

Best Tooling for Hard Milling a Gear Tooth on 5-Axis Machining Center

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QUESTION

What is the best tooling to use when hard milling a gear tooth on a 5-axis machining center? And what makes it the best? We have just bought a DMG Mori mono-block and are not getting the finishes at the cycle times we require.

Expert response provided by Julian Staudt, Saint-Gobain Sekurit.

Hard milling gears on a 5-axis machine is a very flexible technology regarding machinable gear types, as well as gear sizes; this flexibility is realized by use of universal tool geometries. The most flexible tool is a standard shaft mill. Disc mills can achieve higher cutting speeds and feed rates, but they are not usable for all types of gears; e.g. — not for most bevel gears. The more specialized a tool system is, the more productive it can be. Thus there is always a conflict between flexibility of the gearing technology and the achievable time-per-part.

Regardless of which tool systems best fit you and your gear portfolio, an optimized machining strategy is the main

driver for the achievement of proper cycle times (Fig. 1). Tangential tool contact brings us more robust and faster processes, i.e. — quality gets better. High feed speed leads to big chip volumes, short cycle times, and often simultaneously to an improvement of cutting conditions; tool life and surface integrity improve. Nevertheless — 5-axis milling of gears does not typically match the capabilities afforded by today's specialized gearing technologies for hard finishing, relative to cycle time.

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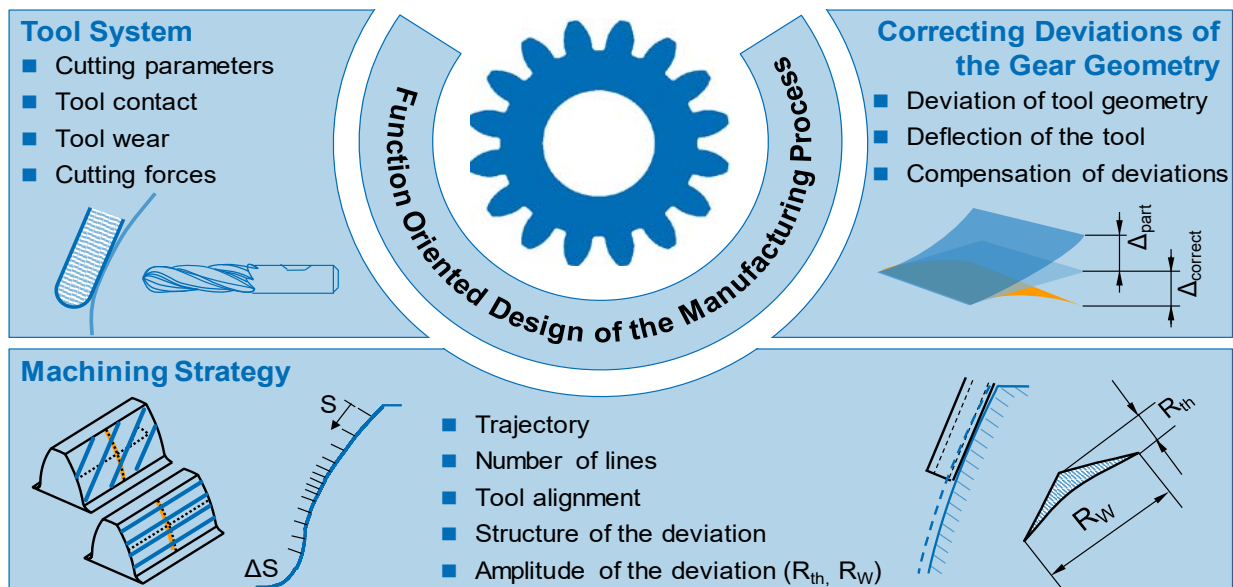


Figure 1 Function-oriented process design in 5-axis milling of gears.

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