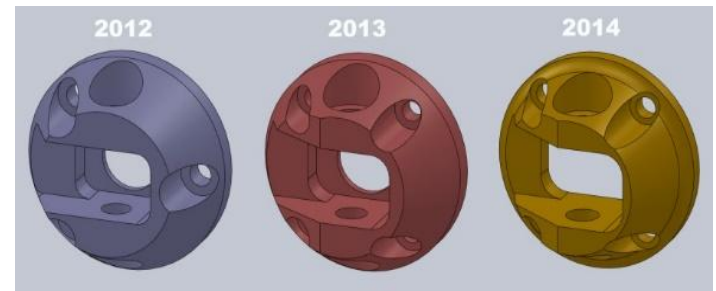
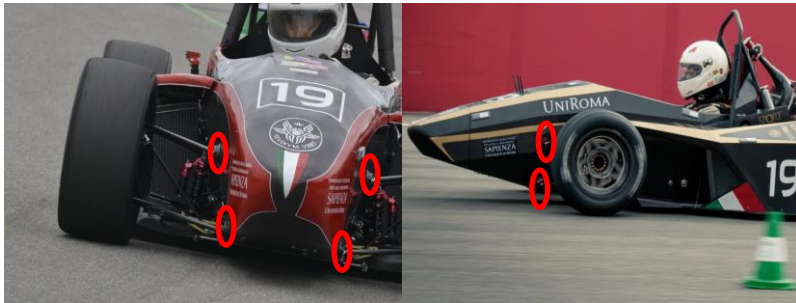


Ottimizzazione Topologica un esempio



Attacco sospensione macchina formula SAE, materiale alluminio: $E=70\text{GPa}$, $\rho=2700\text{ Kg/mm}^3$, $\sigma_{\text{yield}}=260\text{ MPa}$, $\nu=0.33$.

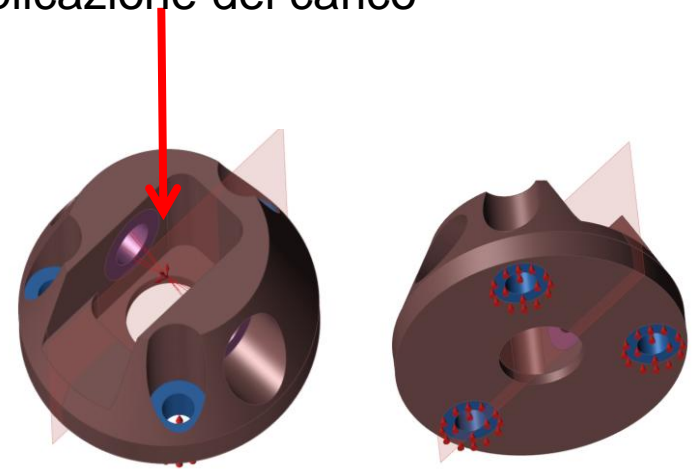
Il componente è utilizzato in diversi punti della macchina (fig. a sinistra), negli anni si è evoluto come in fig. a destra. Massa nel 2012 = 0.14 kg... Massa nel 2014 = 0.031 kg



Punto applicazione del carico

Schema di simulazione

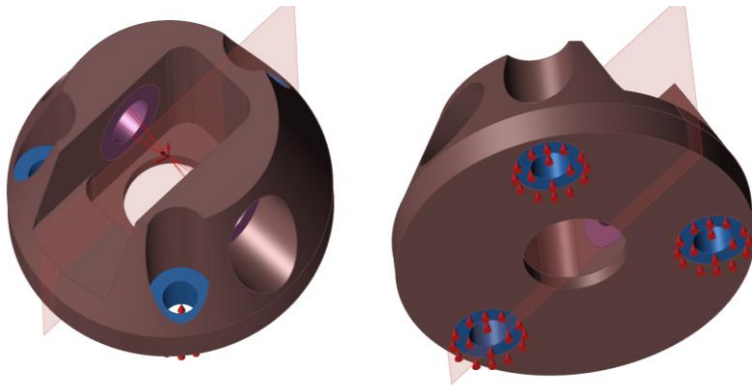
3 Carichi possibili
inclinati rispetto alla
verticale a 0° , 30° e
 60° $F=10000\text{N}$



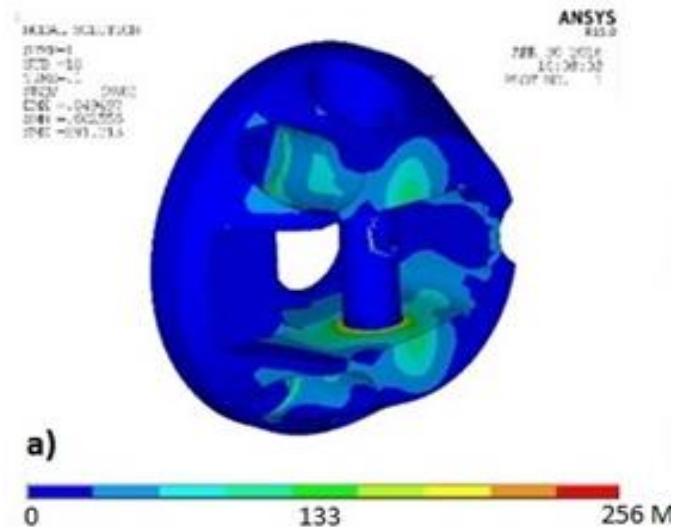
Case study #1: Ottimizzazione topologica di un componente già parzialmente definito:
Si parte da



Definizione Ottimizzazione Topologica

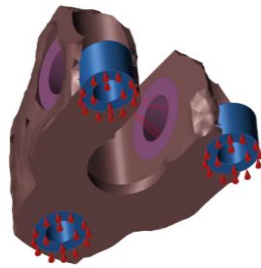


In marrone design space da alleggerire
In azzurro aree di non design space perché funzionali
Vincolo geometrico: simmetria rispetto piano verticale |-- asse

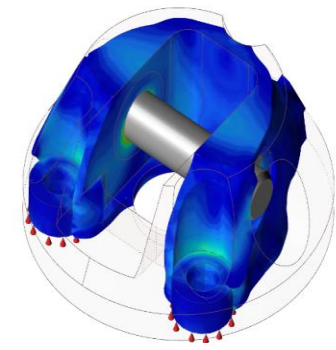
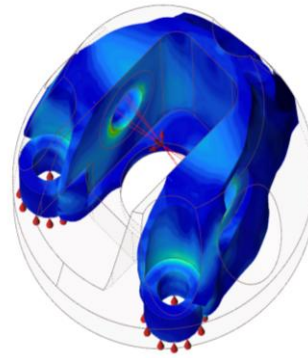


Stress analysis del componente iniziale

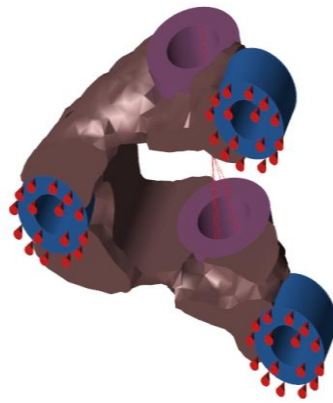
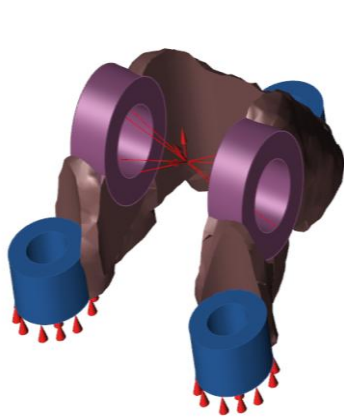
Risultati



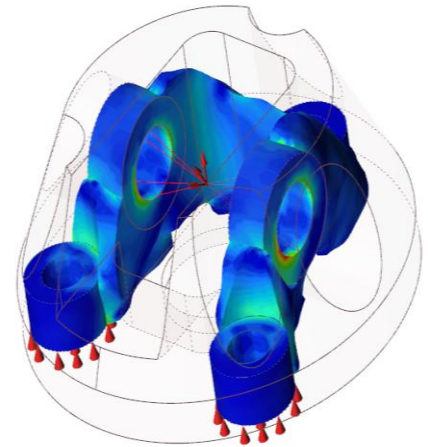
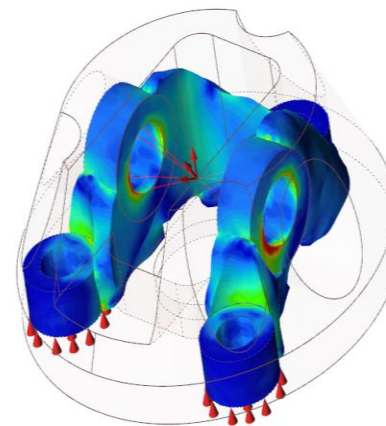
Mass reduction 50%
< yield



max stress

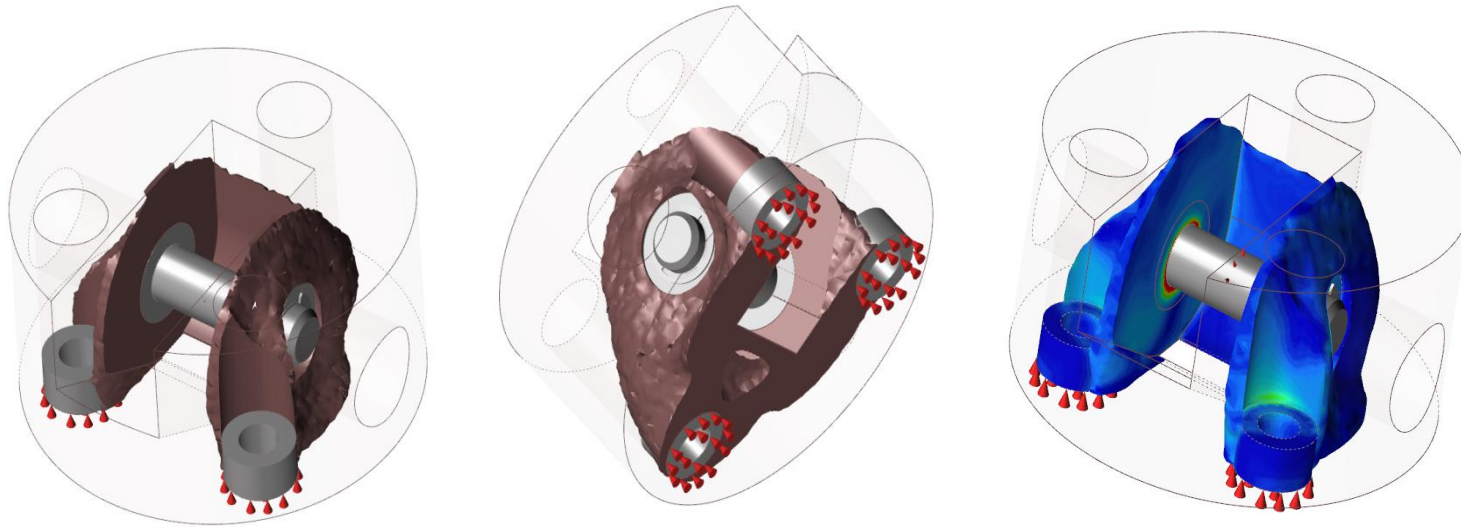
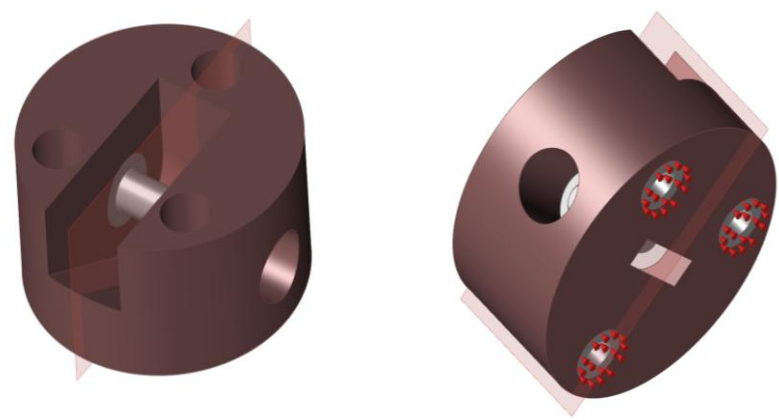


Mass reduction 20%
stress < yield



max

Case study #2: Ottimizzazione topologica dal massimo volume di ingombro



Mass reduction -83% = 0.024 kg.