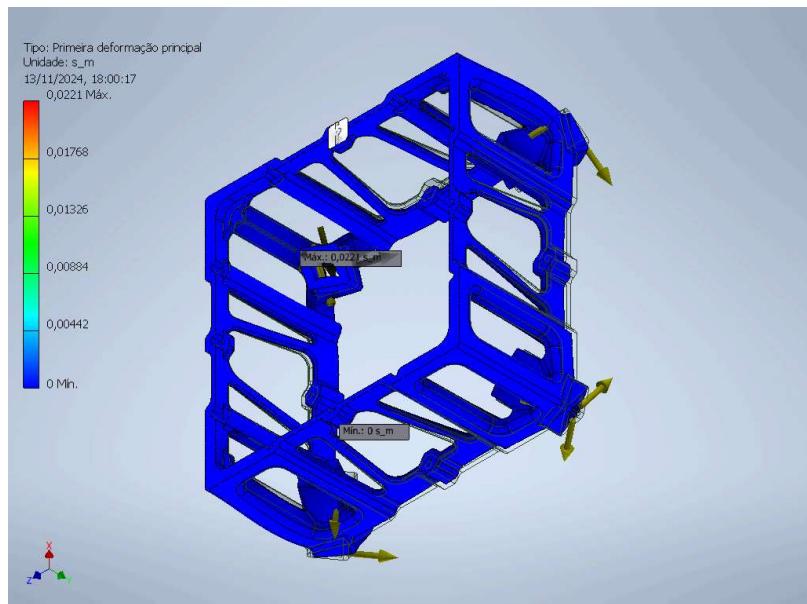
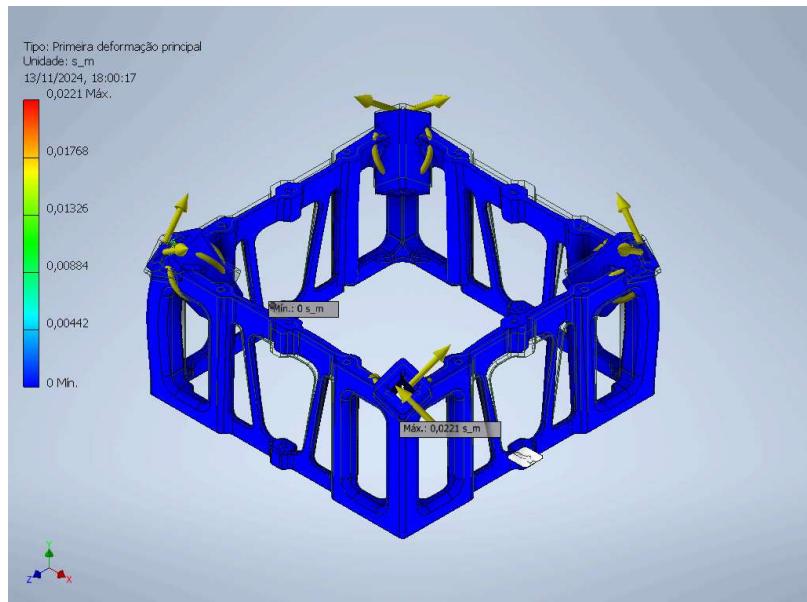




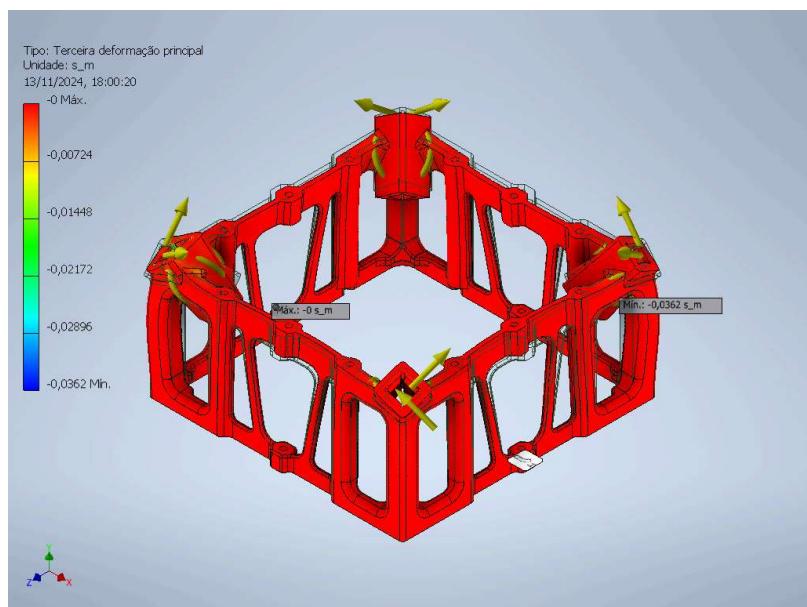
### Deformação equivalente

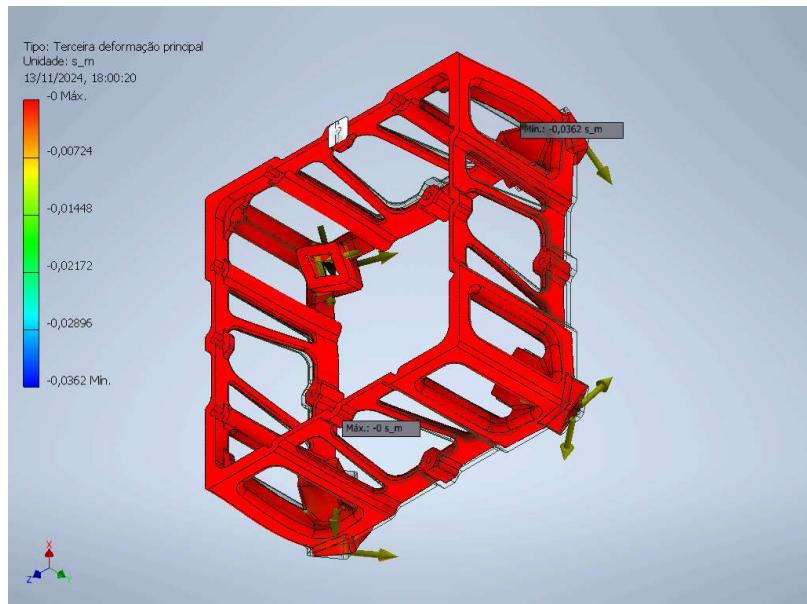


### Primeira deformação principal

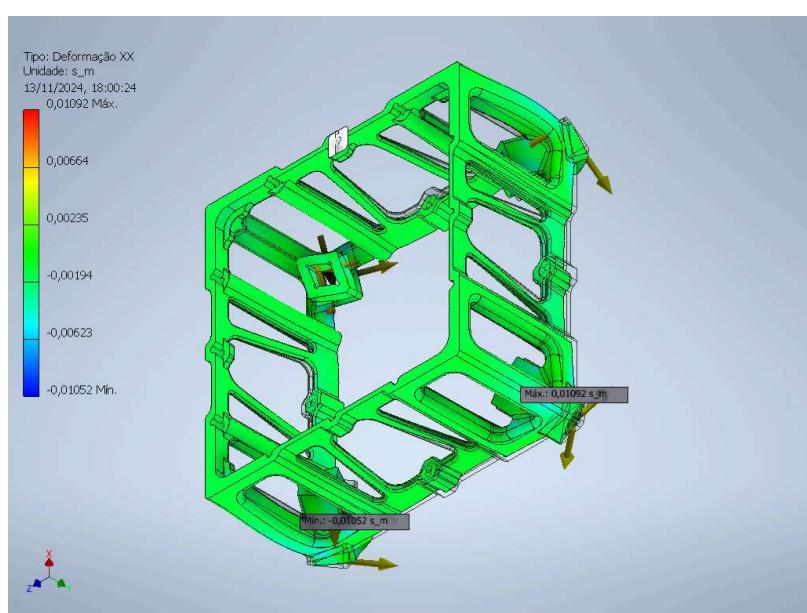
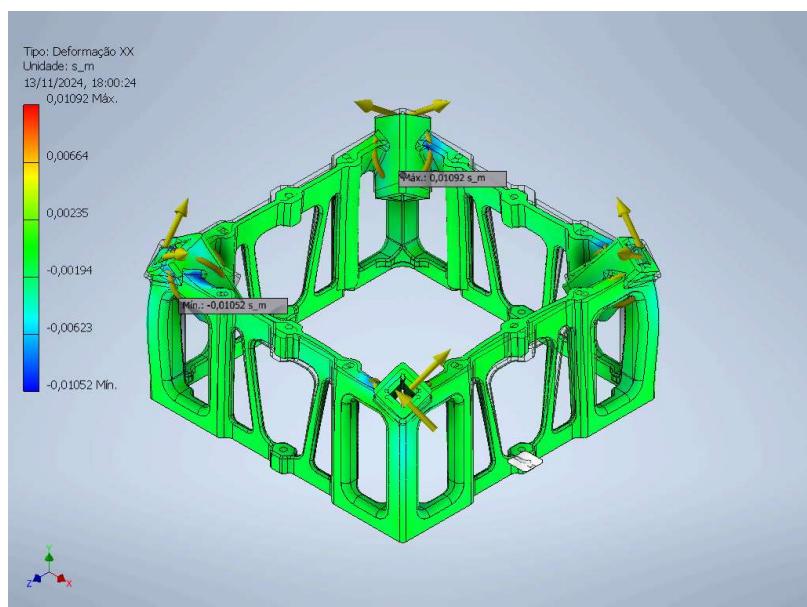


### Terceira deformação principal

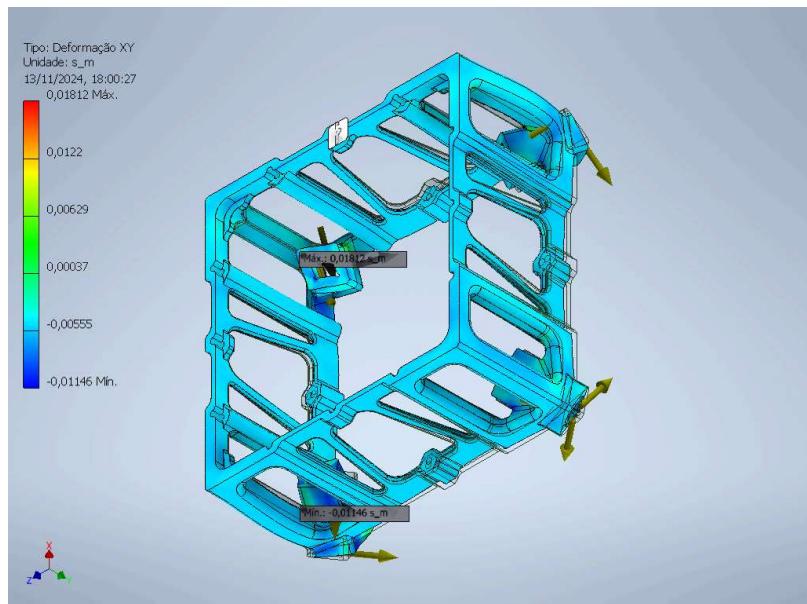
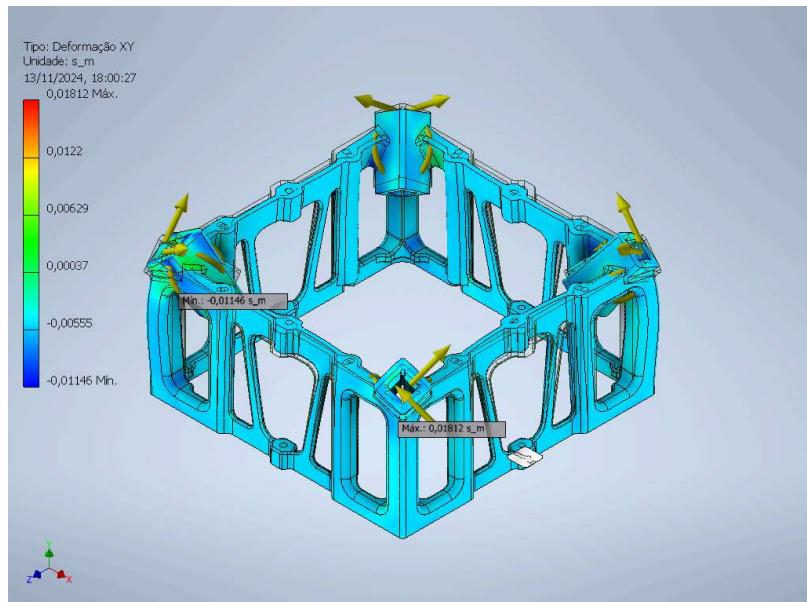




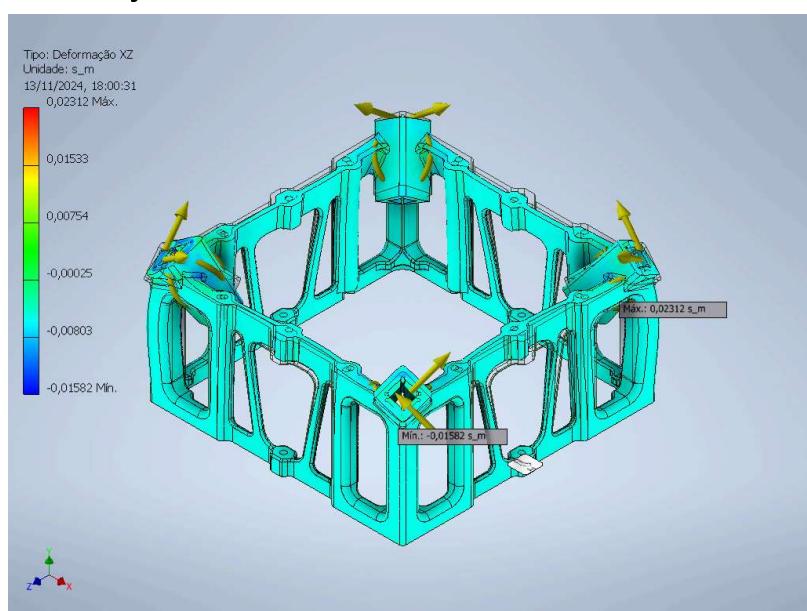
**Deformação XX**

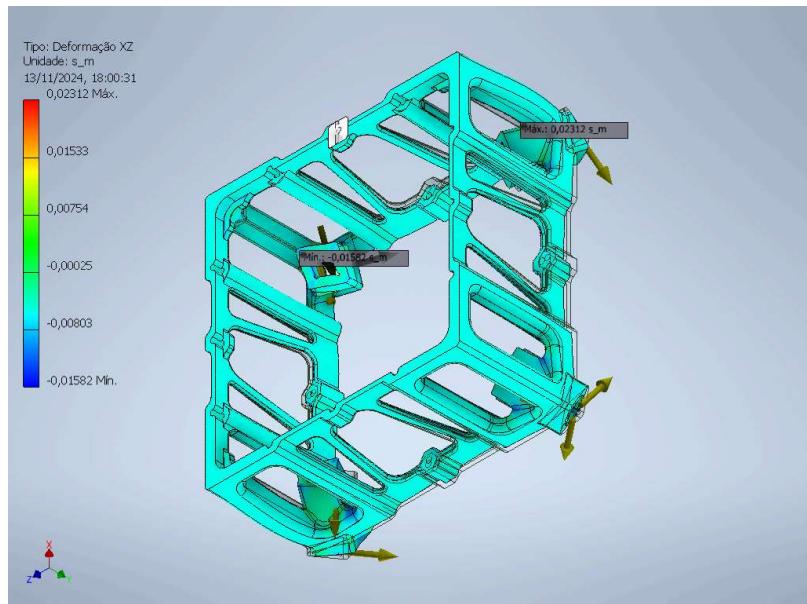


**Deformação XY**

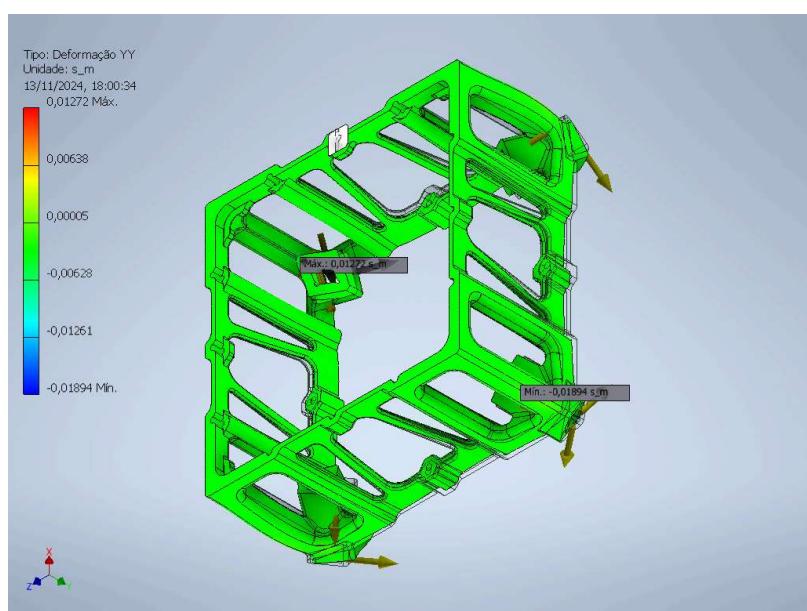
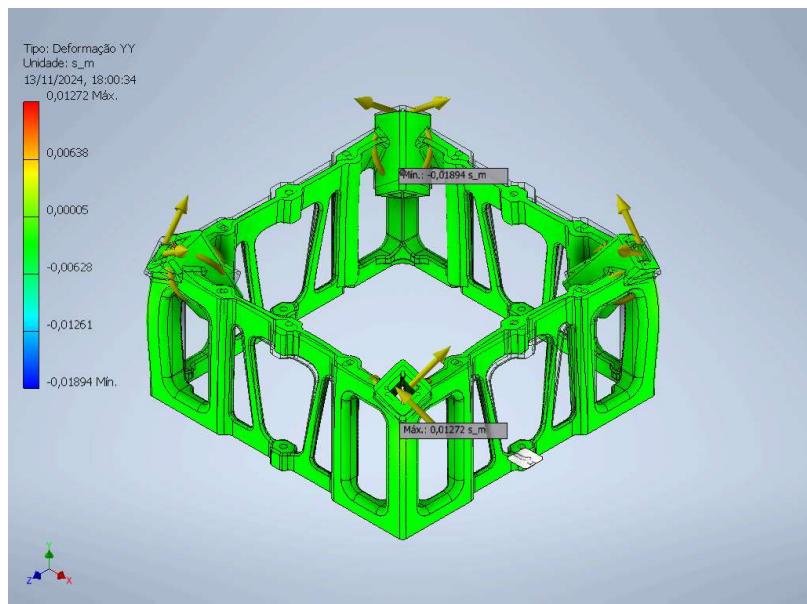


### Deformação XZ

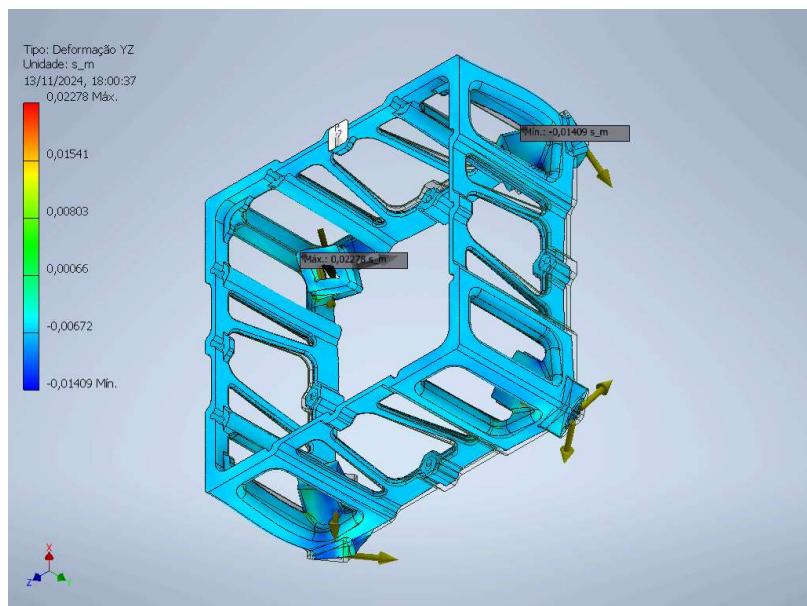
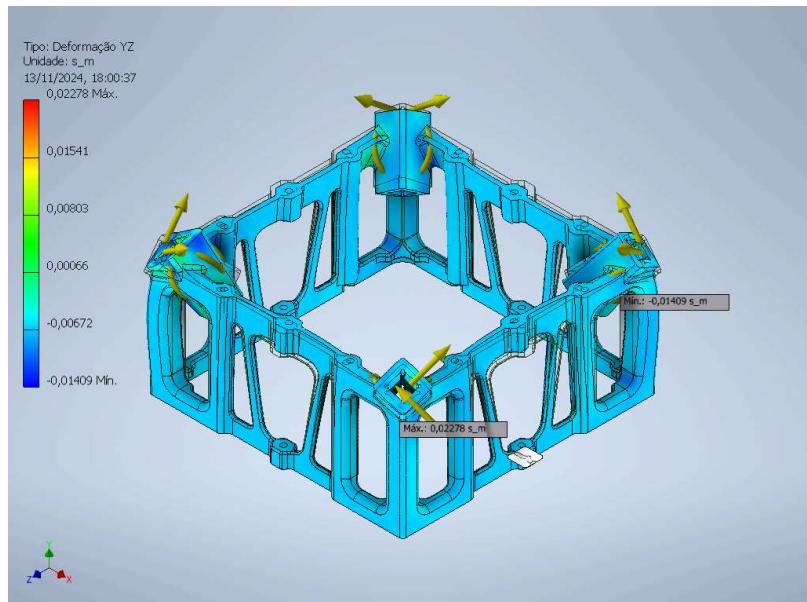




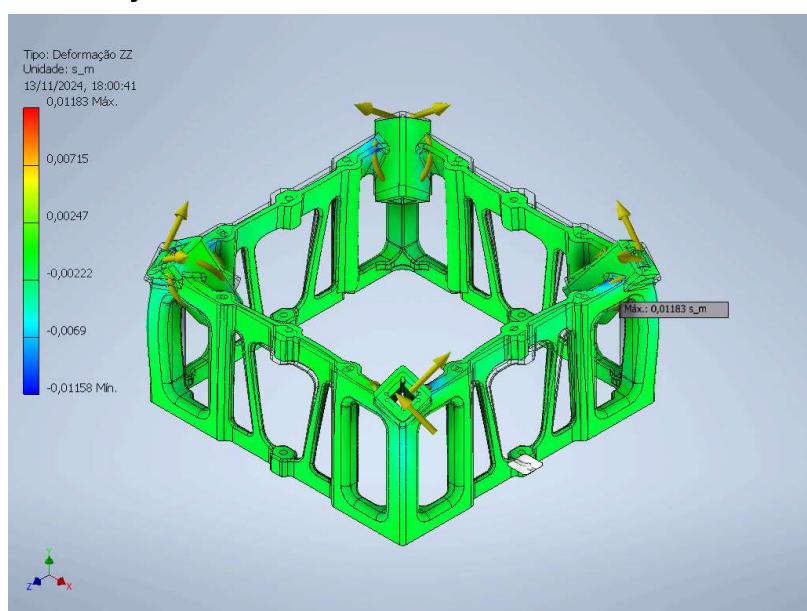
**Deformação YY**

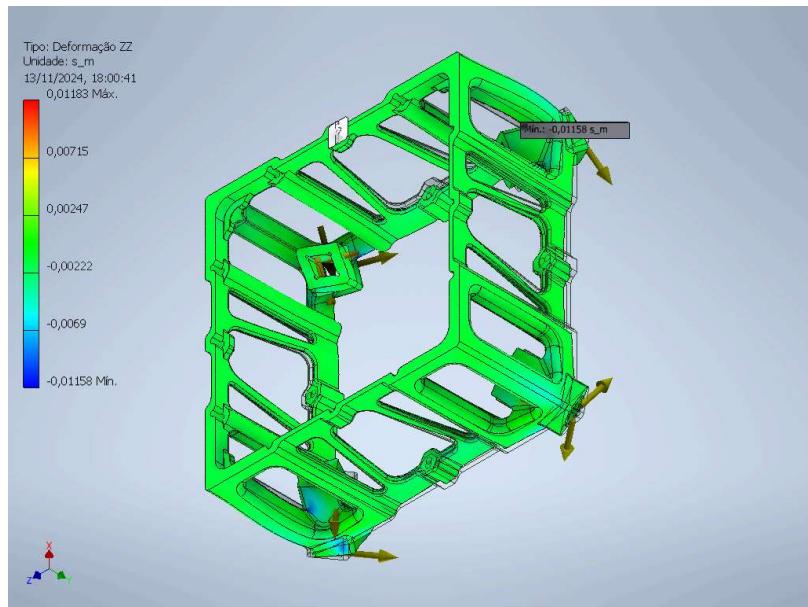


**Deformação YZ**



## Deformação ZZ





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