PALFINGER EUROPE GMBH| F.-W.-Scherer-Straße 24 | 5020 Salzburg | Austria

Köstendorf, on October 3, 2023

Diploma-/Master's thesis

Buckling behavior of telescope structures for future aerial working platforms

The development of modern aerial working platforms (AWPs) hinges on the optimization of telescope structures for minimum weight while fulfilling load bearing and overall statics requirements. Only through this optimization it becomes possible to further increase both the range and the functionality of AWPs while ensuring safety requirements and compliance with regulations and laws, for example the maximum permissible overall weight of the targeted vehicle category.

One of the main aspects of the optimization of the telescope structure employed in AWPs is the geometry of the profile cross-section. The continuous improvements in manufacturing combined with the use of modern high-performance materials steadily open-up new optimization potentials and opportunities. Weight optimization that relies on high-strength materials goes together with a reduction of wall thickness. However, going this route one does not only have to respect limits of strength. The thinner the walls, the more important becomes structural stability, most importantly *buckling*.

The main purpose of this work is the development of an efficient methodology for the estimation and the assessment of the buckling behavior of future profiles for telescope structures. For this purpose, model order reduction and data-driven methods may be employed as well as analytical approaches and techniques. The methodology should be validated by means of simulations and component tests. Concludingly, the new tool should be employed to assess the potential for further optimization of existing profiles respecting the important constraint of structural stability.

Main tasks:

- Literature review on stability calculation of supporting structures and construction machines
- Assembly of overview about currently valid industrial standards and possible approaches for the calculation of the stability for thin-walled steel and aluminum profiles
- Development of a fast methodology for the evaluation of the buckling behavior
- Validation of the methodology by means of FE simulations and experiments
- Analysis of the potential for optimization of current telescope structures

Administrative aspects:

Location:	Palfinger Köstendorf-Salzburg / University of Stuttgart
Duration:	6 Months
Beginning:	any time
Salary:	Monthly gross salary of EUR 2.236,16 (plus aliquot holiday and Christmas bonus)
Supervision:	Malte von Scheven (University of Stuttgart, Institute for Structural Mechanics)
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