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Summary

This final thesis project concerns endurance of steel wire ropes in free bending circumstances. Endurance tests were made on one particular rope on the REFMA.
The objective of the project was to find a prediction formula for the endurance of wire ropes in free bending circumstances. This free bending prediction formula has to fit within the so called Feyrer method, because preference exists for the Feyrer prediction method for the endurance of wire ropes in forced bending circumstances.
A principal formula for predicting endurance in free bending has been derived by an analysis of the test results, experience about bending behaviour in free bending circumstances gained in earlier experiments and a dimension analyses.
For the usage of this formula coefficients had to be determined. The determination of these coefficients was done by a linear regression based on data from the test results. The coefficients have been determined for two criteria; number of cycles before discard and number of cycles before fracture. This is done for two assumptions; constant and variable bending stiffness of the rope. A validation of the formula has been made by two additional tests and with the results of the tests the coefficients are based on. From this validation the conclusion can be drawn that the predictions are fairly accurate and that the derived formula can be used well for the prediction of the endurance of the rope in free bending circumstances. However, more tests and better analysis of the results have to be made before the formula can be used for practical applications.

Concerning the usage of prediction methods for the (save) life time of wire ropes in general, clear guidelines and working instructions have to be made before any prediction method will be ready for common usage.