

Announcement for Bachelor Thesis / Research project

Flex Spline Modeling for Strain Wave Gears using Finite Element (FE) Models

Motivation

Strain wave gears, also known as harmonic drive gears, are often used in robot joints due to their compact design and high gear ratio at the same time. While running, the flex spline (see Figure 1) is deformed elastically. For long operating times, the flex spline shows wear and often is the reason for failure of the gear. On the other hand, information about the acting torque can be derived from its deformation. Therefore, a close investigation of the deformation of the flex spline is mandatory when studying the behavior of strain wave gears. In this thesis, finite element (FE) analysis is applied to study the elastic behavior of the flex spline.

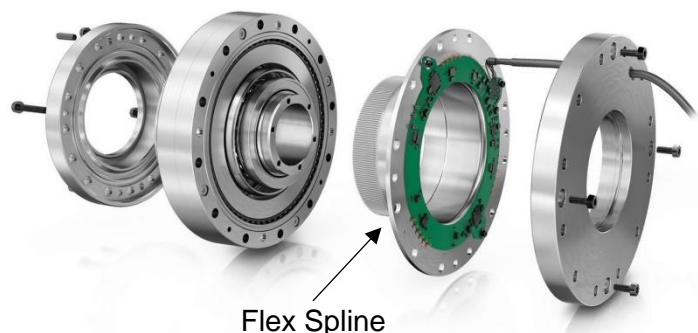


Figure 1: Source: <https://www.schaeffler.de> (modified).

Task description

The FE model shall be set up with basic geometric bodies. Furthermore, different load cases derived from real experiments shall be applied and a mesh refinement study is to be carried out. Finally, the spatial regions of the flex spline that are dominant for deriving the acting torque shall be identified by means of dimension reduction methods.

Requirements

Basic knowledge of FE software (e.g. Abaqus) and continuum mechanics is required.

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