



Università degli studi di Padova- Dipartimento di ingegneria industriale
Corso di Laurea in Ingegneria Meccanica



Relazione per la prova finale

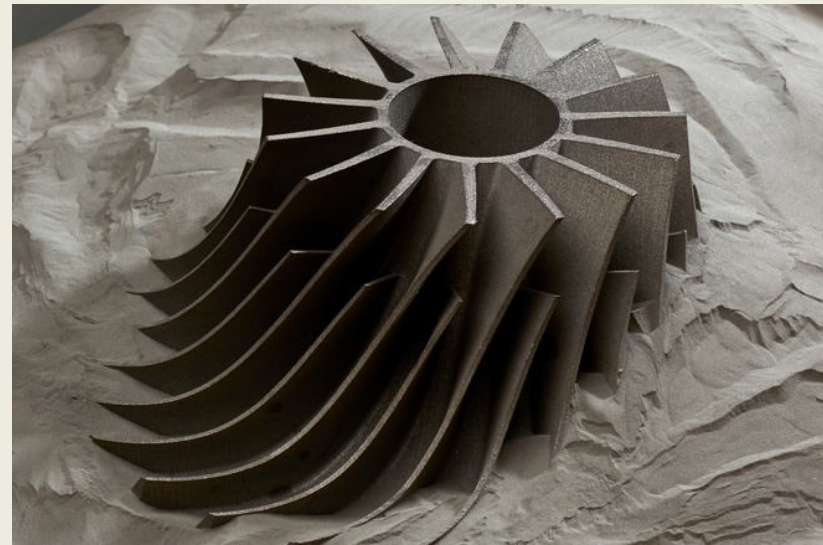
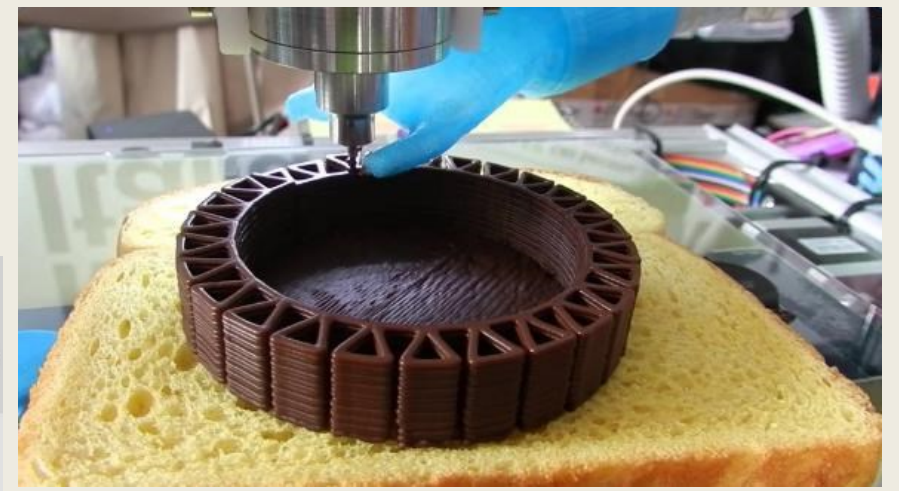
RESISTENZA A FATICA DI COMPONENTI STRUTTURALI OTTENUTI PER STAMPA ADDITIVA

Tutor universitario: Prof. Alberto Campagnolo

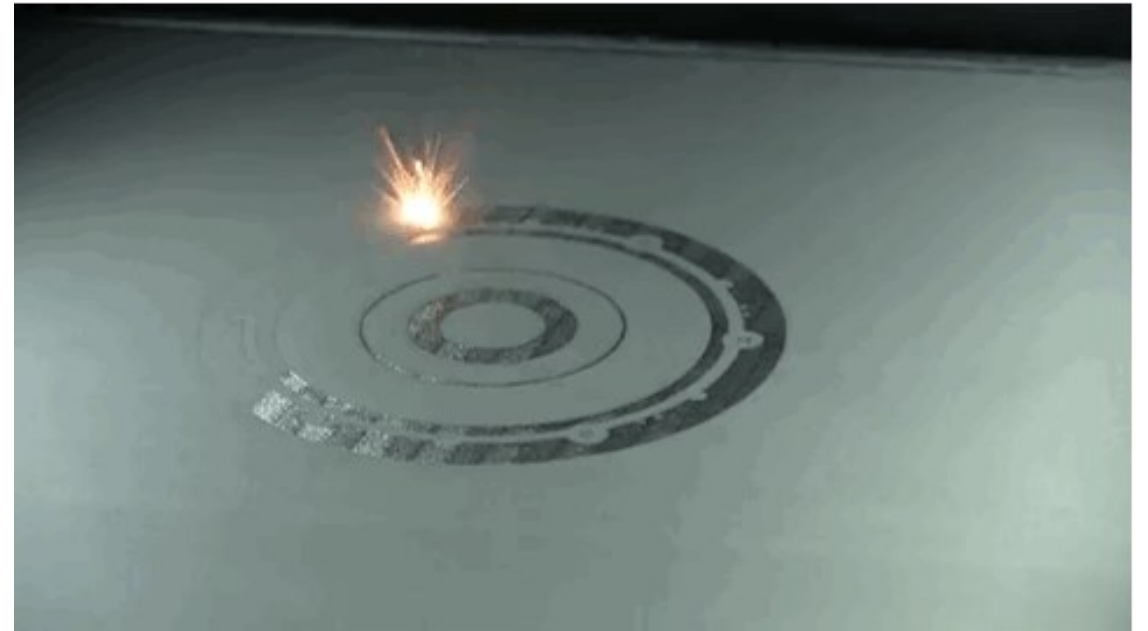
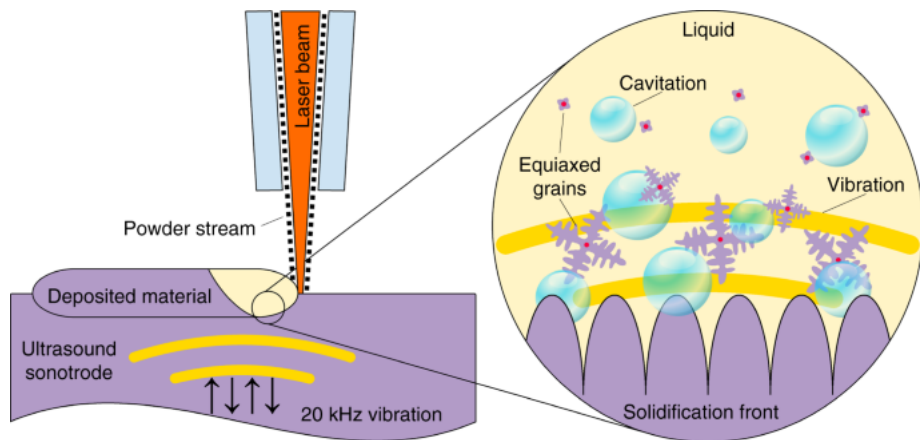
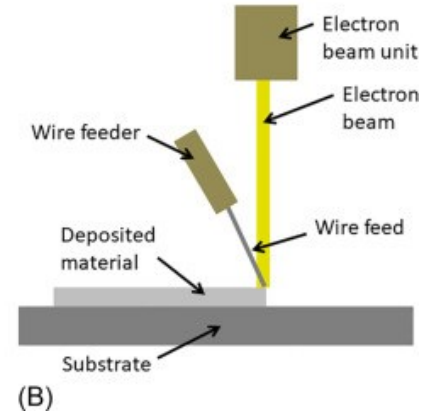
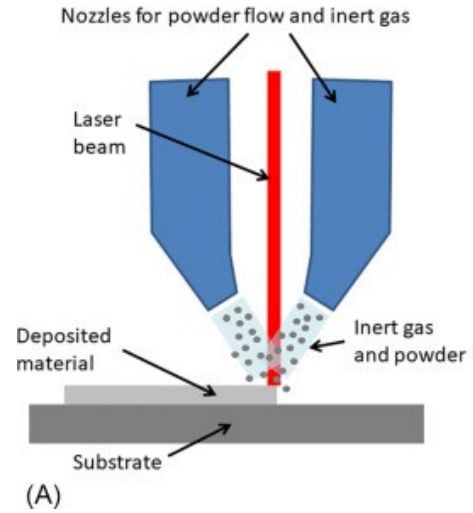
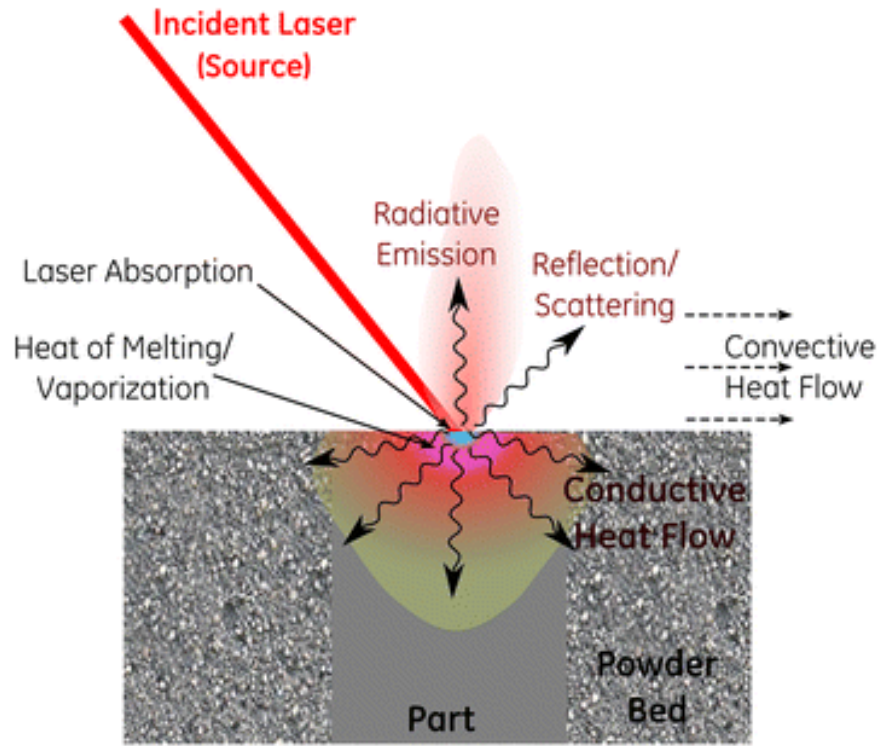
Padova : 24/11/2023

Laureando : Riccardo De Battisti

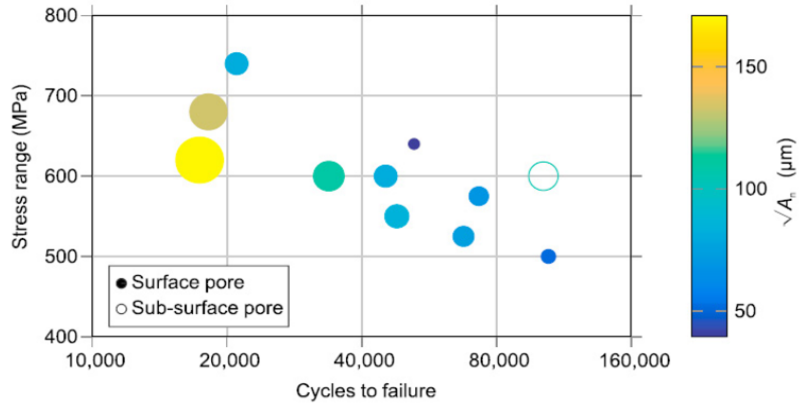
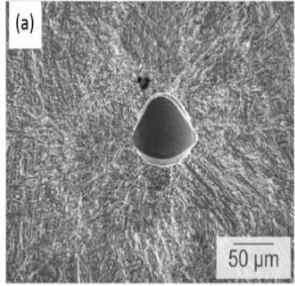
LA STAMPA ADDITIVA:



LE TECNOLOGIE DI STAMPA?



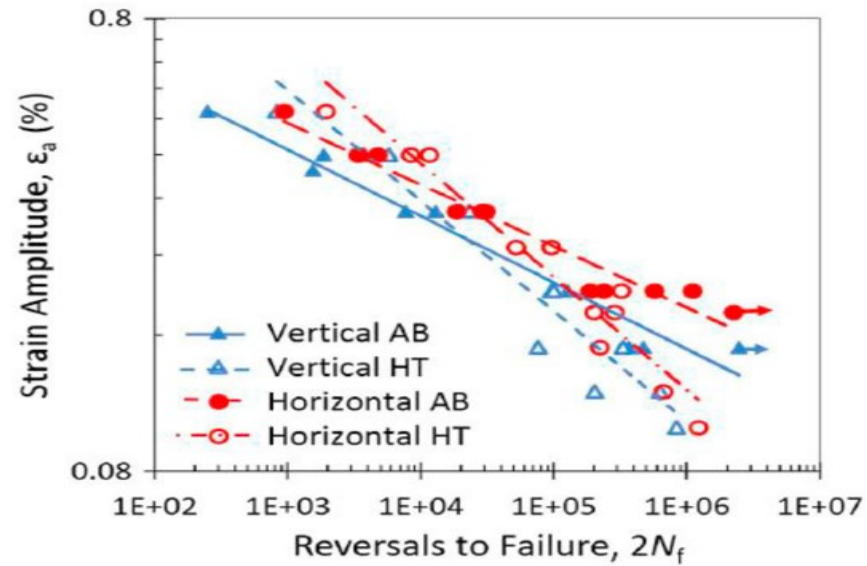
I PARAMETRI FONDAMENTALI :



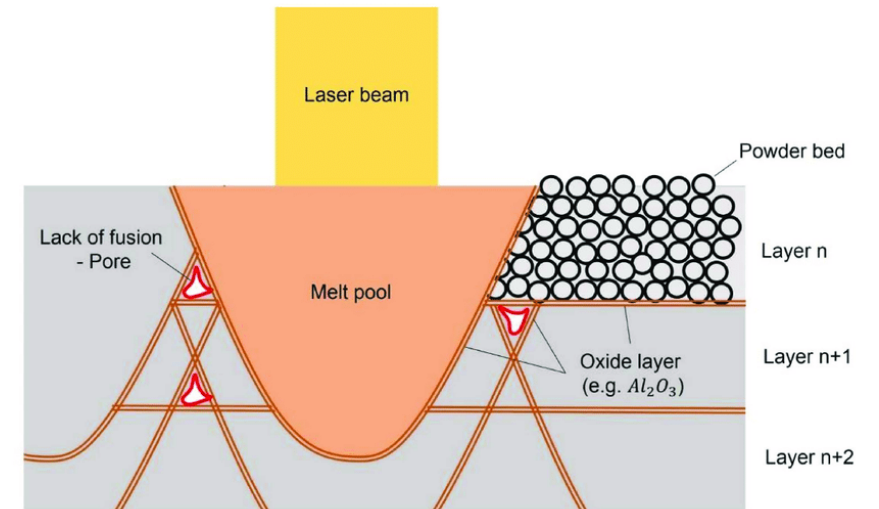
a) POROSITÀ



b) FINITURA



c) ORIENTAZIONE COSTRUTTIVA



d) POZZE DI FUSIONE

CONFRONTO ADDITIVO/METALLURGICO : Ti6Al4V

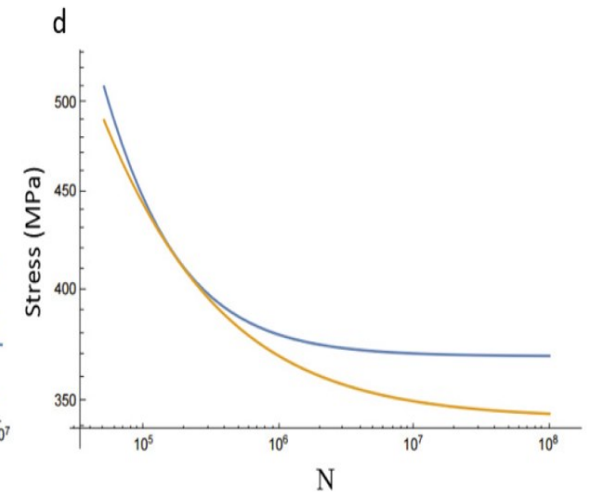
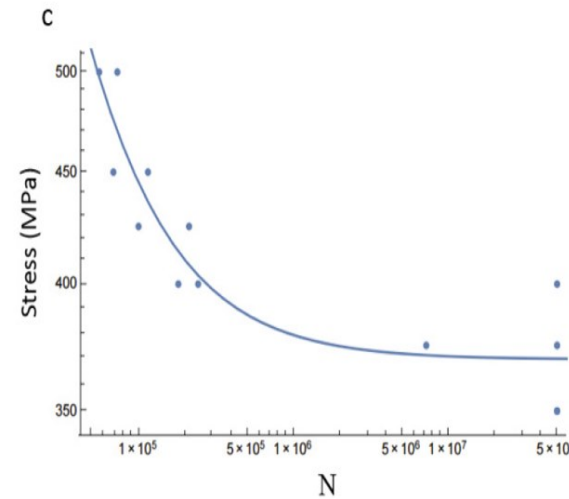
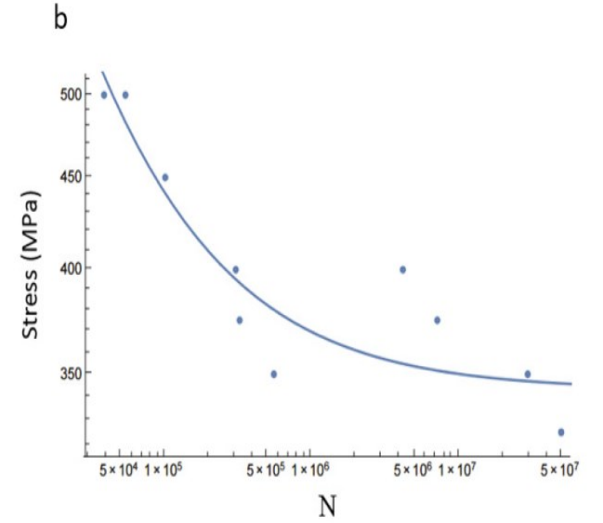
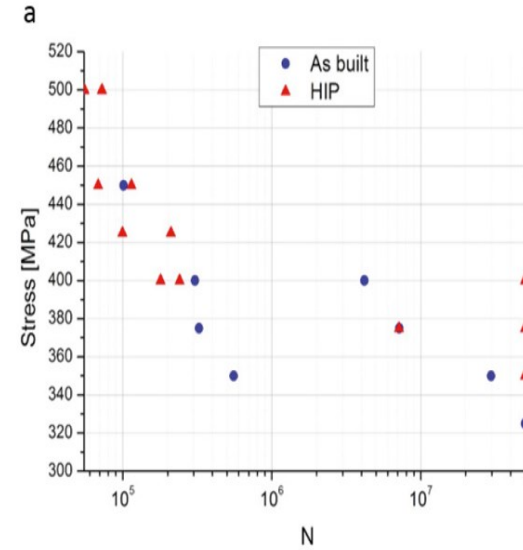
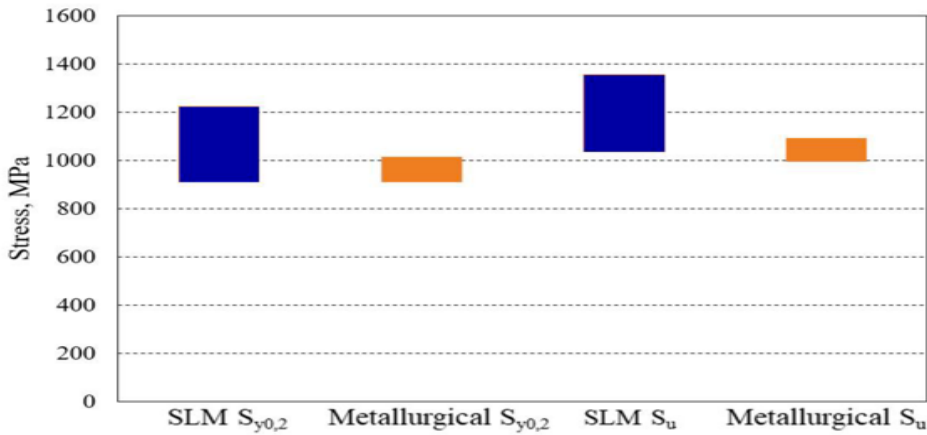
Forgiatura vs PBF



Modulo di Young	112.7 Gpa
Tensione di snervamento	1022,22 Mpa
Tensione di rottura	1092,4 Mpa
Allungamento	16,47 %



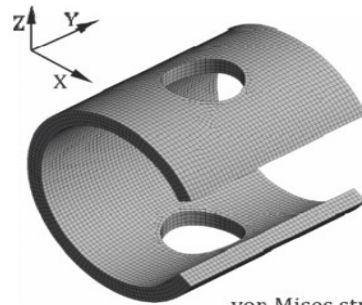
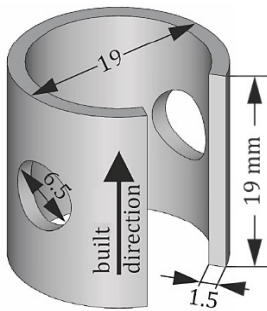
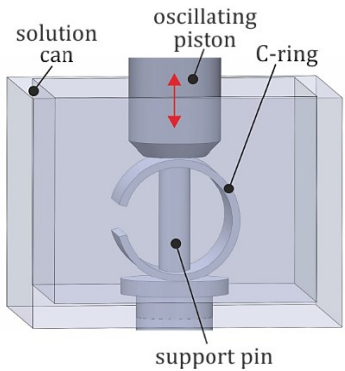
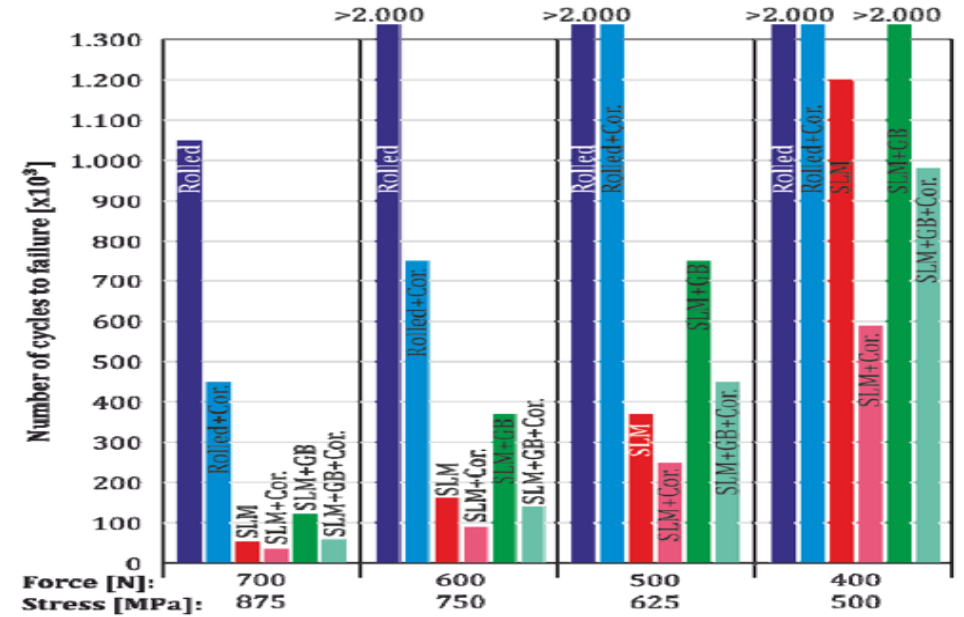
Modulo di Young	110 GPa
Tensione di snervamento	915 MPa
Tensione di rottura	980 MPa
Allungamento	13%



CONFRONTO ADDITIVO/METALLURGICO: ACCIAI MARAGING

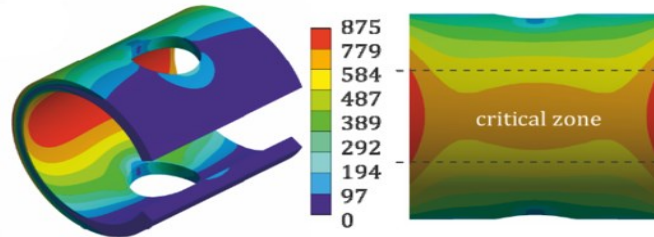
Alloying elements (wt %)	Bar stock	Powder
Fe	Balance	
Ni	18.3	17.0 - 19.0
Co	9.2	8.5 - 9.5
Mo	4.8	4.5 - 5.2
Ti	0.6	0.6 - 0.8
Al	0.07	0.05 - 0.15
Cr, Cu	each 0.15	each ≤ 0.5
C	0.004	≤ 0.03
Mn, Si	0.04, 0.03	each ≤ 0.1
P, S	0.002, 0.001	each ≤ 0.01

Rullatura vs SLM

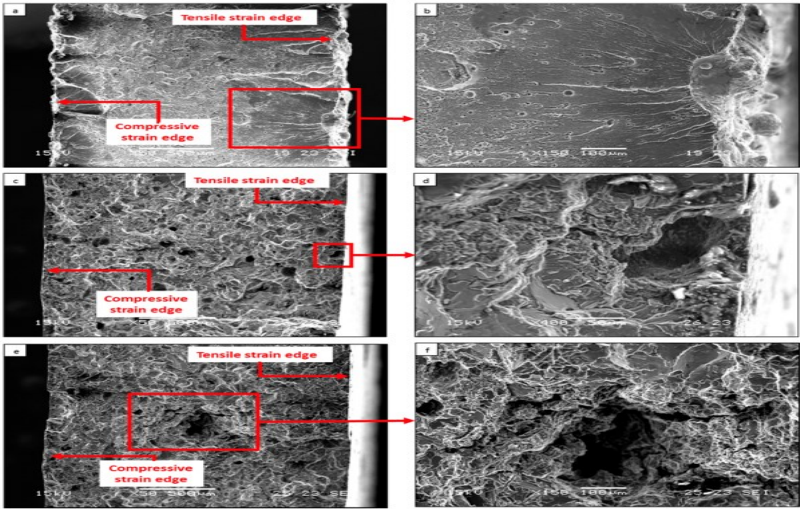


Number of elements: 21×10^3
 Type of elements: hexahedral
 Element size: 0.4 mm
 Young's modulus: 190 GPa
 Poisson ratio: 0.3

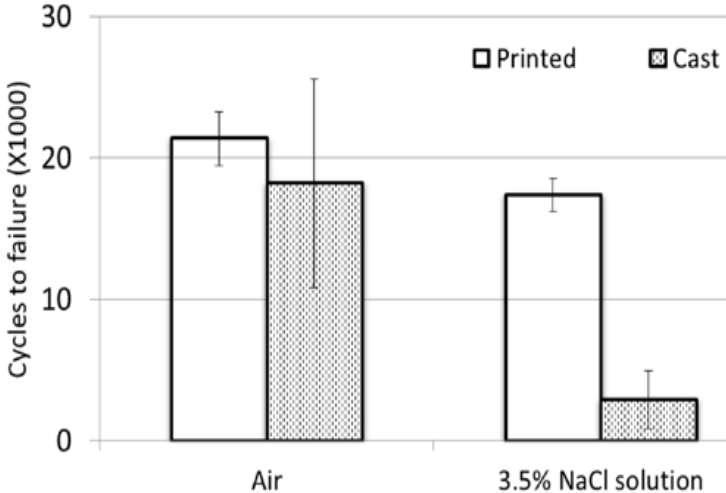
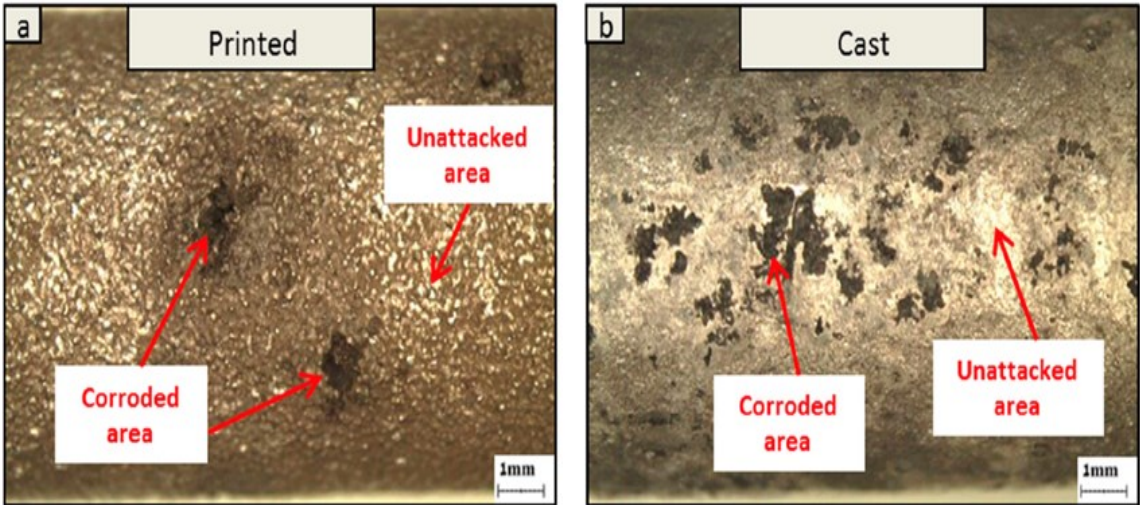
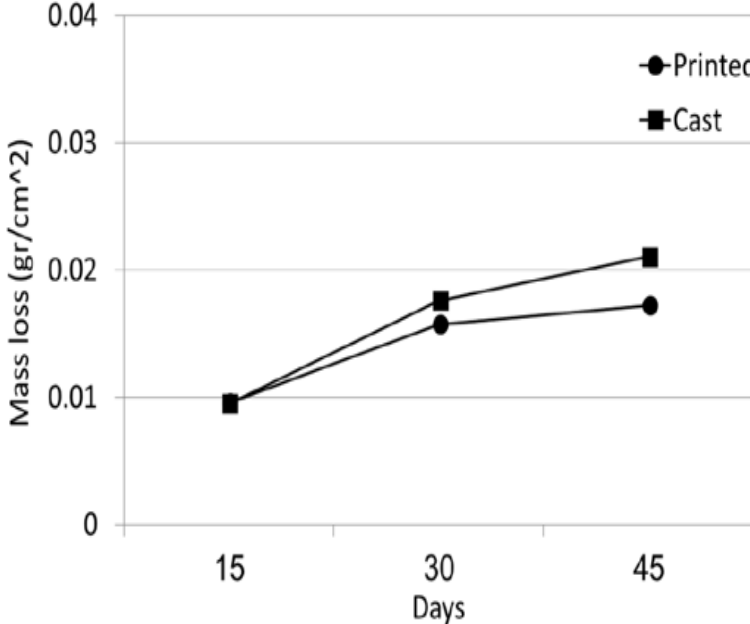
von Mises stress in MPa. at 700N













CONFRONTO ADDITIVO METALLURGICO: AlSi10Mg



Colata vs SLM



CONCLUSIONI:

Additive Manufacturing	Traditional Manufacturing
 Shorter production time	 Longer production time
 Reduced material waste	 Increased material waste
 Easily customized	 Difficult to customize
 Cheaper to make prototypes	 Expensive to make prototypes
 Reduced labor costs	 Increased labor costs

