

NeoBuild Technical Notes

Report Title:

Comparison between Warren and Pratt floor trusses



Discipline:

LGS

Date:

2023.06.20

Provided By:

NeoBuild Engineering

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1. Purpose of the study

The purpose of this study is a comparison between Warren and Pratt floor joists.

2. Geometry of the model

2.1. Shape and specifications



Pratt floor joist



Warren joist

Joist specifications

Span	5000mm
Depth	400mm
Spacing	450mm
Eccentricity	55mm
Max node space value	450mm
Section	C89-41-0.75

2.2. Support condition

Support condition is considered in the following two cases:

- Rigid support
- Pinned support

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Support condition detail

Rigid	It is connected to the bearer joist with two screws at the top and two screws at the bottom.
Pinned	sits on the top of the wall

3. Loading

Loading is considered as below table:

Load values

Imposed load	1.5 KN/m^2
Dead load	0.5 KN/m^2
Concentrated load	1.8 KN
Partition load	0.5 KN/m^2

4. Comparison of the result

The comparison of the results is presented in the below table:

Design result summary




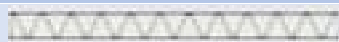
Support condition	Shape	Joist NO.	Maximum values						
			Top chord D/C ratio	Bottom chord D/C ratio	Web D/C ratio	Connection D/C ratio	Deflection-distributed load (mm)		Deflection-point load (mm)
							DL	LL	1.8 KN Concentrated live load
Rigid	Pratt	FT 108	0.79	0.58	0.31	1.00	4.01	2.8	1.82
	Warren	FT 118	0.84	0.58	0.34	0.87	4.13	2.91	1.87
Pinned	Pratt	FT 204	0.89	0.56	0.32	0.875	4.93	3.45	2.15
	Warren	FT 214	0.88	0.52	0.36	0.937	4.73	3.32	2.09

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5. Comparison of the weight and screws

The following table presents a comparison between the total weight of each joist and also total number of required screws.

Weight and quantity of screws

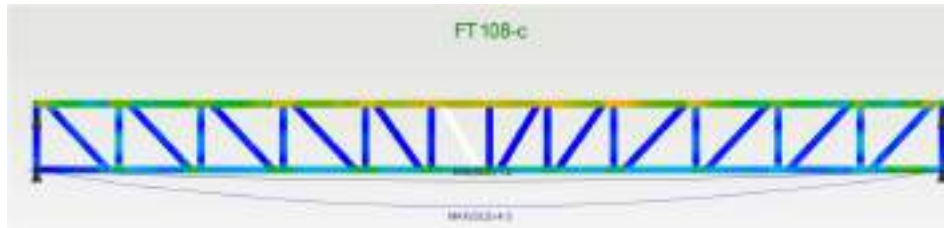
Comp ID	connection	Shape	Total Weight	Height	Length	Screw Qty
FT108	Rigid		24.24	400	5000	144
FT118	Rigid		22.40	400	5000	124
FT204	Pinned		23.61	400	5178	156
FT214	Pinned		23.61	400	5178	136

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6. Detailed result for more information

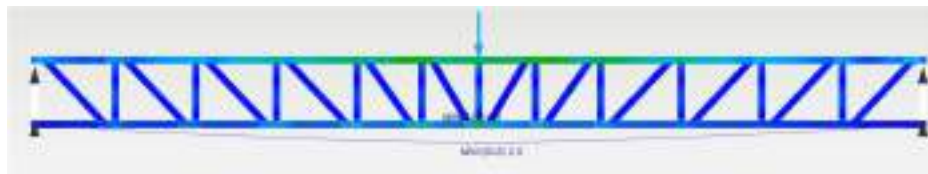
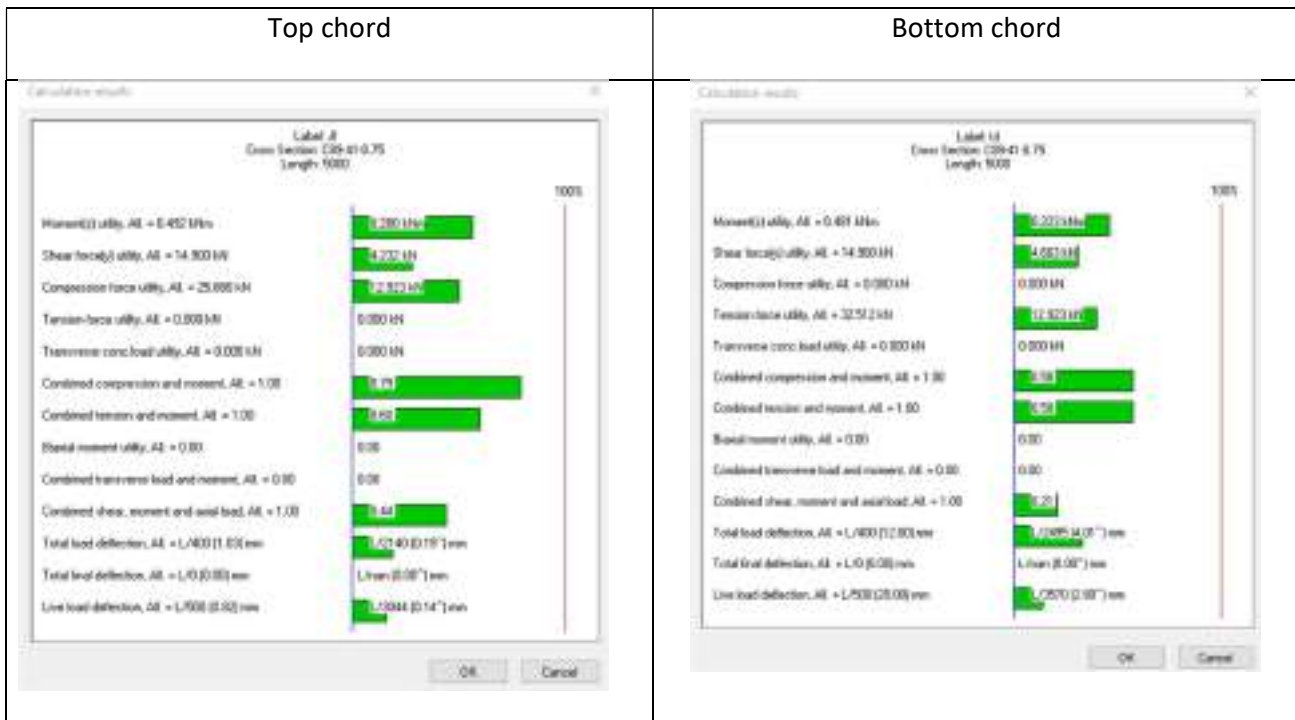
6.1. FT 108

FT108-c Design Passes (Members=79.0%(11), Connections=100.0%(95))



Truss engineering design

Result:

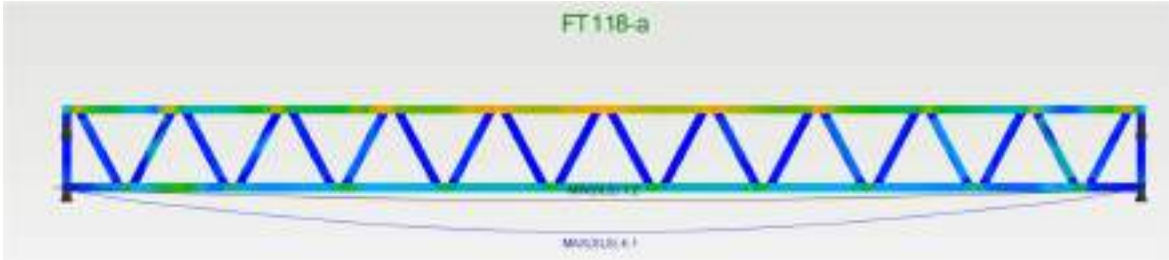


Deflection under the effect of a point live load of 1.8 kN

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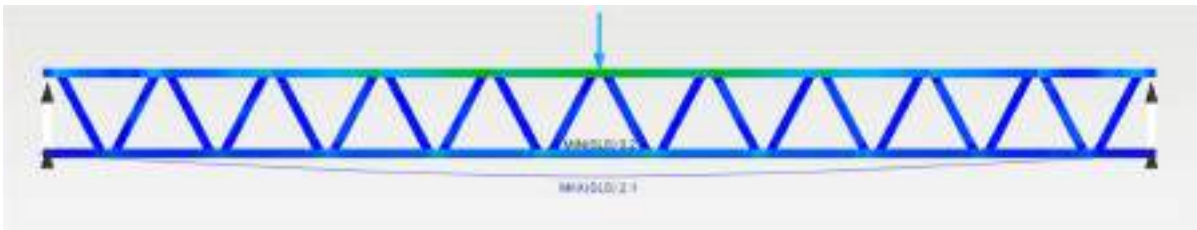
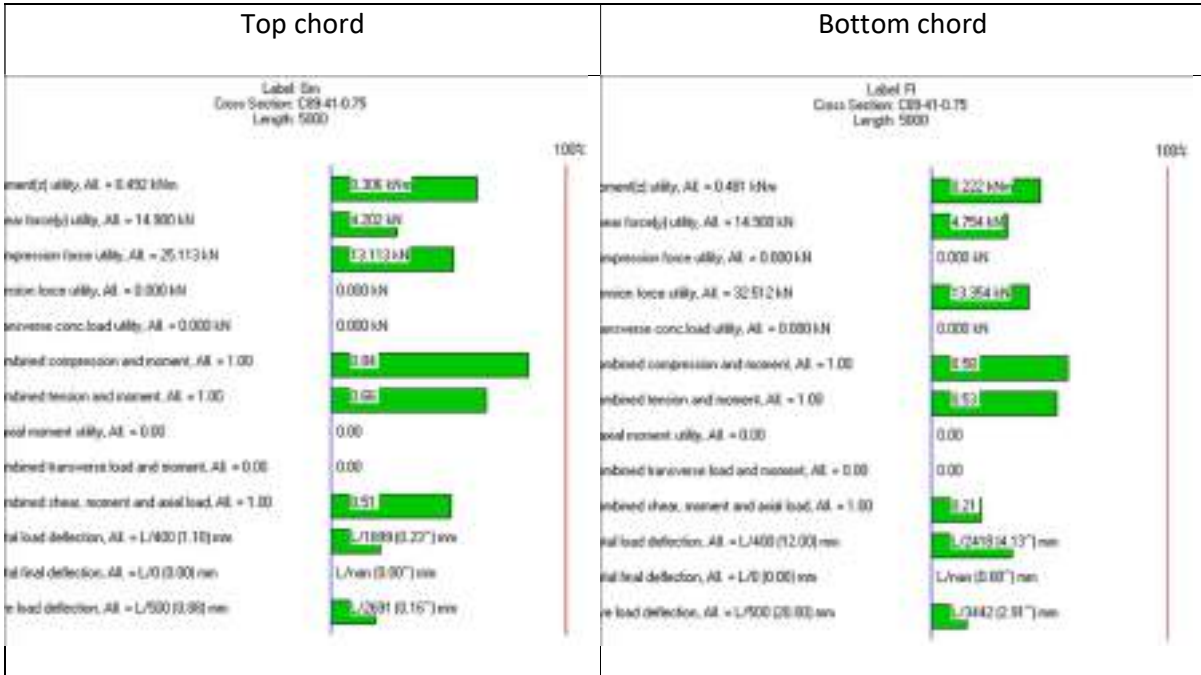
6.2. FT 118

FT118-a Design Passes (Members=83.6%(Gm), Connections=87.1%(11))



Truss engineering design

Result:

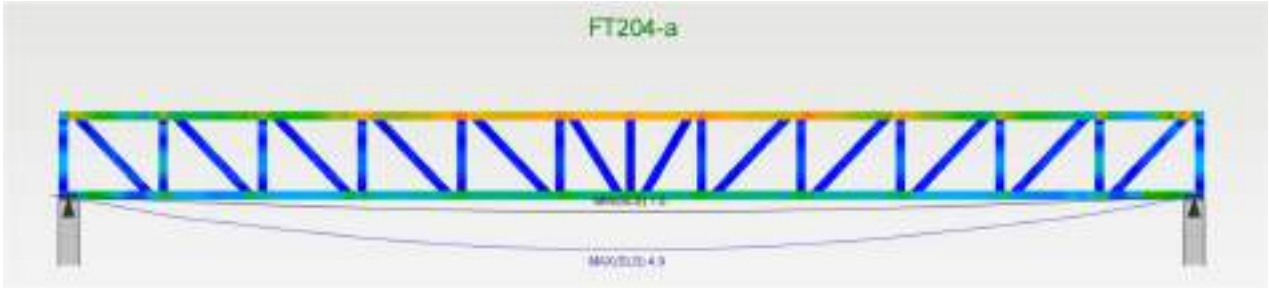


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6.3. FT 204

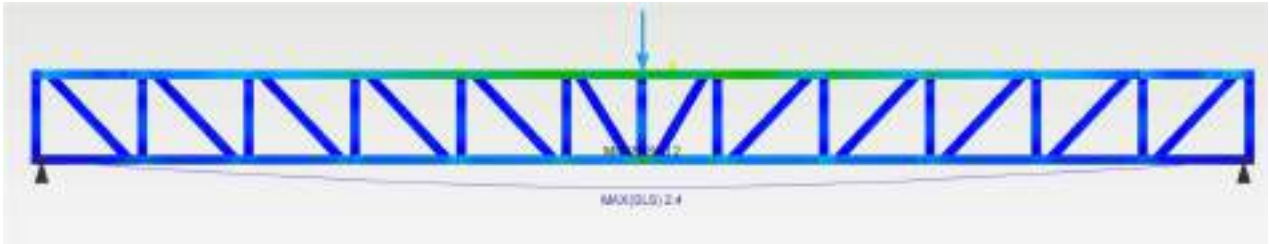
FT204-a Design Passes (Members=88.6%(Fth), Connections=87.5%(27))



Truss engineering design

Result:

Top chord	Bottom chord
<p>Label: Ft3 Class Section: C93-41-0.75 Length: 5178</p> <p>Moment(s) utility, AE = 0.432 kNm Shear force(s) utility, AE = 14.908 kN Compression force utility, AE = 25.304 kN Tension force utility, AE = 0.000 kN Transverse conc load utility, AE = 0.000 kN Combined compression and moment, AE = 1.00 Combined tension and moment, AE = 1.00 Basis moment utility, AE = 0.00 Combined transverse load and moment, AE = 0.00 Combined shear, moment and axial load, AE = 1.00 Total load deflection, AE = L/400 (1.03) mm Total live deflection, AE = L/10 (0.00) mm Live load deflection, AE = L/500 (0.00) mm</p>	<p>Label: Ft3 Class Section: C93-41-0.75 Length: 5178</p> <p>Moment(s) utility, AE = 0.481 kNm Shear force(s) utility, AE = 14.908 kN Compression force utility, AE = 0.000 kN Tension force utility, AE = 32.512 kN Transverse conc load utility, AE = 0.000 kN Combined compression and moment, AE = 1.00 Combined tension and moment, AE = 1.00 Basis moment utility, AE = 0.00 Combined transverse load and moment, AE = 1.00 Combined shear, moment and axial load, AE = 1.00 Total load deflection, AE = L/400 (12.00) mm Total live deflection, AE = L/10 (0.00) mm Live load deflection, AE = L/500 (0.36) mm Bearing utility (1), AE = 26.007 kN Plate bearing utility (1), AE = 0.000 kN Bearing utility (2), AE = 26.559 kN Plate bearing utility (2), AE = 0.000 kN</p>

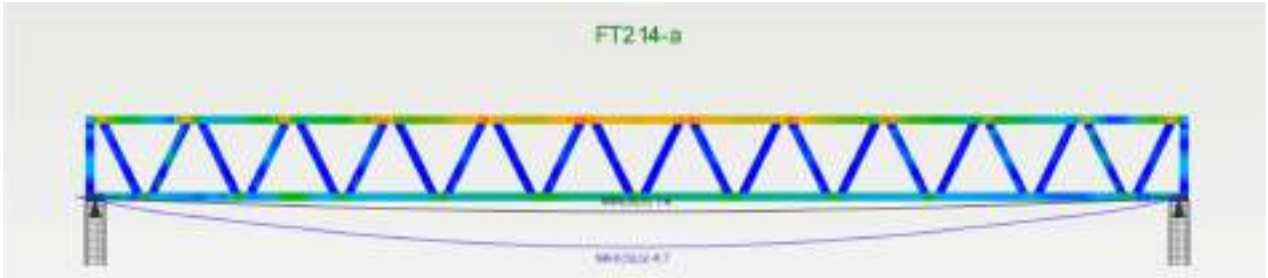


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6.4. FT 214

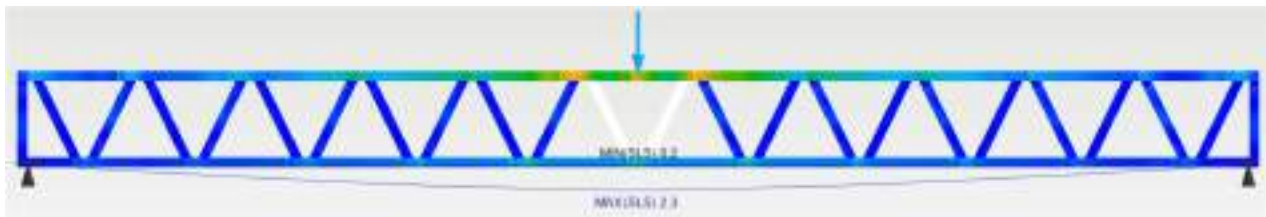
FT214-a Design Passes (Members=87.8%(Eauo), Connections=93.7%(25))



Truss engineering design

Result:

Top chord	Bottom chord
<p>Label Eauo Cross Section: C20410.75 Length: 9176</p> <p>Moment(z) utility, AE = 0.492 kNm Shear force(y) utility, AE = 14.980 kN Compression force utility, AE = 25.205 kN Tension force utility, AE = 0.000 kN Transverse conc load utility, AE = 0.000 kN Combined compression and moment, AE = 1.00 Combined tension and moment, AE = 1.00 Biaxial moment utility, AE = 0.00 Combined transverse load and moment, AE = 0.00 Combined shear, moment and axial load, AE = 1.00 Total load deflection, AE = L/400 (1.62) mm Total load deflection, AE = L/5 (0.93) mm Live load deflection, AE = L/500 (0.82) mm</p>	<p>Label Eauo Cross Section: C20410.75 Length: 9176</p> <p>Moment(z) utility, AE = 0.401 kNm Shear force(y) utility, AE = 14.980 kN Compression force utility, AE = 0.000 kN Tension force utility, AE = 32.512 kN Transverse conc load utility, AE = 0.000 kN Combined compression and moment, AE = 1.00 Combined tension and moment, AE = 1.00 Biaxial moment utility, AE = 0.00 Combined transverse load and moment, AE = 1.00 Combined shear, moment and axial load, AE = 1.00 Total load deflection, AE = L/400 (1.62) mm Total load deflection, AE = L/5 (0.93) mm Live load deflection, AE = L/500 (0.82) mm Bearing utility (T), AE = 20.007 kN Plate bearing utility (T), AE = 0.000 kN Bearing utility (C), AE = 25.007 kN Plate bearing utility (C), AE = 0.000 kN</p>



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