

# 大型風力機用多階齒輪傳動系統之特性分析

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## 摘要

Large-scaled wind turbines have been the most successful green energy measure. Still, increasing the operation safety is heavily relying on the reliability improvement of multi-stage gear boxes. This study uses two kinds of CAE packages to analyze the statics and dynamics of the gear transmission systems. First, using software LS-DYNA, structural natural frequencies and modal shapes of a multi-stage gear system are investigated. Afterward, ROMAX is used to analyze the transmission system which includes the evaluation of gearing safety and detailed tooth design. For verification, the numerical results of modal shapes and natural frequencies from the both analysis methods are compared. Influences of tooth modifications on dynamic behaviors are also investigated using ROMAX. The result demonstrated a adequate crowning or end relief can effectively reduce gear contact force and avoid tooth edge contact. This study has attained a design of the multi-stage transmission system with fine dynamic performance. The design and analysis technique is also established.

**關鍵字：**Wind turbine, Gear system, Modal analysis, Dynamic response, Tooth modification