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Entitled

DESIGN OF TELESCOPIC BEAMS BASED ON PARAMETRIC STUDIES USING FEA AND STATISTICAL OPTIMIZATION

by

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Abstract

This thesis describes 'how the overlap region of a telescopic beam behaves under a tip load' and explains a new generic approach to the design of telescopic beams based on parametric studies using FEA and statistical optimization. Experimental investigations and exploratory analyses were conducted to study the behavior of RHS rings and RHS pieces. Based on these observations, theoretical explanations were developed. Further, a methodology for the design of the inner beam assembly based on FEA and DOE is recommended. The methodology was implemented on a case study. Results showed that the overlap area can be treated as an assembly of RHS rings or RHS pieces and a middle section. Further, the inner beam region near the bottom wearpads of the overlap area is identified as most vulnerable. RHS rings are treated as an assemblage of horizontal beams and vertical columns whereas RHS pieces as an assemblage of plates. Complete theoretical solutions are not derived because of the nature of the assembly where the end conditions of the constituent members of the RHS rings and pieces are unknown. Computer experiments therefore were used to establish a design methodology for telescopic beams.

Keywords: telescopic beams, Finite Element Analysis, Statistical Optimization