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Weight Optimization Of Steel Roof Truss With Different Types, Spans & Slopes of Roof

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Abstract—The main aim of this study is to weight optimize of steel roof truss according to different type truss, span & slop of roof. The design load are from IS 875 Part-1 to 3 and design of member as per IS:800:2007. The entire work of analysis is carried in Staad.pro software.

Keywords-N-Type, Pratt type, Fan type, Howe type, Staad.pro

I. INTRODUCTION

A roof truss is basically a framed structure formed by connecting various members at their ends to form a system of triangles, arranged in pre-decided pattern depending upon the span, Type of loading and functional requirements .In industrial buildings, steel trusses are commonly used.

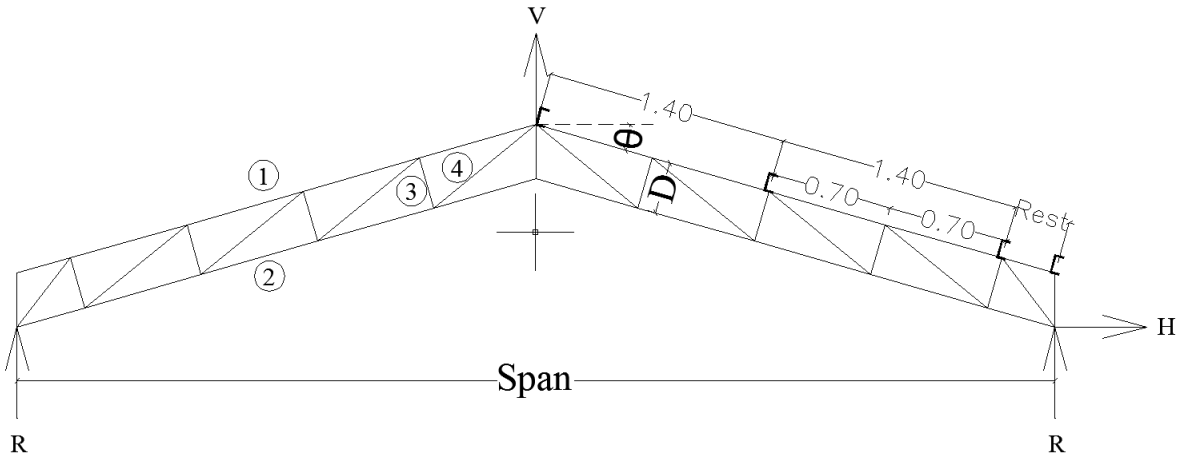
Some of the points are noted regarding analysis and design of these structure are as follow

Building Height	-	10.0m
Length (span) of truss	-	6, 10, 14, 18, 22, 26, 30 m
Spacing of truss	-	4.0 m
Slope of roof	-	12, 16 and 20 degree
Purlin spacing	-	1.40 m
Roofing Material	-	A.C. Sheet
Types of truss	-	N-Type, Pratt Type, Howe Type, Fan Type
Wind zones	-	I, IS:875 (Part-3) - 1987

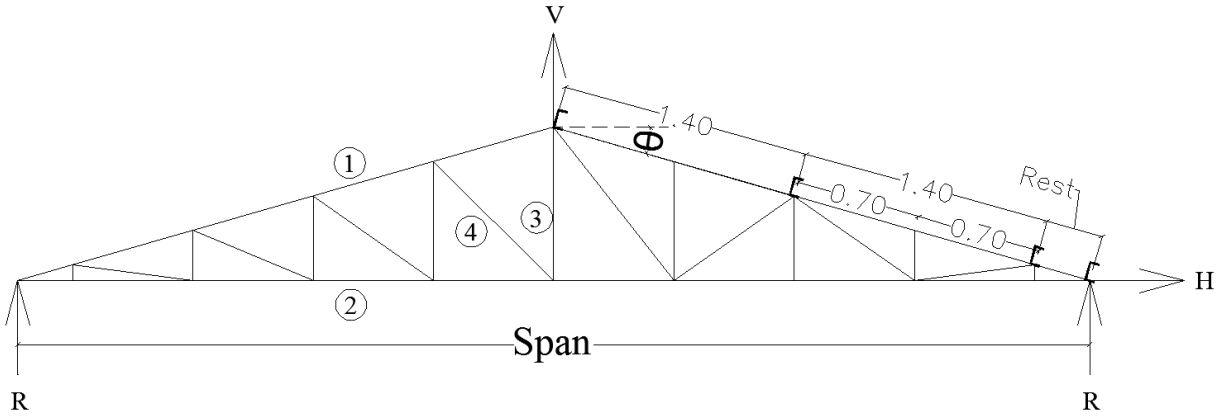
Trusses have been designed for design life of 50 years, category 1 and class A & B as mentioned in IS : 875 (Part-3)-1987, The analysis & design has been made using computer programme Staad.pro. Trusses have been designed for angle sections only. The structure with steel roof trusses have been designed following the provisions of IS: 800-2007 for hot rolled section. SP-6 is used for section properties

II. FIGURE OF TYPES OF TRUSS

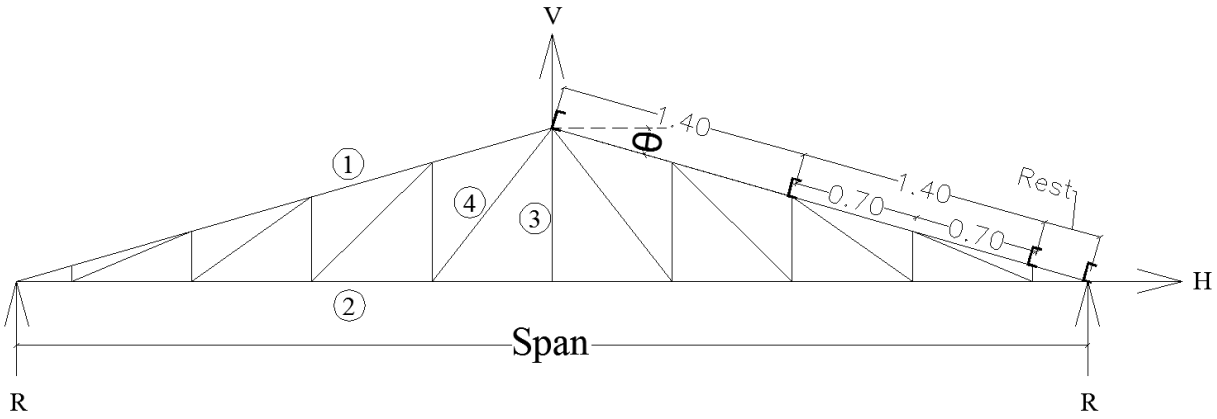
N-Type Truss



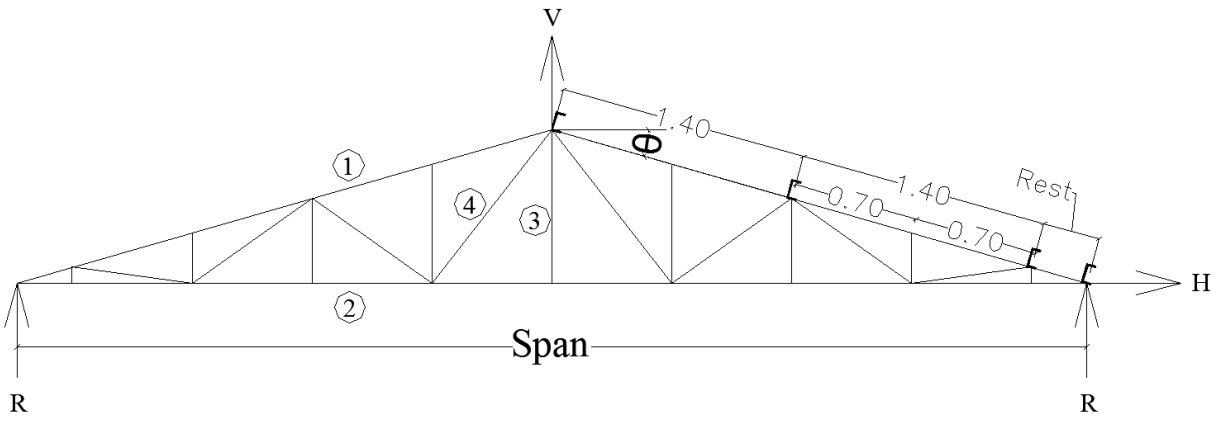
Pratt Type Truss



Howe Type Truss



Fan Type Truss



III. Matrix of Optimized weight(Kg) according to Type and Span of truss

Wind Zone =			I				
Slop of roof =			12^0	Spacing = 4 m			
Span(m)	6	10	14	18	22	26	30
Type							
N	84.811	196.805	426.343	700.851	1015.229	1473.286	2106.529
Pratt	**79.231**	**183.039**	**396.975**	676	990.96	1370.6	1914.619
Howe	83.82	186.914	409.824	688.818	**919.07**	1531.156	2104.286
Fan	80.224	184.939	415.228	**643.951**	926.514	**1363.054**	**1880.051**

Wind Zone =			I				
Slop of roof =			16^0	Spacing = 4 m			
Span(m)	6	10	14	18	22	26	30
Type							
N	86.166	208.532	410.333	672.197	1006.562	1405.883	1973.66
Pratt	**78.62**	**184.568**	**360.062**	**558.702**	998.608	1425.461	2068.8
Howe	84.432	194.459	385.656	608.872	979.539	1494.802	2155.68
Fan	80.224	187.933	364.956	566.96	**951.293**	**1381.817**	**1960.302**

Wind Zone =			I				
Slop of roof =			20^0	Spacing = 4 m			
Span(m)	6	10	14	18	22	26	30
Type							
N	84.84	209.857	404.827	691.775	959.859	**1491.845**	**2039.636**
Pratt	**84.33**	**198.844**	**359.144**	680.558	**1188.887**	1765.434	2477.808
Howe	88.511	210.265	397.077	719.103	1253.231	1833.245	2506.258
Fan	86.748	200.068	364.446	**659.144**	1218.255	1691.301	2317.917

IV. CONCLUSION

We conclude from the above result that, change in type of truss with span and roof inclination give us lighter weight truss. e.g. for 30.0 mt span, Fan type with 12^0 is lighter weight truss.

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