

Design and Analysis of A 2 Axle Tipper Trailer Chassis Frame By Improving The Strength And Lowering The Weight of The Chassis Frame

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GUIDE

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ABSTRACT

The main purpose of this project is to analysis for different cross-section and different material for the frame. The frame is consist of the side long members, one main long member joined with a series of number of cross-members. So here we are optimizing the cross members and the material optimizing is done by using a composite material and even the loads are being varied for the better optimizing of the product, here the static analysis is done using ANSYS software and the design considerations are done using CATIA software. Modal analysis is carried out to determine the dynamic characteristics of the trailer. The weights of the products are also considered as an additional advantage to improve the productivity.

INTRODUCTION

Enclosed toy trailers and motorcycle trailers can be towed by commonly accessible pickup truck or van, which generally require no special permit beyond a regular driver's license. Specialized trailers like open-air motorcycle trailers, bicycle trailers are much smaller, accessible to small automobiles, as are some simple trailers, have a drawbar and ride on a single axle. Other trailers, such as utility trailers and travel trailers or campers come in single and multiple

axle varieties, to allow for varying sizes of tow vehicles.

Some of the advantages of a travel trailer include:

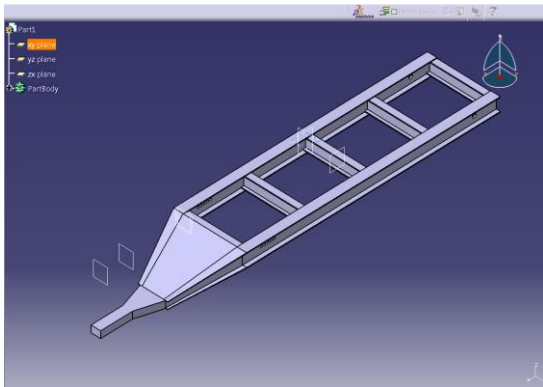
- Models to fit virtually every budget
- "Ranch-style" single-level living ideal for anyone who doesn't like to climb stairs
- Your everyday car or truck can double as your RV hauler, so no reason to purchase a dedicated tow vehicle, understand your towing options by visiting Towing Guides
- Once you unhitch at your campsite, you have your vehicle to help you get around
- Solid walls and locking door for security
- Very easy to set up
- Multiple slide-outs expand to create wide-open living spaces
- Tailored to fit your needs with lots of choices in floorplan layouts, including bunkhouse models, couples coaches and rear kitchen floorplans
- Many offer two or more bedrooms for privacy
- Generally the size of the trailer ranges from 13 to 40feet in size.

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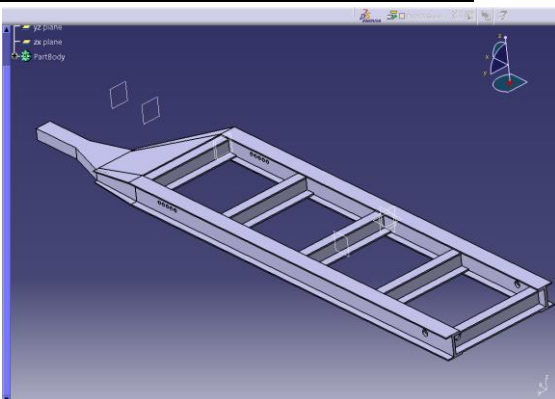
OBJECTIVE OF THE PROJECT

Here in this thesis we are going to consider different models of frames and sub frames of a tractor trailer. The frame is consist of the side long members, one main long member joined with a series of number of cross-members. So here we are optimizing the cross members and the material optimizing is done by using a composite material and even the loads are being varied for the better optimizing of the product, here the static analysis is done using ANSYS software and the design considerations are done using CATIA software. And here after the static analysis, we are even going to even verify the designs using vibrational analysis and very the results. The weight of the product is also considered and the results are compared and resulted.

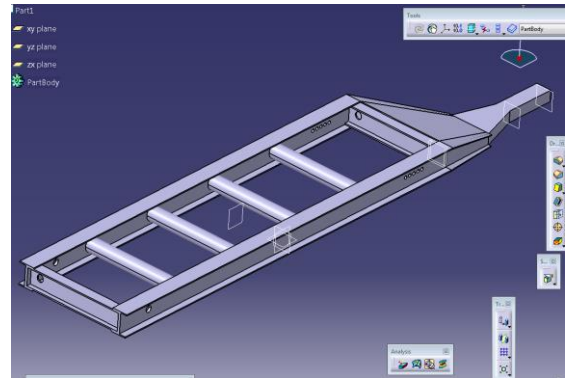
DESIGN IMAGES OF 2 AXLE TIPPER TRAILER CHASSIS FRAME
MODEL 1 – I SECTION FRAME



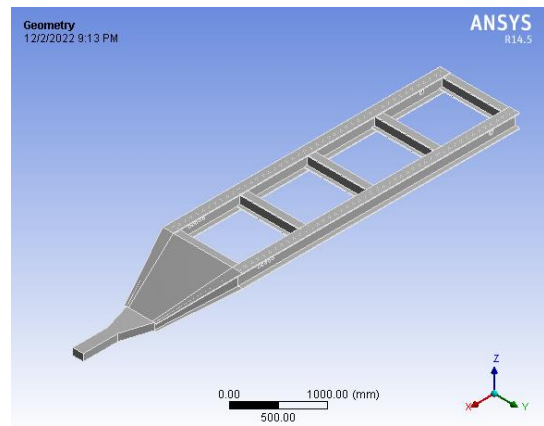
MODEL 2 – C CHANNEL FRAME



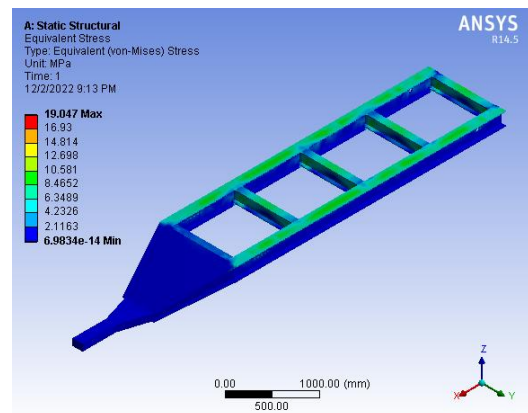
MODEL 3 – I SECTION WITH ROUND SUB FRAMES



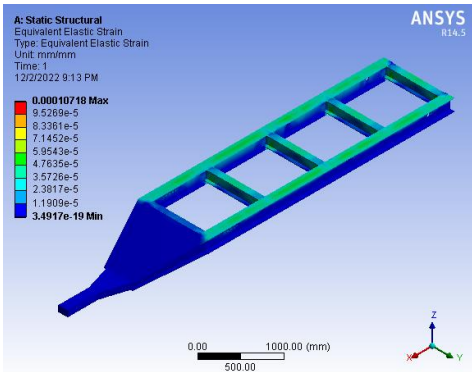
STATIC ANALYSIS OF ORIGINAL MODEL USING AISI 4130 ALLOY STEEL GEOMETRY



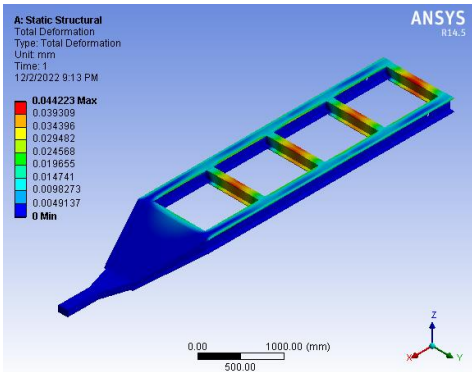
STRESS



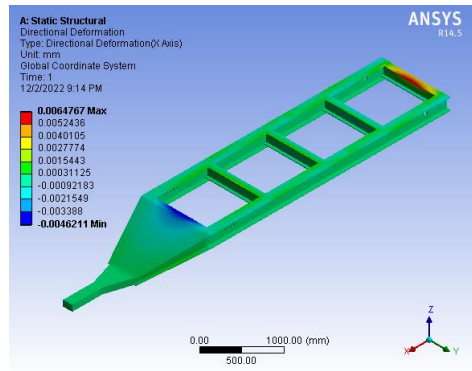
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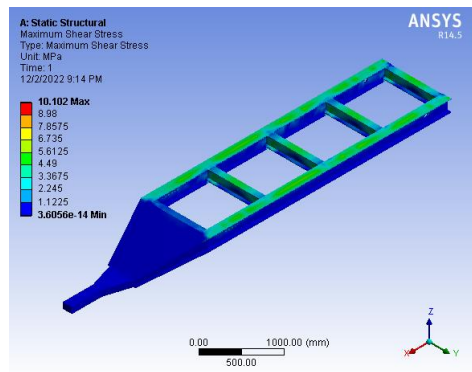
TOTAL DEFORMATION



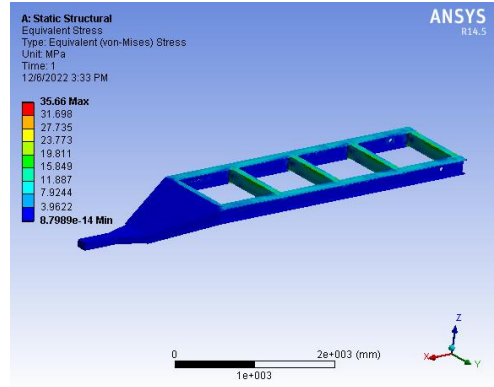
DIRECTIONAL DEFORMATION



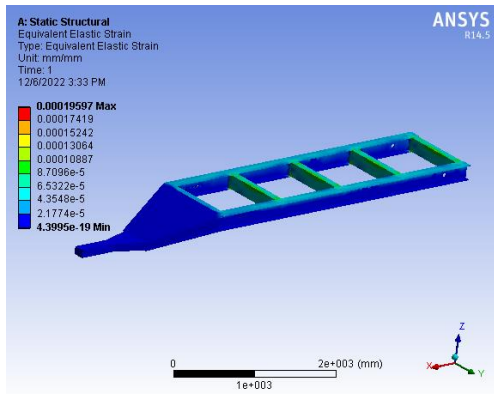
SHEAR STRESS



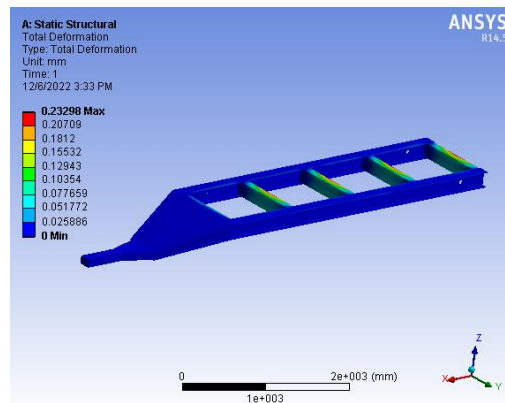
STATIC ANALYSIS OF MODIFIED MODEL C CHANNEL SUB FRAMES USING CARBON STEEL STRESS



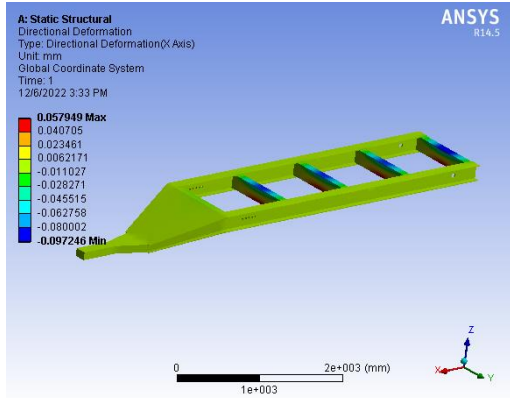
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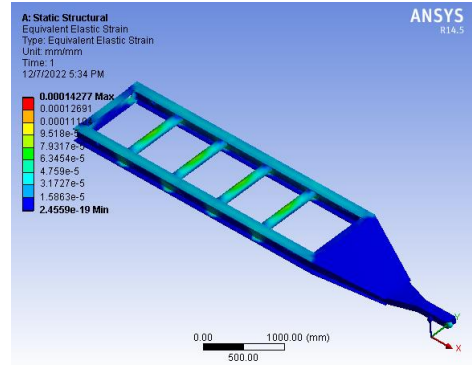
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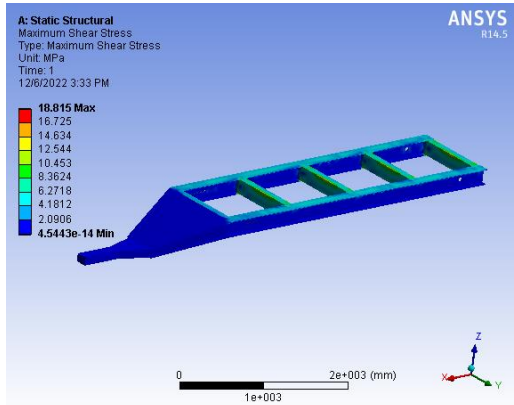
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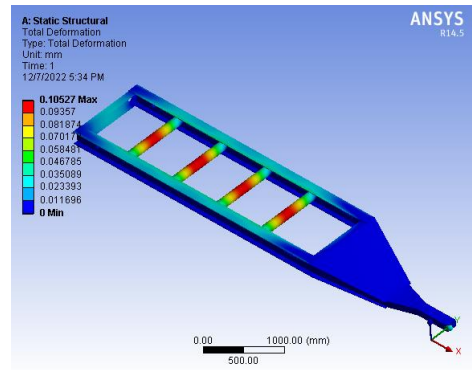
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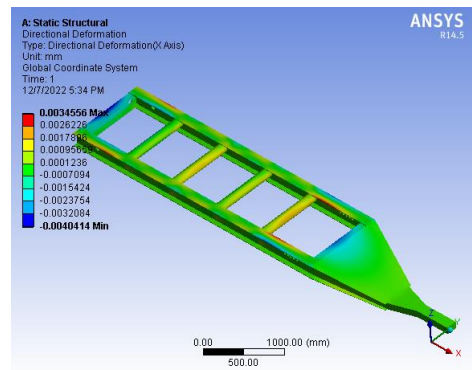
SHEAR STRESS



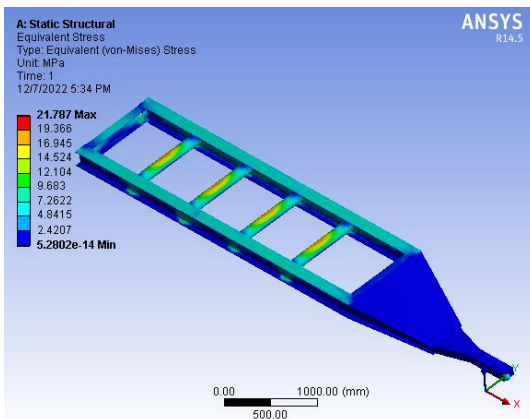
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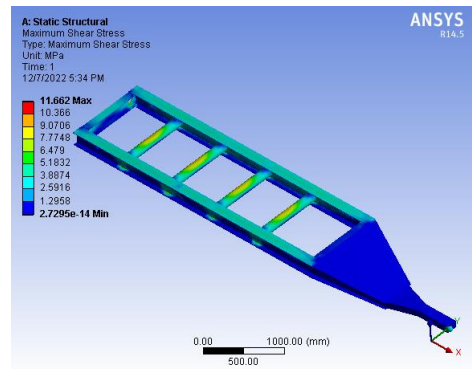
DIRECTIONAL DEFORMATION



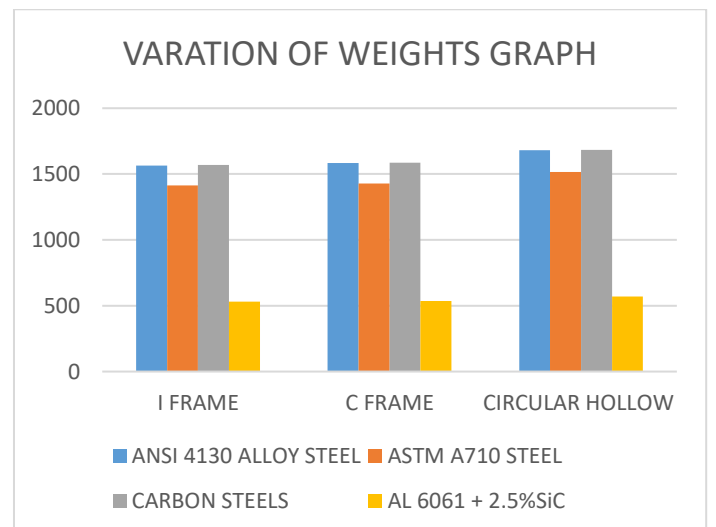
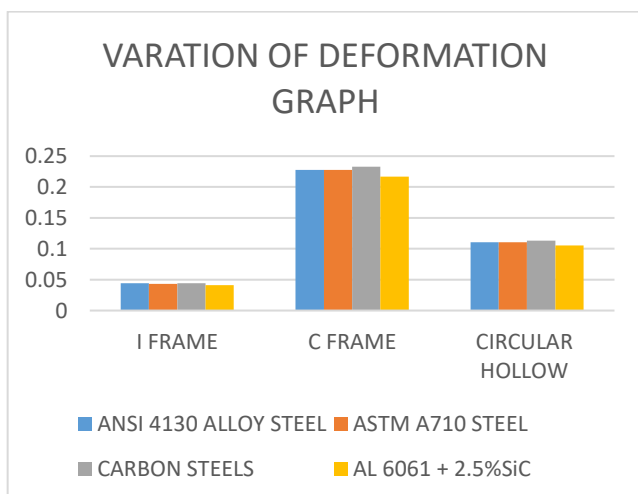
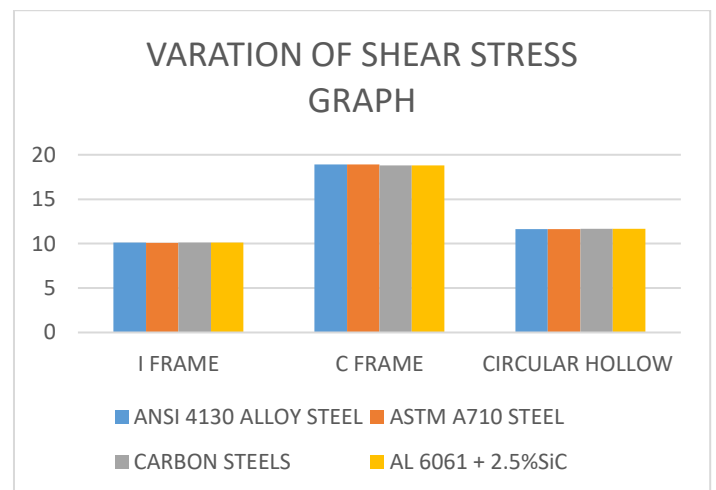
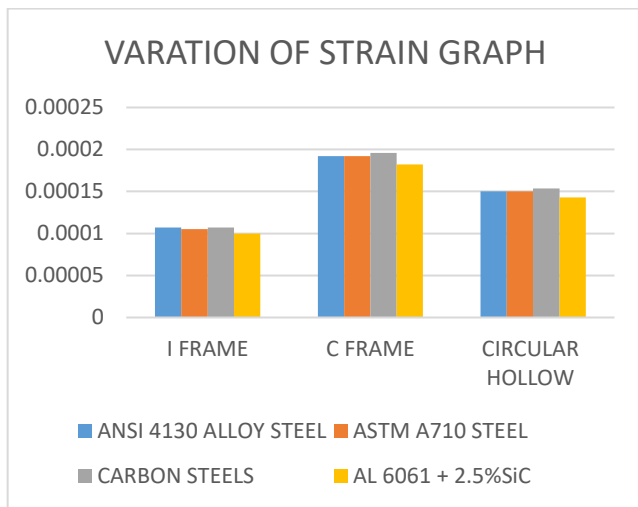
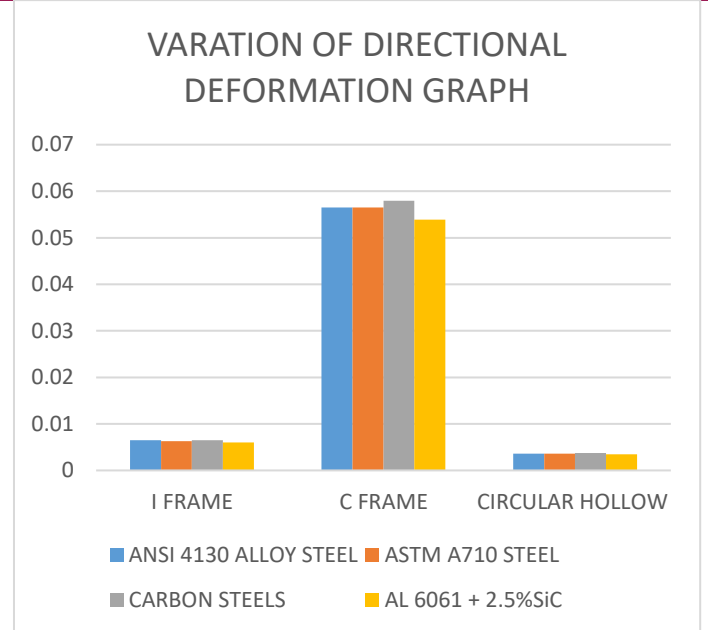
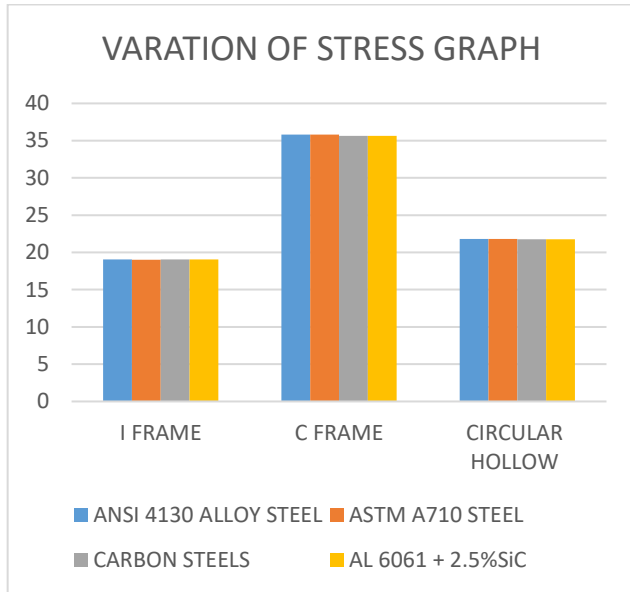
STATIC ANALYSIS OF MODIFIED MODEL ROUND CHANNEL SUB FRAMES USING Al 6061 + 2.5% SiC STRESS



SHEAR STRESS



GRAPHS



CONCLUSION

The main purpose of this project is to analysis for different cross-section and different material for the frame. The frame is consist of the side long members, one main long member joined with a series of number of cross-members. So here we are optimizing the cross members and the material optimizing is done by using a composite material and even the loads are being varied for the better optimizing of the product, here the static analysis is done using ANSYS software and the design considerations are done using CATIA software. Modal analysis is carried out to determine the dynamic characteristics of the trailer. The weights of the products are also considered as an additional advantage to improve the productivity. Here in this thesis we are going to optimize the design profile from “I” section to “C” frame and “circular hollow” frame sub frames. And even the materials are also being optimized. Here we are using ANSI 4130 alloy steel material, ASTM A710, carbon steels and a composite material Al 6061 + 2.5% SiC.

From the above obtained results as if we verify the stress results here the “I: section frame and “circular hollow” frame has obtained the lesser values. As if we verify between those two profiles, there is a slight difference in stress values. And coming to the deformation results, here also “I” frame and “circular hollow” frame models only obtained the better results, but for the 3 models used here the deformation is very less and negligible.

While coming to the shear limits, for all the materials and the models used here have obtained the shear results in limit and in safe limit. And when compared with the weights here the composite material when used for any

of the frame models have the lesser weight than the other materials and models.

So from all the comparisons of weights, materials and profiles, here the “I” section or the “circular hollow” frame models are suggested for the future purpose.

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