

SOCOPRO

Surveillance des outils de coupe en production

Monitoring of cutting tools in production (J.-L. Briamont, C. Charlet, R. Fourneau)

Aims

We explored various methods to determine the moment at which the cutting tool on a lathe should be considered as worn out. The project was developed in partnership with a rolling mill cylinders manufacturer, Ohio Steel of Belgium (later named Forcast).

Forcast manufactured long (4 meters) rolling mill cylinders, made of 58HRC up to 62HRC steel, on a SAFOP lathe. The inserts used by them were of the CERAMETAL brand, with an edge 40 mm long. The problem was to tell in advance that the tool will be worn out in a moment, in such a way that it will be replaced just in time before any damage to the working piece, and able to finish the trail begun. We developed a method enabling us to predict the failure (the maximum acceptable wearing level) of the tool in 30 sec (in fact 10 sec if we accept a greater risk).

The main result

We have conducted a series of experiments on our lathe, measuring the efforts and other parameters for various cutting speeds, feeds, cutting angles, sort of inserts... .

We have constructed a function of the recorded parameters whose values can be used to detect the moment at which the tool can be considered as worn out by a suitable extrapolation.

The following plot shows the phenomenon. The V_{bb} value is only an indication, the quality of the surface of the working piece was in fact the criteria for declaring the tool as worn out, this is the reason of the divergent looking curve.

