

# Re-Validation of Is Hand Book Islb Sections Fem Analysis of Islb Section Under Udl Load

Sumit Juyal, Akhilesh Bhatt

<sup>1</sup>Student, Department Of Structural engineering Uttarakhand Technical University Dehradun, Uttarakhand -248007

<sup>2</sup>Senior Engineer, Engineer mantra, Dehradun Uttarakhand -248007

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**ABSTRACT**—This is a study of ISLB steel section as per IS handbook. Under which a FEM model of each section of different length as given in IS handbook is analyzed under UDL loading and results are compared with manual calculation and tables in IS handbook. This study is aimed to update and simplify the tables in IS handbook in a graphical representation for layman understanding.

**KEYWORDS**-ISLB, Steel Beam, I beam, FEM analysis, IS Handbook.

## I. INTRODUCTION

This is a research of steel section ISLB (Indian standards light weight beams) as provided in IS Handbook No. 01. The goal of this result is to re-verify that the allowable weight on such beam is as given in table XII in the handbook. Then to generate a chart for the table to simplify the hand book and allow an interpolation using curve generated.

## II. LITERATURE REVIEW

1. The Mathematics of Simple Beam Deflection Laing O'Rourke Civil Engineering
2. Basic Engineering Mathematics, John Bird, 2007, published by Elsevier Ltd.
3. Engineering Mathematics, Fifth Edition, John Bird, 2007, published by Elsevier Ltd.
4. Structural Mechanics, Ray Hulse & Jack Cain, 2nd Edition, 2000, published by Palgrave.

All the studies found in such topics are based on mathematics formulas while this study uses much more accurate FEM methods and simulation software which provides results much more real life like situation. This study also uses such formula to verify the results generated by software. If the results from both the methods are similar then the research can be used for future uses.

## III. OBJECTIVE

1. To create a FEM model of all listed ISLB steel beam listed in IS Handbook 1 table No. I page no 02.
2. Analyze the FEM model under udl load
3. Compare and validate the results with manual calculations
4. Create a graphical representation of IS handbook 1 table no. XII for ISLB steel section with results from analysis

## IV. RESEARCH METHADODOLOGY

As per is handbook 1 table no I an fem model is created of every beam with different length provided in table no. XII

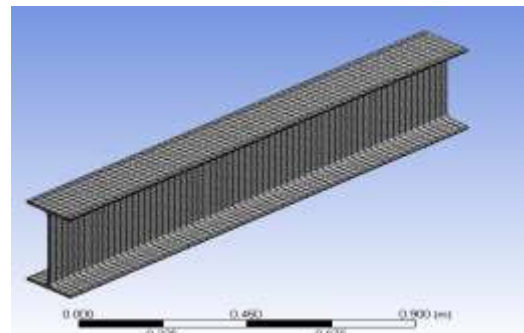


Fig 01 FEM model of ISLB 350 1.5m length

A UDL is applied on the top surface of the beam

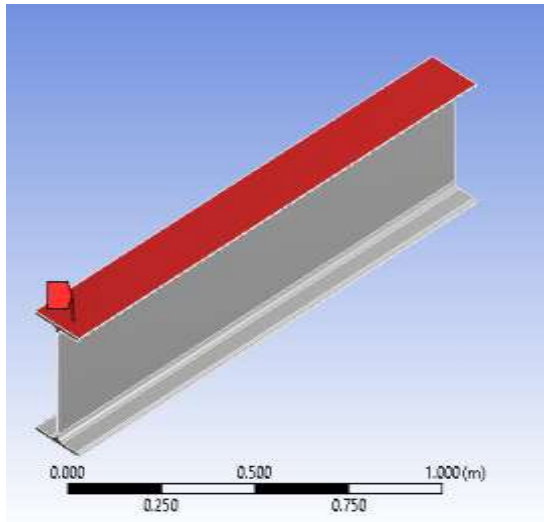


Fig 02 UDL load applied

The supports are applied at both end of the beam opposite side of the surface where UDL is applied

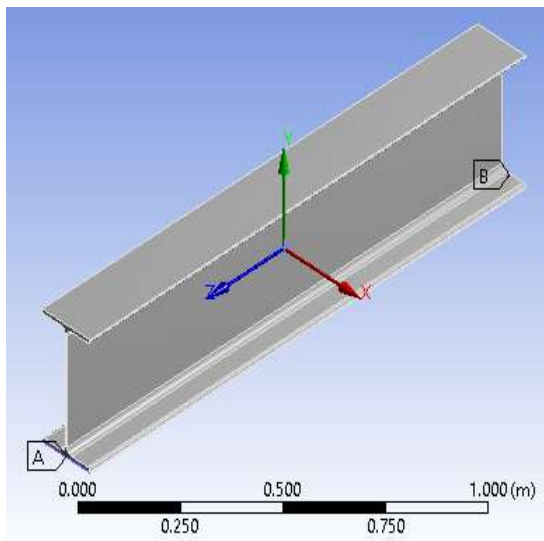


Fig 03 Supports applied Support A- fixed  
Support B-Support free in Z direction only

The model is tested for different loads until a factor of safety of 1.5 is achieved the failure load deflection in Y direction is measured similar results are calculated with manual calculation and both the results are compared to check for any errors in the analysis by check any big variation in deflection calculated and deflection analyzed

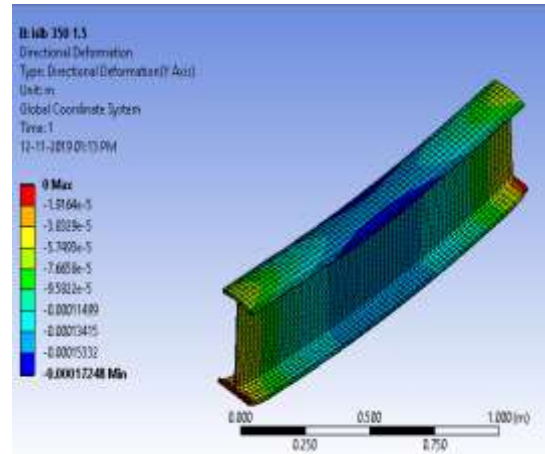


Fig 04 deflection graph

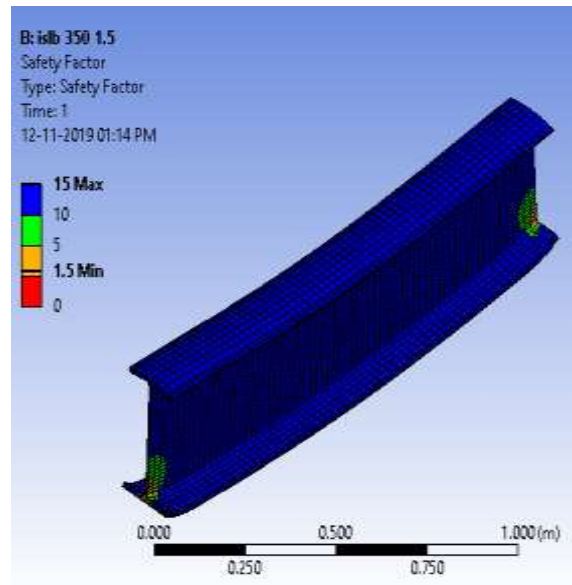


Fig 05 FOS graph

Equations used

$$\Delta_x = \frac{wx^2}{24EI} (L - x)^2$$

**V. RESULTS**

<b>Table no. 01 results of FEM analysis and comparison to data in IS Handbook No. 01</b>							
<b>Beam</b>	<b>Length (M)</b>	<b>Failure Load (in kg) (FEM)</b>	<b>MAXIMUM ALLOWED Load (in kg) as per is hand book</b>	<b>Failure Load / ALLOWED Load</b>	<b>Y axis max deflection (mm)</b>	<b>Calculated Deflection (mm)</b>	<b>MAXIMUM ALLOWED DEFLECTION AS PER IS HANDBOOK (mm)</b>
ISLB 75	1	2.29E+04	2.40E+03	9.54E+00	0.73	0.67	2.10
ISLB 75	1.5	2.87E+04	1.60E+03	1.80E+01	2.93	2.84	4.70
ISLB 75	2	3.23E+04	1.20E+03	2.69E+01	7.86	7.56	8.30
ISLB 100	1	2.81E+04	4.20E+03	6.69E+00	0.41	0.36	1.60
ISLB 100	1.5	3.58E+04	2.80E+03	1.28E+01	1.62	1.53	3.50
ISLB 100	2	3.78E+04	2.10E+03	1.80E+01	3.95	3.84	6.20
ISLB 100	2.5	4.18E+04	1.70E+03	2.46E+01	8.42	8.28	9.80
ISLB 100	3	4.56E+04	1.40E+03	3.26E+01	15.78	15.61	14.10
ISLB 125	1	2.53E+04	8.20E+03	3.08E+00	0.27	0.20	1.20
ISLB 125	1.5	2.77E+04	5.50E+03	5.05E+00	0.83	0.73	2.80
ISLB 125	2	3.04E+04	4.10E+03	7.42E+00	2.03	1.91	5.00
ISLB 125	2.5	2.99E+04	3.30E+03	9.07E+00	3.80	3.67	7.80
ISLB 125	3	3.67E+04	2.80E+03	1.31E+01	7.97	7.79	11.20
ISLB 150	1	2.83E+04	1.16E+04	2.44E+00	0.21	0.14	1.00
ISLB 150	1.5	2.81E+04	7.70E+03	3.66E+00	0.55	0.47	2.30
ISLB 150	2	3.32E+04	5.80E+03	5.72E+00	1.42	1.31	4.20
ISLB 150	2.5	3.61E+04	4.60E+03	7.84E+00	2.93	2.79	6.50
ISLB 150	3	3.59E+04	3.80E+03	9.44E+00	4.94	4.79	9.40
ISLB 150	3.5	3.89E+04	3.30E+03	1.18E+01	8.43	8.25	1.28
ISLB 150	4	4.19E+04	2.90E+03	1.44E+01	13.47	13.27	1.67
ISLB 175	1	2.59E+04	1.58E+04	1.64E+00	0.16	0.09	0.90
ISLB 175	1.5	2.50E+04	1.05E+04	2.38E+00	0.37	0.29	2.00
ISLB 175	2	2.95E+04	7.90E+03	3.73E+00	1.42	0.82	3.60
ISLB 175	2.5	3.42E+04	6.30E+03	5.43E+00	2.00	1.87	5.60
ISLB 175	3	3.71E+04	5.20E+03	7.14E+00	3.66	3.50	8.00
ISLB 175	3.5	3.64E+04	4.50E+03	8.08E+00	5.61	5.45	10.90
ISLB 175	4	3.92E+04	4.00E+03	9.79E+00	8.95	8.76	14.30
ISLB 200	1	2.57E+04	2.14E+04	1.20E+00	0.14	0.06	0.80
ISLB 200	1.5	2.79E+04	1.43E+04	1.48E+00	0.32	0.24	1.80
ISLB 200	2	2.70E+04	1.07E+04	1.92E+00	0.63	0.54	3.10
ISLB 200	2.5	3.32E+04	8.60E+03	2.94E+00	1.43	1.30	4.90
ISLB 200	3	3.59E+04	7.20E+03	3.82E+00	2.58	2.43	7.00

<b>ISLB 200</b>	3.5	3.52E+04	6.10E+03	4.40E+00	3.95	3.79	9.60
<b>ISLB 200</b>	4	3.78E+04	5.40E+03	5.41E+00	6.28	6.08	12.50
<b>ISLB 200</b>	4.5	5.25E+04	4.80E+03	8.34E+00	8.27	12.01	15.80
<b>ISLB 200</b>	5	4.68E+04	4.30E+03	8.35E+00	14.93	14.66	19.50
<b>ISLB 225</b>	1	3.16E+04	2.80E+04	1.13E+00	0.12	0.05	0.70
<b>ISLB 225</b>	1.5	3.30E+04	1.87E+04	1.76E+00	0.27	0.19	1.60
<b>ISLB 225</b>	2	3.83E+04	1.40E+04	2.73E+00	0.62	0.52	2.80
<b>ISLB 225</b>	2.5	4.13E+04	1.12E+04	3.69E+00	1.21	1.10	4.30
<b>ISLB 225</b>	3	4.08E+04	9.40E+03	4.34E+00	1.99	1.87	6.20
<b>ISLB 225</b>	3.5	4.69E+04	8.00E+03	5.86E+00	3.55	3.42	8.50
<b>ISLB 225</b>	4	5.01E+04	7.00E+03	7.16E+00	5.59	5.45	11.10
<b>ISLB 225</b>	4.5	5.28E+04	6.20E+03	8.52E+00	8.32	8.19	14.10
<b>ISLB 225</b>	5	5.55E+04	5.60E+03	9.92E+00	11.92	11.81	17.40
<b>ISLB 250</b>	1	2.34E+04	3.75E+04	6.25E-01	0.10	0.03	0.60
<b>ISLB 250</b>	1.5	3.01E+04	2.50E+04	1.20E+00	0.24	0.15	1.40
<b>ISLB 250</b>	2	3.27E+04	1.88E+04	1.74E+00	0.48	0.37	2.50
<b>ISLB 250</b>	2.5	3.42E+04	1.50E+04	2.28E+00	0.88	0.76	3.90
<b>ISLB 250</b>	3	3.71E+04	1.25E+04	2.97E+00	1.56	1.43	5.60
<b>ISLB 250</b>	3.5	3.95E+04	1.07E+04	3.69E+00	2.56	2.43	7.70
<b>ISLB 250</b>	4	4.18E+04	9.40E+03	4.45E+00	3.97	3.83	10.00
<b>ISLB 250</b>	4.5	4.32E+04	8.30E+03	5.20E+00	5.76	5.63	12.70
<b>ISLB 250</b>	5	4.56E+04	7.50E+03	6.07E+00	8.27	8.15	15.60
<b>ISLB 250</b>	5.5	4.81E+04	6.80E+03	7.07E+00	11.54	11.44	18.90
<b>ISLB 250</b>	6	5.06E+04	6.20E+03	8.16E+00	15.71	15.65	22.50
<b>ISLB 275</b>	1	2.27E+04	4.94E+04	4.60E-01	1.01	0.03	0.60
<b>ISLB 275</b>	1.5	3.04E+04	3.30E+04	9.22E-01	0.22	0.11	1.30
<b>ISLB 275</b>	2	3.23E+04	2.47E+04	1.31E+00	0.40	0.29	2.30
<b>ISLB 275</b>	2.5	3.51E+04	1.98E+04	1.77E+00	0.74	0.61	3.60
<b>ISLB 275</b>	3	3.71E+04	1.65E+04	2.25E+00	1.25	1.11	5.10
<b>ISLB 275</b>	3.5	3.85E+04	1.41E+04	2.73E+00	1.98	1.83	7.00
<b>ISLB 275</b>	4	4.09E+04	1.24E+04	3.30E+00	3.05	2.90	9.10
<b>ISLB 275</b>	4.5	4.33E+04	1.10E+04	3.93E+00	4.52	4.37	11.50
<b>ISLB 275</b>	5	4.32E+04	9.90E+03	4.36E+00	6.13	5.98	14.20
<b>ISLB 275</b>	5.5	4.51E+04	9.00E+03	5.01E+00	8.45	8.32	17.20
<b>ISLB 275</b>	6	4.75E+04	8.20E+03	5.79E+00	11.49	11.38	20.50
<b>ISLB 300</b>	1	2.65E+04	6.16E+04	4.29E-01	0.11	0.02	0.50
<b>ISLB 300</b>	1.5	3.20E+04	4.11E+04	7.79E-01	0.20	0.09	1.20
<b>ISLB 300</b>	2	3.37E+04	3.08E+04	1.09E+00	0.35	0.23	2.10
<b>ISLB 300</b>	2.5	3.54E+04	2.46E+04	1.44E+00	0.06	0.48	3.30
<b>ISLB 300</b>	3	3.79E+04	2.06E+04	1.84E+00	1.04	0.89	4.70
<b>ISLB 300</b>	3.5	3.98E+04	1.76E+04	2.26E+00	1.64	1.48	6.40

<b>ISLB 300</b>	4	4.30E+04	1.54E+04	2.80E+00	2.57	2.40	8.30
<b>ISLB 300</b>	4.5	4.54E+04	1.37E+04	3.32E+00	3.78	3.61	10.50
<b>ISLB 300</b>	5	4.75E+04	1.23E+04	3.86E+00	5.34	5.17	13.00
<b>ISLB 300</b>	5.5	4.97E+04	1.12E+04	4.43E+00	7.36	7.19	15.80
<b>ISLB 300</b>	6	5.22E+04	1.03E+04	5.07E+00	9.98	9.82	18.80
<b>ISLB 300</b>	6.5	5.31E+04	9.50E+03	5.59E+00	12.84	12.71	22.00
<b>ISLB 300</b>	7	5.54E+04	8.80E+03	6.29E+00	16.63	16.53	25.50
<b>ISLB 325</b>	1	2.98E+04	7.66E+04	3.90E-01	0.14	0.02	0.05
<b>ISLB 325</b>	1.5	3.21E+04	5.10E+04	6.30E-01	0.19	0.08	1.10
<b>ISLB 325</b>	2	3.00E+04	3.83E+04	7.83E-01	0.28	0.17	1.90
<b>ISLB 325</b>	2.5	3.59E+04	3.06E+04	1.17E+00	0.53	0.40	3.00
<b>ISLB 325</b>	3	3.79E+04	2.55E+04	1.49E+00	0.88	0.73	4.30
<b>ISLB 325</b>	3.5	3.93E+04	2.19E+04	1.80E+00	1.36	1.20	5.90
<b>ISLB 325</b>	4	4.10E+04	1.92E+04	2.13E+00	2.03	1.86	7.70
<b>ISLB 325</b>	4.5	4.32E+04	1.70E+04	2.54E+00	2.97	2.80	9.70
<b>ISLB 325</b>	5	4.48E+04	1.53E+04	2.93E+00	4.21	3.98	12.00
<b>ISLB 325</b>	5.5	4.76E+04	1.39E+04	3.43E+00	5.82	5.64	14.50
<b>ISLB 325</b>	6	4.49E+04	1.28E+04	3.51E+00	7.06	6.91	17.30
<b>ISLB 325</b>	6.5	4.69E+04	1.18E+04	3.97E+00	9.31	9.16	20.30
<b>ISLB 325</b>	7	4.89E+04	1.10E+04	4.45E+00	12.06	11.94	23.60
<b>ISLB 350</b>	1	3.58E+04	9.47E+04	3.78E-01	0.13	0.02	0.40
<b>ISLB 350</b>	1.5	3.50E+04	6.32E+04	5.54E-01	0.17	0.06	1.00
<b>ISLB 350</b>	2	5.30E+04	4.74E+04	1.12E+00	0.49	0.23	1.80
<b>ISLB 350</b>	2.5	3.43E+04	3.79E+04	9.05E-01	0.51	0.29	2.80
<b>ISLB 350</b>	3	4.25E+04	3.16E+04	1.34E+00	0.76	0.61	4.00
<b>ISLB 350</b>	3.5	4.20E+04	2.71E+04	1.55E+00	1.12	0.96	5.50
<b>ISLB 350</b>	4	4.65E+04	2.37E+04	1.96E+00	1.76	1.59	7.10
<b>ISLB 350</b>	4.5	5.43E+04	2.11E+04	2.58E+00	1.99	2.64	9.00
<b>ISLB 350</b>	5	5.05E+04	1.90E+04	2.66E+00	3.57	3.37	11.20
<b>ISLB 350</b>	5.5	5.28E+04	1.72E+04	3.07E+00	4.89	4.68	13.50
<b>ISLB 350</b>	6	5.47E+04	1.58E+04	3.46E+00	6.51	6.31	16.10
<b>ISLB 350</b>	6.5	5.69E+04	1.46E+04	3.90E+00	8.54	8.34	18.90
<b>ISLB 350</b>	7	5.88E+04	1.36E+04	4.32E+00	10.96	10.76	12.90
<b>ISLB 350</b>	7.5	6.10E+04	1.26E+04	4.84E+00	13.91	13.73	15.10
<b>ISLB 350</b>	8	6.32E+04	1.18E+04	5.35E+00	17.43	17.26	18.60
<b>ISLB 350</b>	8.5	6.54E+04	1.11E+04	5.89E+00	21.57	21.44	32.30
<b>ISLB 350</b>	9	6.76E+04	1.06E+04	6.38E+00	26.42	26.32	36.20
<b>ISLB 400</b>	1	4.23E+04	1.22E+05	3.48E-01	0.12	0.02	0.40
<b>ISLB 400</b>	1.5	3.94E+04	8.11E+04	4.86E-01	0.16	0.05	0.90
<b>ISLB 400</b>	2	4.49E+04	6.08E+04	7.38E-01	0.26	0.13	1.60
<b>ISLB 400</b>	2.5	4.25E+04	4.87E+04	8.72E-01	0.37	0.24	2.40

<b>ISLB 400</b>	3	4.50E+04	4.06E+04	4.25E+00	0.58	0.44	3.50
<b>ISLB 400</b>	3.5	4.72E+04	3.48E+04	1.36E+00	0.89	0.74	4.80
<b>ISLB 400</b>	4	5.23E+04	3.04E+04	1.72E+00	1.39	1.22	6.20
<b>ISLB 400</b>	4.5	6.00E+04	2.70E+04	2.22E+00	1.23	1.99	7.90
<b>ISLB 400</b>	5	5.68E+04	2.46E+04	2.31E+00	2.78	2.58	9.80
<b>ISLB 400</b>	5.5	5.90E+04	2.21E+04	2.67E+00	3.79	3.57	11.80
<b>ISLB 400</b>	6	6.05E+04	2.03E+04	2.98E+00	4.97	4.75	14.10
<b>ISLB 400</b>	6.5	6.28E+04	1.87E+04	3.36E+00	6.50	6.27	16.50
<b>ISLB 400</b>	7	6.52E+04	1.74E+04	3.74E+00	8.36	8.13	19.10
<b>ISLB 400</b>	7.5	6.75E+04	1.62E+04	4.17E+00	10.60	10.36	22.00
<b>ISLB 400</b>	8	7.04E+04	1.52E+04	4.63E+00	0.03	13.11	25.00
<b>ISLB 400</b>	8.5	6.85E+04	1.43E+04	4.79E+00	15.52	15.31	28.20
<b>ISLB 400</b>	9	7.07E+04	1.35E+04	5.24E+00	18.96	18.76	31.60
<b>ISLB 400</b>	9.5	7.29E+04	1.28E+04	5.70E+00	22.94	22.75	35.30
<b>ISLB 400</b>	10	7.52E+04	1.22E+04	6.16E+00	27.51	27.34	39.10
<b>ISLB 450</b>	1	4.11E+04	1.54E+05	2.66E-01	0.12	0.01	0.30
<b>ISLB 450</b>	1.5	4.24E+04	1.03E+05	4.13E-01	0.15	0.04	0.80
<b>ISLB 450</b>	2	4.84E+04	7.71E+04	6.28E-01	0.23	0.10	1.40
<b>ISLB 450</b>	2.5	4.54E+04	6.17E+04	7.36E-01	0.31	0.19	2.20
<b>ISLB 450</b>	3	5.05E+04	5.14E+04	9.83E-01	0.50	0.36	3.10
<b>ISLB 450</b>	3.5	5.37E+04	4.41E+04	1.22E+00	0.77	0.61	4.30
<b>ISLB 450</b>	4	5.59E+04	3.86E+04	1.45E+00	1.12	0.94	5.60
<b>ISLB 450</b>	4.5	5.83E+04	3.43E+04	1.70E+00	1.59	1.40	7.00
<b>ISLB 450</b>	5	6.05E+04	3.08E+04	1.96E+00	2.19	1.99	8.70
<b>ISLB 450</b>	5.5	6.31E+04	2.80E+04	2.25E+00	2.98	2.76	10.50
<b>ISLB 450</b>	6	5.87E+04	2.57E+04	2.28E+00	4.97	3.33	12.50
<b>ISLB 450</b>	6.5	6.75E+04	2.37E+04	2.85E+00	5.11	4.87	14.70
<b>ISLB 450</b>	7	6.95E+04	2.20E+04	3.16E+00	6.51	6.26	17.00
<b>ISLB 450</b>	7.5	7.20E+04	2.06E+04	3.49E+00	8.23	7.98	19.50
<b>ISLB 450</b>	8	7.45E+04	1.93E+04	3.86E+00	10.28	10.02	22.20
<b>ISLB 450</b>	8.5	7.70E+04	1.81E+04	7.62E+00	12.69	12.42	25.10
<b>ISLB 450</b>	9	8.00E+04	1.72E+04	4.65E+00	15.60	15.33	28.10
<b>ISLB 450</b>	9.5	8.26E+04	1.62E+04	5.10E+00	18.87	18.60	31.30
<b>ISLB 450</b>	10	8.51E+04	1.54E+04	5.53E+00	22.62	22.37	34.70
<b>ISLB 450</b>	10.5	8.77E+04	1.47E+04	5.96E+00	26.91	26.67	38.30
<b>ISLB 450</b>	11	9.02E+04	1.40E+04	6.44E+00	31.78	31.56	42.00
<b>ISLB 500</b>	1	4.21E+04	1.94E+05	2.17E-01	0.12	0.01	0.30
<b>ISLB 500</b>	1.5	4.51E+04	1.30E+05	3.48E-01	0.15	0.03	0.70
<b>ISLB 500</b>	2	5.15E+04	9.72E+04	5.29E-01	0.22	0.08	1.20
<b>ISLB 500</b>	2.5	4.79E+04	7.78E+04	6.15E-01	0.28	0.15	2.00
<b>ISLB 500</b>	3	4.99E+04	6.48E+04	1.16E+00	0.61	0.40	2.80

<b>ISLB 500</b>	3.5	5.24E+04	5.56E+04	9.43E-01	0.60	0.45	3.80
<b>ISLB 500</b>	4	5.45E+04	4.86E+04	1.12E+00	0.86	0.69	5.00
<b>ISLB 500</b>	4.5	6.09E+04	4.32E+04	1.41E+00	1.29	1.10	6.30
<b>ISLB 500</b>	5	6.33E+04	3.89E+04	1.63E+00	1.78	1.57	7.80
<b>ISLB 500</b>	5.5	6.56E+04	3.54E+04	1.85E+00	2.39	2.17	9.50
<b>ISLB 500</b>	6	6.83E+04	3.24E+04	2.11E+00	3.16	2.93	11.30
<b>ISLB 500</b>	6.5	6.92E+04	2.99E+04	2.31E+00	4.01	3.77	13.20
<b>ISLB 500</b>	7	7.04E+04	2.76E+04	2.55E+00	40.57	38.59	15.30
<b>ISLB 500</b>	7.5	7.36E+04	2.59E+04	2.84E+00	6.42	6.17	17.60
<b>ISLB 500</b>	8	7.60E+04	2.43E+04	3.13E+00	8.00	7.73	20.00
<b>ISLB 500</b>	8.5	7.85E+04	2.29E+04	3.43E+00	9.85	9.57	22.60
<b>ISLB 500</b>	9	8.10E+04	2.16E+04	3.75E+00	12.01	11.73	25.30
<b>ISLB 500</b>	9.5	8.35E+04	2.05E+04	4.07E+00	14.49	14.21	28.20
<b>ISLB 500</b>	10	8.64E+04	1.94E+04	4.45E+00	17.43	17.15	31.30
<b>ISLB 500</b>	10.5	8.89E+04	1.85E+04	4.81E+00	20.72	20.45	34.50
<b>ISLB 500</b>	11	9.15E+04	1.77E+04	5.17E+00	24.46	24.20	37.80
<b>ISLB 500</b>	11.5	9.42E+04	1.69E+04	5.57E+00	28.69	28.44	41.30
<b>ISLB 500</b>	12	9.68E+04	1.62E+04	5.97E+00	33.45	33.21	45.00
<b>ISLB 550</b>	1	3.86E+04	2.44E+05	1.58E-01	0.11	0.01	0.30
<b>ISLB 550</b>	1.5	5.67E+04	1.62E+05	3.49E-01	0.17	0.03	0.60
<b>ISLB 550</b>	2	5.41E+04	1.22E+05	4.44E-01	0.20	0.07	1.10
<b>ISLB 550</b>	2.5	5.49E+04	9.74E+04	5.63E-01	0.27	0.13	1.80
<b>ISLB 550</b>	3	5.31E+04	8.12E+04	6.54E-01	0.36	0.22	2.60
<b>ISLB 550</b>	3.5	5.84E+04	6.94E+04	8.42E-01	0.54	0.38	3.50
<b>ISLB 550</b>	4	6.17E+04	6.09E+04	1.01E+00	0.78	0.60	4.50
<b>ISLB 550</b>	4.5	6.47E+04	5.41E+04	1.20E+00	1.09	0.90	5.80
<b>ISLB 550</b>	5	6.69E+04	4.87E+04	1.37E+00	1.48	1.27	7.10
<b>ISLB 550</b>	5.5	6.94E+04	4.43E+04	1.57E+00	1.98	1.76	8.60
<b>ISLB 550</b>	6	7.18E+04	4.06E+04	1.77E+00	2.60	2.36	10.20
<b>ISLB 550</b>	6.5	7.27E+04	3.75E+04	1.94E+00	3.28	3.04	12.00
<b>ISLB 550</b>	7	7.47E+04	3.48E+04	2.15E+00	4.15	3.90	13.90
<b>ISLB 550</b>	7.5	7.71E+04	3.25E+04	2.37E+00	5.21	4.95	16.00
<b>ISLB 550</b>	8	7.96E+04	3.04E+04	2.62E+00	6.47	6.20	18.20
<b>ISLB 550</b>	8.5	8.23E+04	2.87E+04	2.87E+00	7.97	7.68	20.50
<b>ISLB 550</b>	9	8.48E+04	2.70E+04	3.14E+00	9.69	9.40	23.00
<b>ISLB 550</b>	9.5	8.73E+04	2.56E+04	3.41E+00	11.68	11.39	25.60
<b>ISLB 550</b>	10	8.98E+04	2.44E+04	3.68E+00	13.96	13.66	28.40
<b>ISLB 550</b>	10.5	9.24E+04	2.32E+04	3.98E+00	16.57	16.27	31.30
<b>ISLB 550</b>	11	9.50E+04	2.22E+04	4.28E+00	19.53	19.24	34.40
<b>ISLB 550</b>	11.5	9.81E+04	2.12E+04	4.63E+00	22.99	22.69	37.60
<b>ISLB 550</b>	12	1.01E+05	2.03E+04	4.96E+00	26.77	26.48	40.90

<b>ISLB 550</b>	12.5	1.03E+05	1.95E+04	5.30E+00	31.00	30.73	44.40
<b>ISLB 550</b>	13	1.06E+05	1.88E+04	5.64E+00	35.72	35.46	48.00
<b>ISLB 600</b>	1	4.28E+04	3.06E+05	1.40E-01	0.13	0.01	0.30
<b>ISLB 600</b>	1.5	5.58E+04	2.04E+05	2.73E-01	0.17	0.02	0.60
<b>ISLB 600</b>	2	5.82E+04	1.53E+05	3.80E-01	0.21	0.06	1.00
<b>ISLB 600</b>	2.5	5.58E+04	1.22E+05	4.56E-01	0.26	0.11	1.60
<b>ISLB 600</b>	3	5.86E+04	1.02E+05	5.74E-01	0.36	0.19	2.30
<b>ISLB 600</b>	3.5	6.02E+04	8.74E+04	6.88E-01	0.49	0.32	3.20
<b>ISLB 600</b>	4	6.21E+04	7.65E+04	8.11E-01	0.67	0.49	4.20
<b>ISLB 600</b>	4.5	6.42E+04	6.80E+04	9.45E-01	0.92	0.72	5.30
<b>ISLB 600</b>	5	1.19E+05	6.12E+04	2.33E+00	1.94	2.19	6.50
<b>ISLB 600</b>	5.5	1.40E+05	5.56E+04	3.00E+00	3.84	3.41	7.90
<b>ISLB 600</b>	6	7.14E+04	5.10E+04	1.40E+00	2.13	1.89	9.40
<b>ISLB 600</b>	6.5	7.40E+04	4.71E+04	1.57E+00	2.74	2.49	11.00
<b>ISLB 600</b>	7	7.64E+04	4.37E+04	1.75E+00	3.48	3.21	12.80
<b>ISLB 600</b>	7.5	7.70E+04	4.08E+04	1.89E+00	4.25	3.98	14.60
<b>ISLB 600</b>	8	7.93E+04	3.82E+04	2.08E+00	5.26	4.98	16.70
<b>ISLB 600</b>	8.5	8.17E+04	3.60E+04	2.27E+00	6.44	6.15	18.80
<b>ISLB 600</b>	9	8.41E+04	3.40E+04	2.47E+00	7.82	7.52	12.10
<b>ISLB 600</b>	9.5	8.67E+04	3.22E+04	2.69E+00	9.42	9.12	23.50
<b>ISLB 600</b>	10	8.92E+04	3.06E+04	2.91E+00	11.25	10.94	26.00
<b>ISLB 600</b>	10.5	9.16E+04	2.91E+04	3.15E+00	13.33	13.01	28.70
<b>ISLB 600</b>	11	9.52E+04	2.78E+04	3.42E+00	15.86	15.54	31.50
<b>ISLB 600</b>	11.5	8.81E+04	2.66E+04	3.31E+00	16.72	16.43	34.40
<b>ISLB 600</b>	12	1.00E+05	2.55E+04	3.93E+00	21.55	21.23	37.50
<b>ISLB 600</b>	12.5	1.03E+05	2.45E+04	4.22E+00	0.04	24.79	40.70
<b>ISLB 600</b>	13	1.06E+05	2.36E+04	4.49E+00	28.87	28.57	44.00
<b>ISLB 600</b>	13.5	1.09E+05	2.27E+04	4.78E+00	33.05	32.76	47.50
<b>ISLB 600</b>	14	1.11E+05	2.18E+04	5.10E+00	37.66	37.39	51.00
<b>ISLB 600</b>	14.5	1.45E+05	2.11E+04	6.86E+00	54.35	54.10	54.80
<b>ISLB 600</b>	15	1.59E+05	2.04E+04	7.77E+00	65.87	65.65	58.60



### VI. GRAPHICAL REPRESENTATION

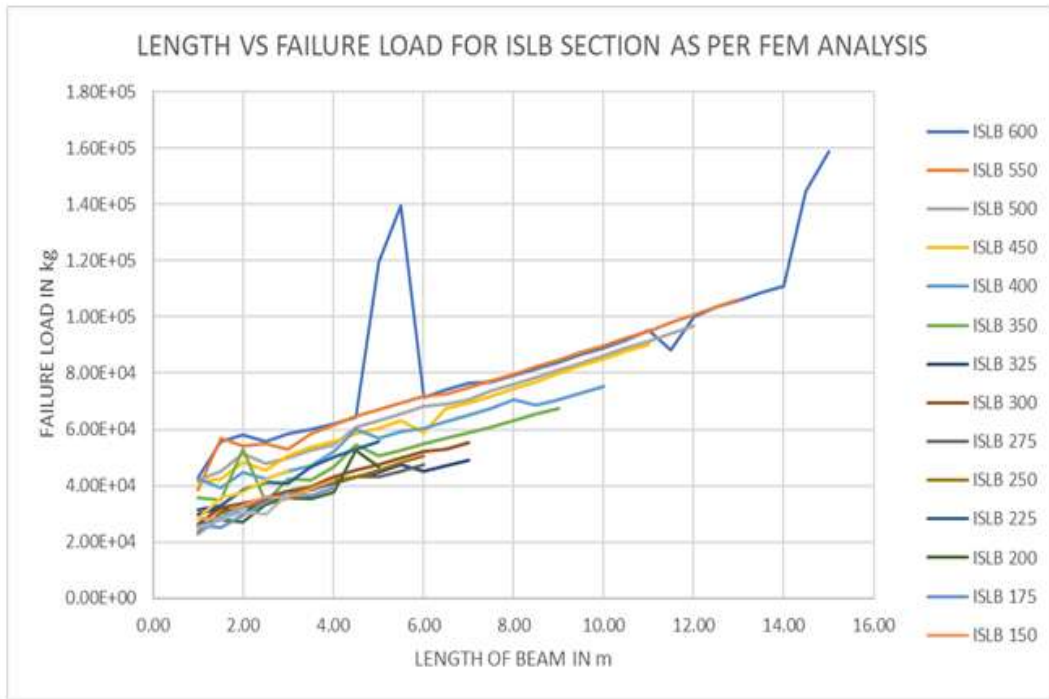


Fig 06 GRAPH SHOWING FEM RESULTS FOR LOAD VS LENGTH OF BEAM

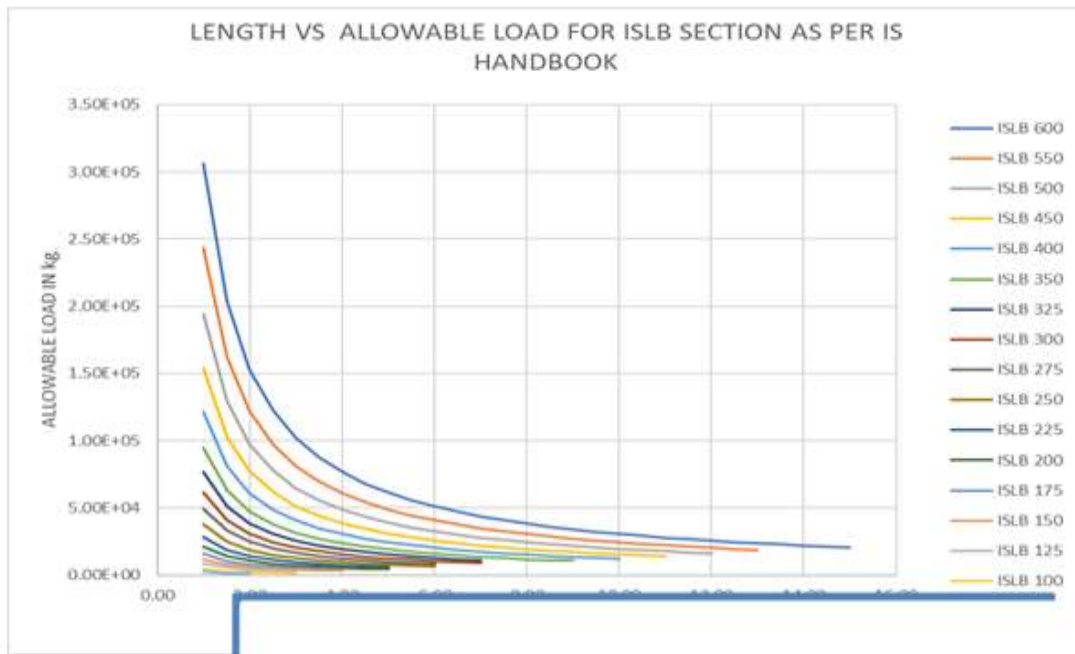


Fig 07 GRAPH SHOWING LENGTH VS ALLOWABLE LOAD FOR ISLB SECTION AS PER IS HANDBOOK

### VII. CONCLUSIONS

As per FEM analysis it can be determined that the allowable load given in IS Handbook is

under the failure load of the beam for most of the section for longer span

For some smaller span as per observation it can be noticed that some span is failing near the support due to warping well below the allowable load

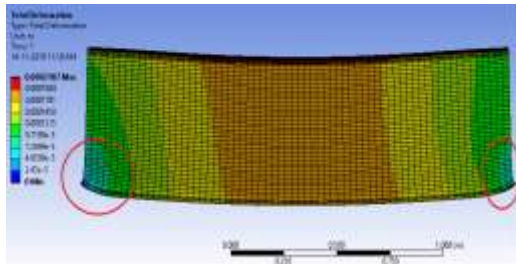


Fig 08 DEFORMATION GRAPH SHOWING WARPING AROUND THE EDGES OF ISLB 600 2m LENGTH

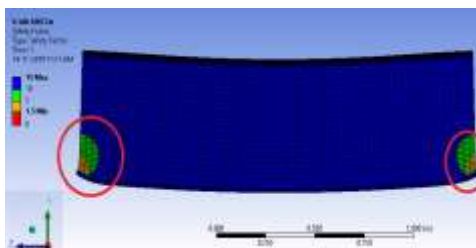


FIG 09 FOS GRAPH SHOWING WARPING AROUND THE EDGES OF ISLB 600 2M LENGTH SHOWING LEAST FOS AT THE SUPPORTS

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## VIII. FUTURE STUDIES

1. For future studies a similar study can be done for other section given in is handbooks no. 1
2. The warping of short span near supports needs to studies further with experiments to deduce that it's not a software error and if it has a significance in steel structures
3. a graphical representation of the tables in is handbooks no. 1 will be helpful to summarize and further interpolation of values

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