POLITECNICO DI TORINO - *Department of Mechanical and Aerospace Engineering ITALY*

Analysis of a load application point in spline coupling teeth

Key words: Spline coupling, Pitch force, Teeth load, Parallel offset

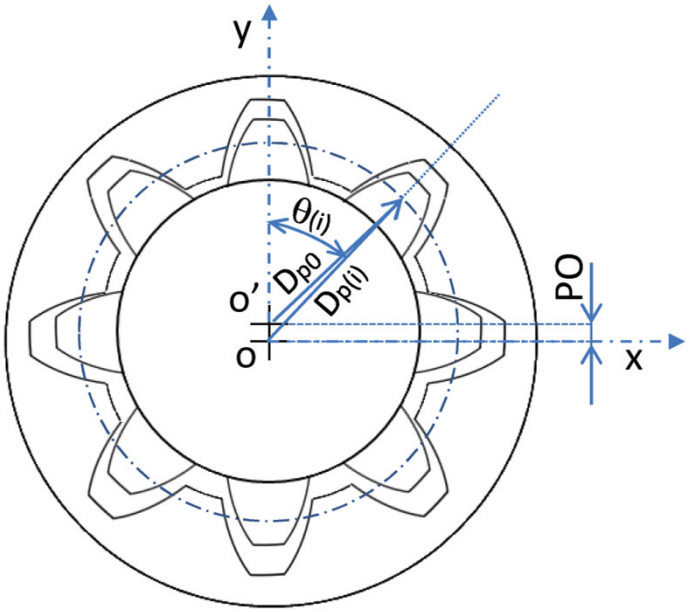
Cite this as: Francesca Curà, Andrea Mura. Analysis of a load application point in spline coupling teeth. *Journal of Zhejiang University-SCIENCE A (Applied Physics & Engineering)*, 2014 15(4):302-308. [10.1631/jzus.A1300323]

Key objective

The objective of this paper is to investigate the position of the resultant force in involute spline coupling teeth due to the contact pressure distribution for both ideal and misaligned conditions.

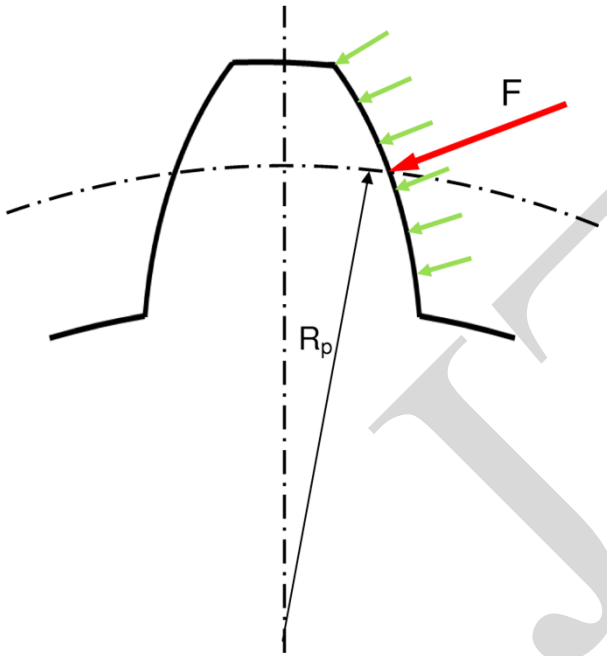
Key methodology

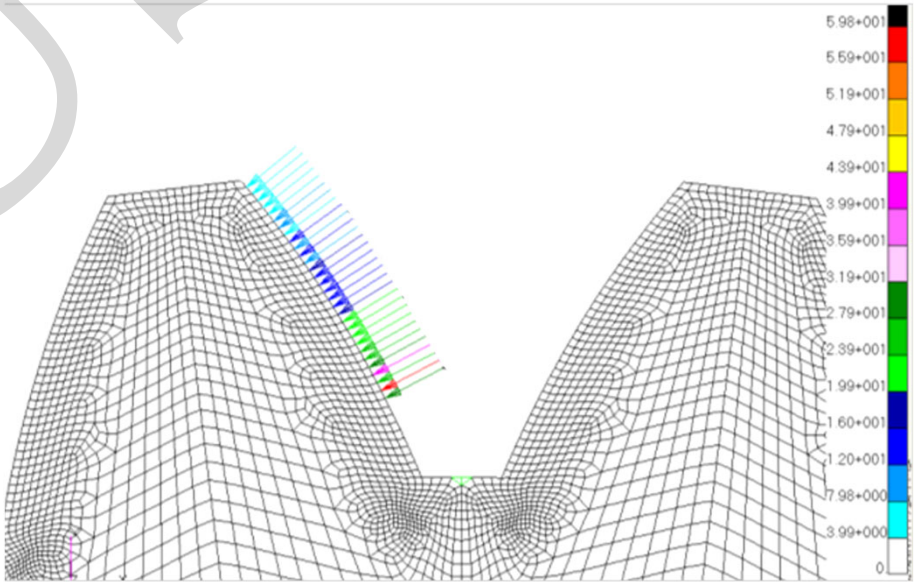
This analysis has been carried out through using FEM models, considering the impact of spline couplings in both ideal conditions and within the context of parallel offset misalignments.



Major aspects investigated

1. Differences between load application diameter and pitch diameter in nominal conditions.
2. Differences between load application diameter and pitch diameter with parallel offset misalignment.
3. Effect of load application point on tooth stiffness.
4. . Effect of load application point on contact pressure distribution



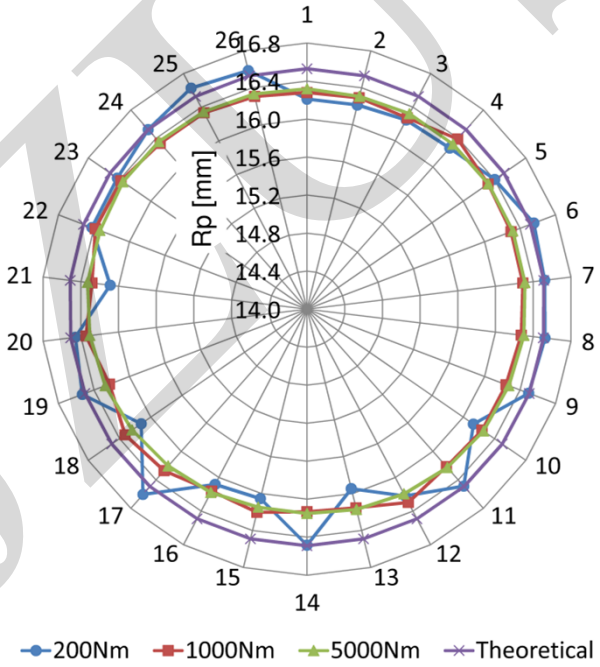


Key conclusions

•This study has been carried out in order to verify the approximation, traditionally considered in publications, of considering the resultant contact force in spline coupling engaging teeth applied on the pitch diameter.

•Results show that in nominal conditions, the differences between load application diameter and pitch diameter increases by increasing the loading level.

•In models with parallel offset misalignment, the maximum difference between FEM results and theoretical pitch diameter is 2.94%, obtained in the case of a 0.08mm misalignment.



Key conclusions

•In general, it is possible to point out that the differences between the load application diameter and pitch diameter is not very high in both the ideal coupling and with the parallel offset misalignment spline coupling, but this approximation becomes more important if the tooth stiffness is calculated with the actual load application points.

•The differences between the stiffness values obtained considering the load applied on the pitch diameter and those obtained with the actual load application point increases to more than 15%.

•Then the effect of the load application point variations have been evaluated related to the axial pressure distribution, showing that this parameter may also be influenced by the position of the load application point.