ADDITIVE MANUFACTURING AND FINITE ELEMENT ANALYSIS OF UNIVERSAL JOINT

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Abstract: Additive manufacturing is a process of making three dimensional solid objects from a digital file. In an additive process an object is created by layers of materials until the entire object is created. Designing the universal joint by using Creo parametric and performing the finite element analysis on universal joint with different materials structural steel, Aluminium AL4032, Comparing the results of two different materials and they are found to be in agreement.

INTRODUCTION: A coupling is a device used to connect two shafts together at their ends for the purpose of transmitting power. Couplings do not normally allow disconnection of shafts during operation. However there are torque limiting couplings which can slip or disconnect when some torque limit is exceeded. The primary purpose of couplings is to join two pieces of Rotating equipment while permitting some degree of misalignment or end movement or both. By careful selection installation and maintenance of couplings, substantial savings can be made in reduced maintenance costs and downtime.

Universal joint

Properties of Structural Steel

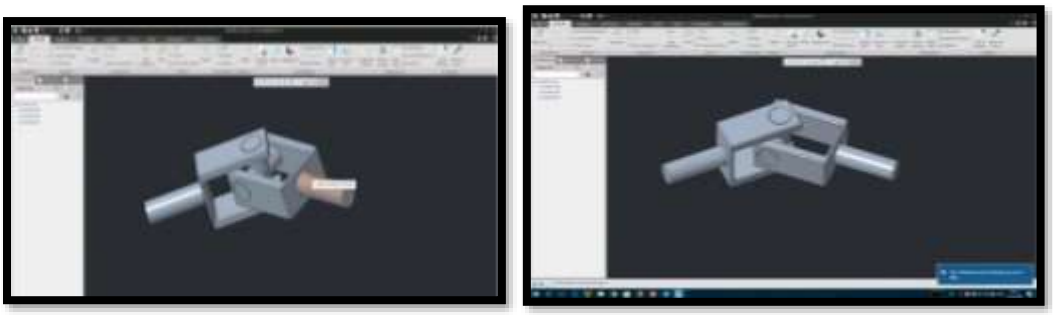
ANSYS

Analysis of Steel frame

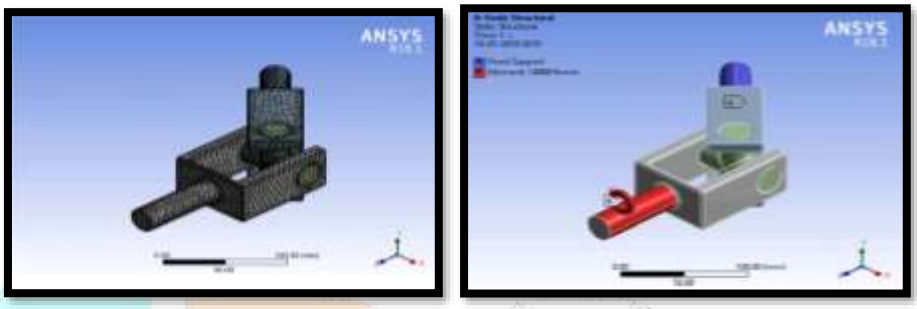
Weight: 2.68 kg

Property	Value	Units
Material name	Structural Steel	
Density	7850	Kg m^3
Thermal expansion	1.2E+05	C^-1
Young's Modulus	2E+11	Pa
Poisson's Ratio	0.3	
Tensile Yield Strength	2.5E+08	Pa
Compressive Yield Strength	2.5E+08	Pa
Tensile Ultimate Strength	4.6E+08	Pa

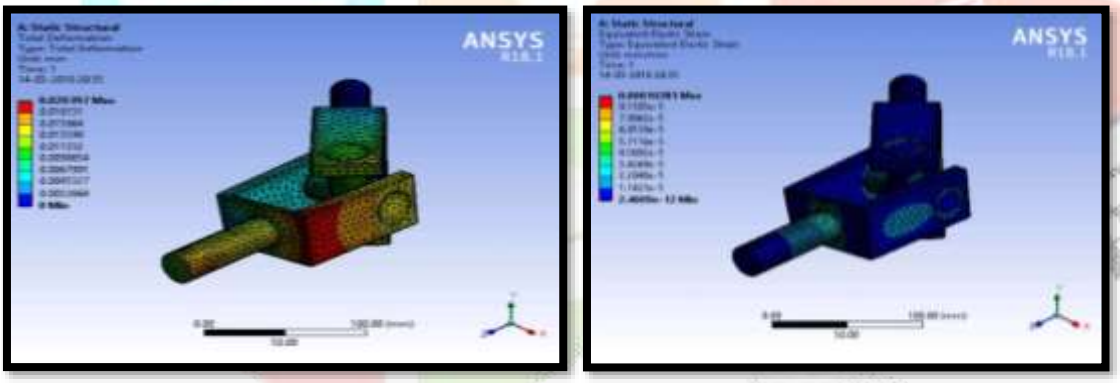
DESIGNING OF UNIVERSAL JOINT IN CREO



Assembly of Yokes and Cross and Assembled universal joint



Meshed universal joint **Load applied on Universal joint**

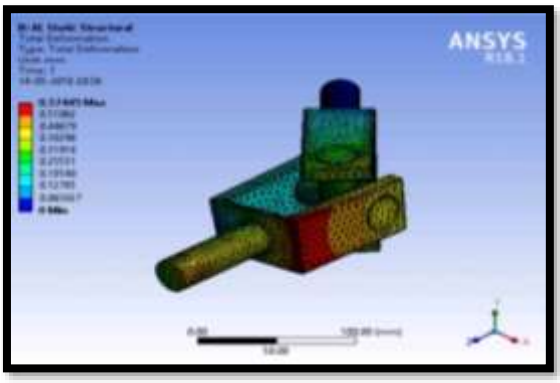


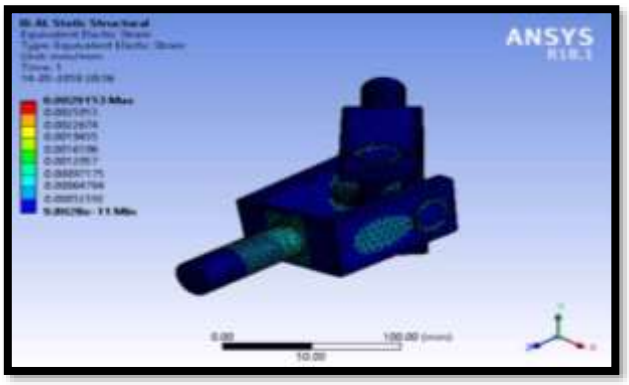
Total deformation **Equivalent Elastic Strain**

Properties of Aluminium

MATERIAL: AL4032
WEIGHT: 0.92939 kg

Property	Value	Units
Material name	AL4032	
Density	2690	Kg m^3
Thermal expansion	1.9E-05	C^-1
Young`s Modulus	8E+11	Pa
Posisson`s Ratio	0.33	-





Total deformation **Equivalent elastic Strain**

Results and Discussion: Additive manufacturing of the universal coupling has been made by 3D printer Finite Element Analysis of the universal joint has been done using ANSYS Work bench. The results obtained are well in agreement. Hence structural steel is better material to manufacture the universal joint by comparing the equivalent elastic strain results of aluminium and structural steel.

Refrences:

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