DESIGNOFFOOTOVERBRIDGE WITHTHEVARIATIONOFSTIFFNESS TO WEIGHT RATIO WITH THE HELP OF TOPOLOGYOPTIMIZATION

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ABSTRACT

Footbridges are needed where there is a separate pathway must be supplied for human beings tomove sitevisitorsflows orsomephysical impediment, alongwith ariver.Themasses theyconveyare,withregardstotollroadorrailwaybridges,prettymodest,andinmostcircumstances a reasonably light structure is needed. They are but, often required to give aprotractedclearspan,andstiffnessthenbecomesancrucialconsideration.Thebridgesarefrequently required very virtually on view to the general public and consequently the adventdeserves careful attention. Steel offers financial and appealing kinds of creation which suit all oftherequirements demandedofafootbridge.

INTRODUCTION

Afootbridge(alsoapedestrianbridge,pedestrianoverpass,orpedestrianovercrossing)isa bridge designed solely for pedestrians.[1]While the primary meaning for a bridge is a structurewhich links "two points at a height above the ground", a footbridge can also be a lower structure,such as a boardwalk, that enables pedestrians to cross wet, fragile, or marshy land.[2] Bridgesrangefromsteppingstones–possiblytheearliestman-madestructureto"bridge"water–toelaborate steel structures. Another early bridge would have been simply a fallen tree. In somecasesafootbridgecan bebothfunctionaland artistic.

TYPESOFFOOTOVERBRIDGES

Typesoffootbridgesincludebutare notlimitedto:

- BeamBridge
- Boardwalk
- Clapperbridge
- Plankroad
- Corduroyroad
- Moonbridge
- Simplesuspensionbridge
- Livingbridge
- Simpletruss

PROJECTDESIGN

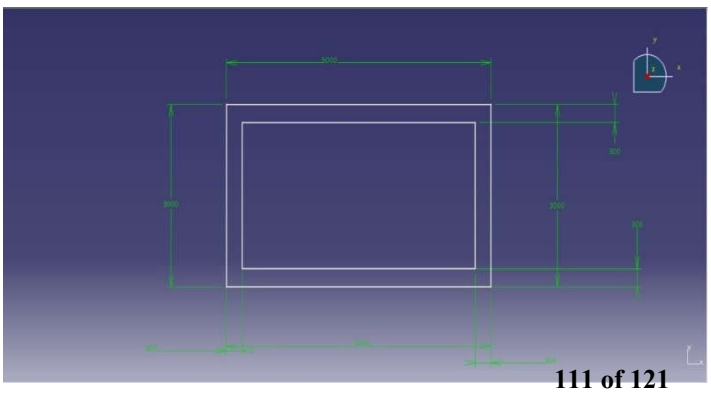
CATIA(ComputerAidedThree-dimensionalInteractiveApplication)isamulti-platformCAD/CAM/CAE commercial software suite developed by the French company Assault Systems.Written in the C++ programming language, CATIA is the cornerstone of the Assault Systemsproductlifecyclemanagement softwaresuite.
CATIAcompetesintheCAD/CAM/CAEmarketwithSiemensNX,Pro/E,AutodeskInventor,andSolidEdgea s well asmany others.

Developer(s)	DassaultSystems
Stablerelease	V6R2011x/November23, 2010
Operatingsystem	Unix/Windows
Type	CADsoftware
License	Proprietary
Website	WWW.3ds.com

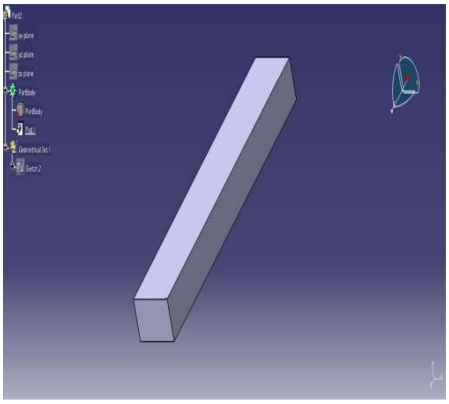
MEASUREMENTS:

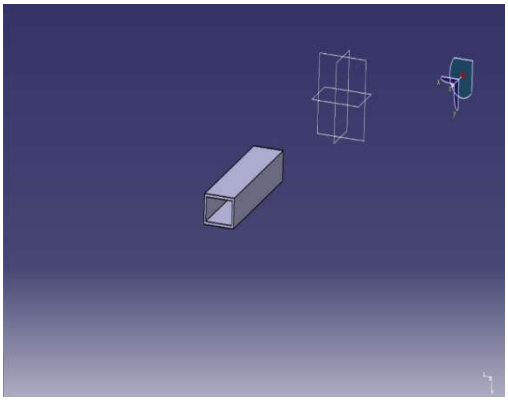
MEASUREMENTS	VALUES
Length	30m
Width	5m
Height	3m
Thickness	0.3m
Force	41678N

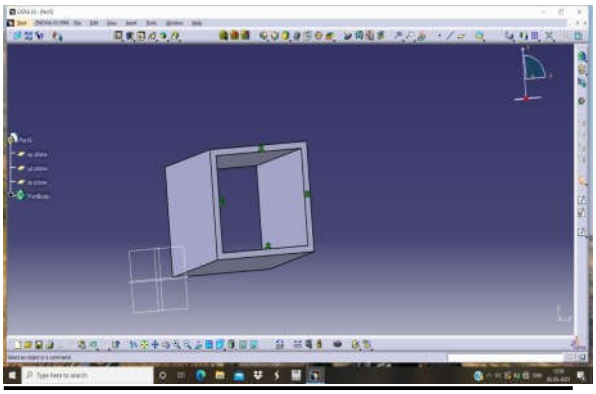
DESIGN:



Pad(extrude):Pocket(hole):

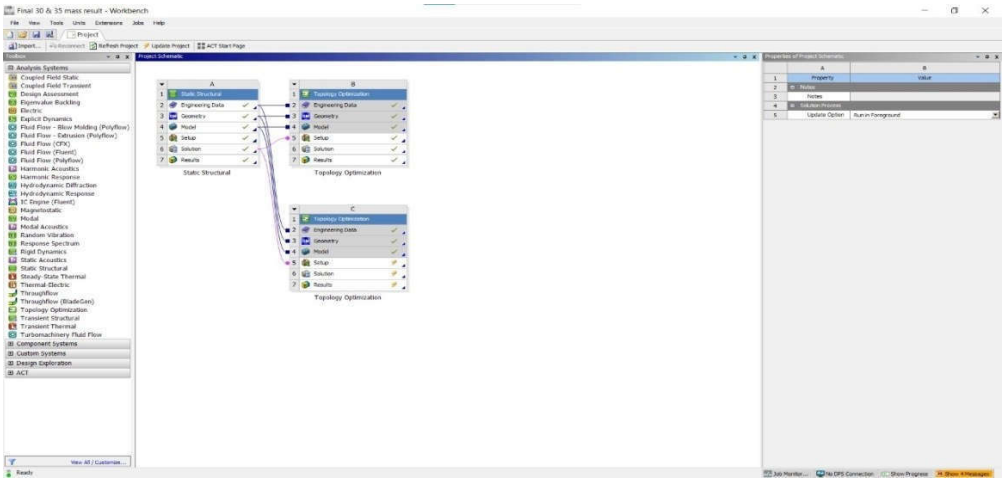




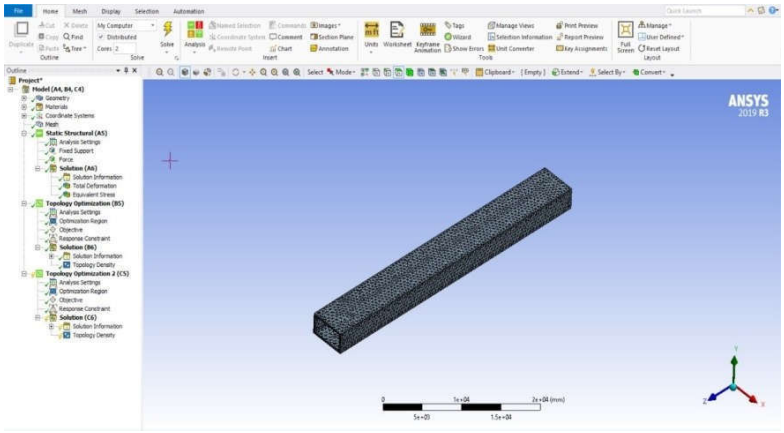


PROJECTIMPLEMENTATION

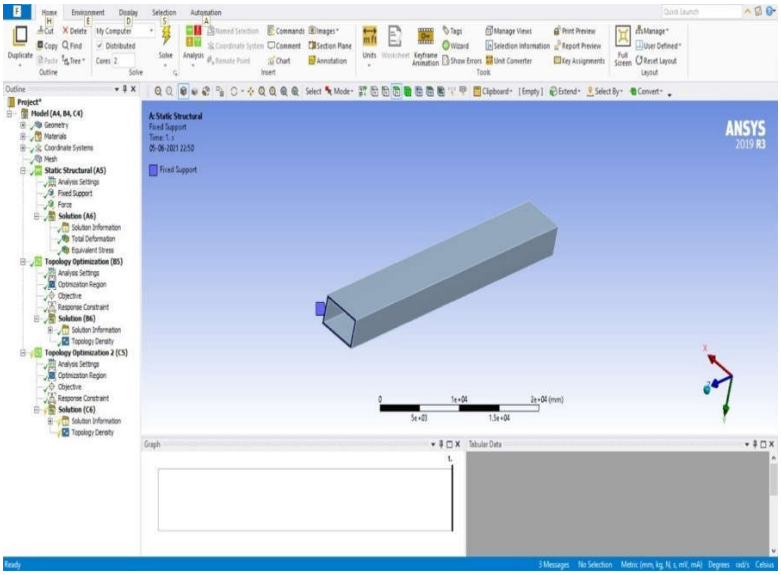
ANALYSINGEXPERIMENTALDATA:



MESH:



FIXEDSUPPORT:



LOADACTING:

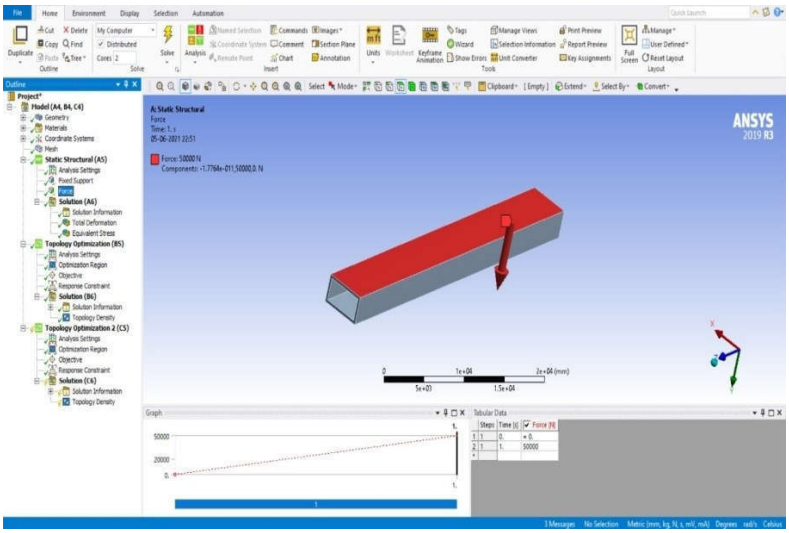
Average weightxNo.of peoplexGravitational force=

Force(Load)85kgs x 50 x9.81 = 41678N

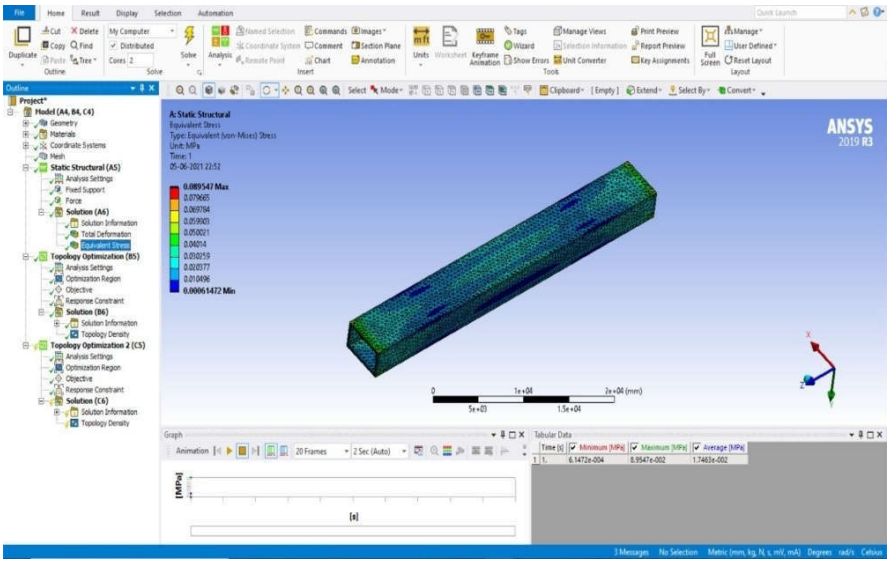
Force(Load)=Deformation41678

N =0.0085297ra

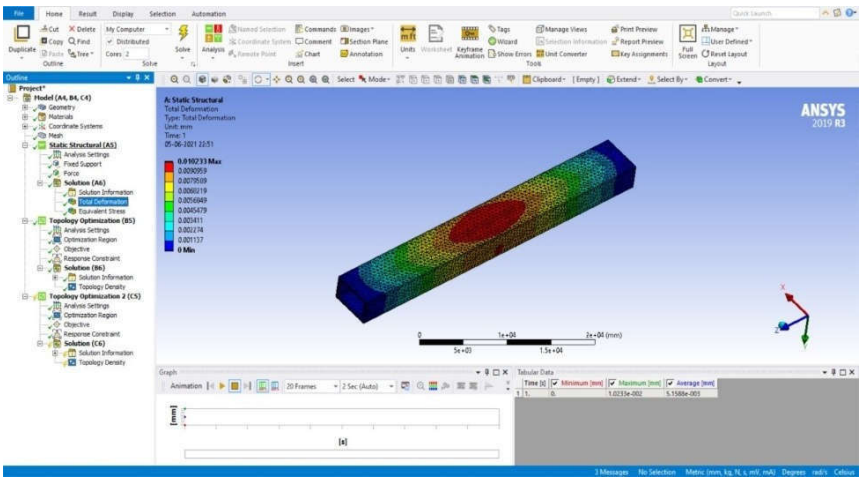
FORCE:



EQUIVALENTSTRESS:



TOTALDEFORMATION:



DEFORMATIONSAMPLES:

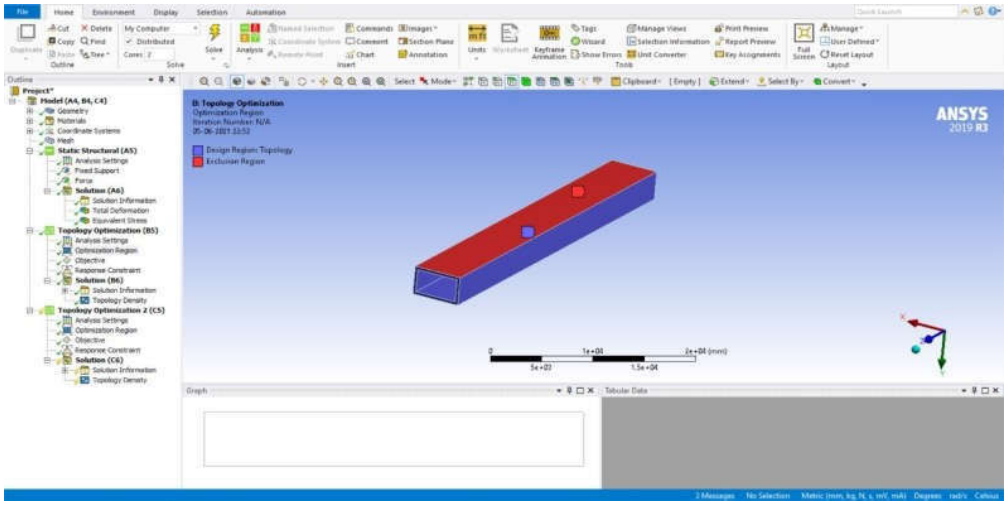
LOAD	DEFORMATION
40000N	0.0081863
42000N	0.0085956
44000N	0.0090049
46000N	0.0094143

48000N	0.0098236
50000N	0.010233

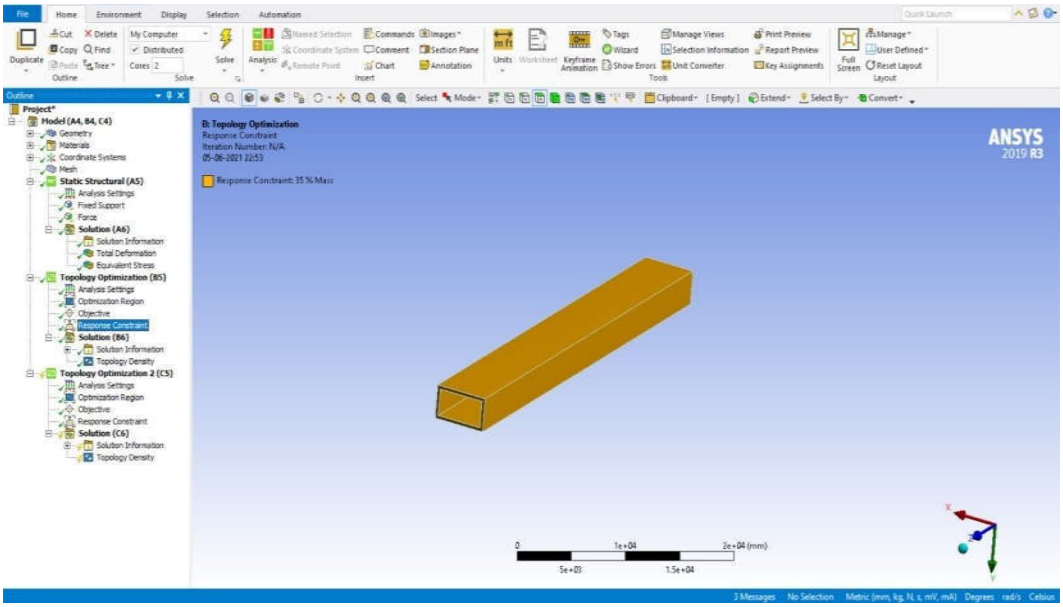
TOPOLOGYOPTIMIZATION:

Thestudyoftopologyoptimizationismakingdifferenceinweight(mass)withoutanychangeindimensions. Removal of excess material where there is no stress acts on it,i also called topology optimization.Itisalsousedto reduce theweight(mass) in case ofgettinggoodperformance.

OPTIMIZATIONREGION:



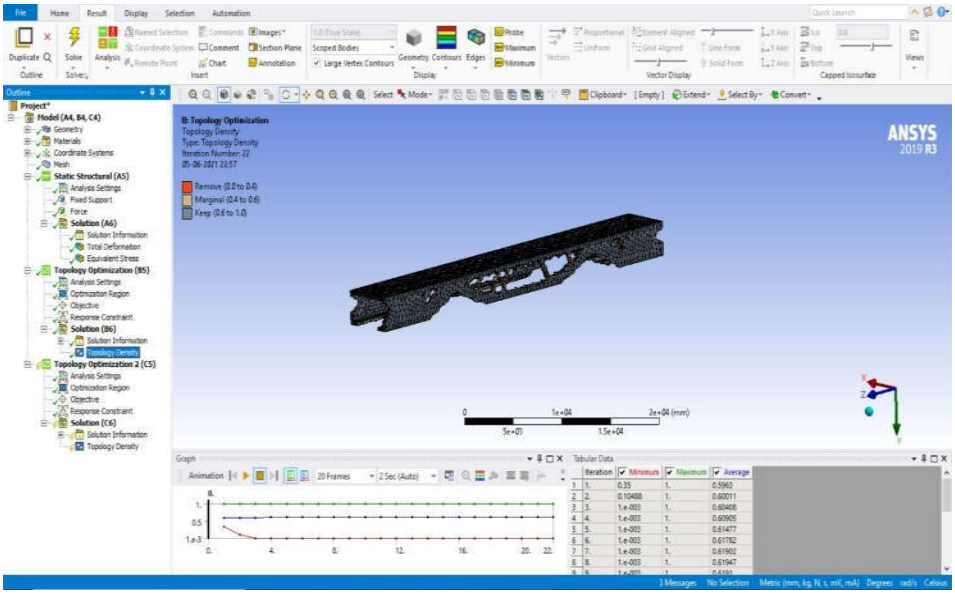
RESPONSECONSTRAINT:



TOPOLOGYOPTIMIZATIONRESULT:

S.NO	MATERIAL	DENSITY	RESPONSECONSTRAINT	ORIGINAL MASS	MASS AFTER TOPOLOGYOPTIMIZATION	PERCENTAGE OF MASS REDUCED
1.	Structural steel	8654.9kg	30%	1537.15kg	868.88kg	43.408%
2.	Structural steel	8654.9kg	35%	1537.15kg	919.06kg	40.208%

ANALYSINGEXPERIMENTALRESULT(FINALRESULT):



CONCLUSION

In thisproject wediddesign ofafootover bridgebyusingCATIA-V5-R2011. Afterthecompletionofdesign,wedidanalysisbyusingANSYSWorkbenchwithhelpofTopologyoptimization. WegotagoodperformanceofthefootoverbridgebygivingthemeasurementswhichweusedinthisProject andwe alsodonethevariationofStiffnesstoWeight(mass)ratio. As a future scope of study, manufacturing techniques for Foot over Bridge could be used in allthe heavy traffic routes,and also be able to construct strong enough to with-stand.

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