

Fault Tree Analysis (FTA) of CNC Turning Center

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Abstract : Today, the CNC turning center becomes an important machine tool for manufacturing industry worldwide. However, as the breakdown of a single CNC turning center may result in the production of an entire plant being halted. For this reason, operations and preventive maintenance have to be minimized to ensure availability of the system. Indeed, improving the availability of the CNC turning center as a whole, objectively leads to a substantial reduction in production loss, operating, maintenance and support cost. In this paper, fault tree analysis (FTA) method is used for reliability analysis of CNC turning center. The major faults associated with the system and the causes for the faults are presented graphically. Boolean algebra is used for evaluating fault tree (FT) diagram and for deriving governing reliability model for CNC turning center. Failure data over a period of six years has been collected and used for evaluating the model. Qualitative and quantitative analysis is also carried out to identify critical sub-systems and components of CNC turning center. It is found that, at the end of the warranty period (one year), the reliability of the CNC turning center as a whole is around 0.61628.

Keywords : fault tree analysis (FTA), reliability analysis, risk assessment, hazard analysis

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