**Acoustic Emission**

Essay

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The appearance of new technologies as well as the perfection of traditional ones is mostly based on the results of research in the fields of solid physics, quantum mechanics, physical chemistry and other fundamental disciplines. That is why perspective methods of technological diagnostic must have an advanced trend of development comparing to the development of new structure and shape forming methods.

Intensification of science research in the fields of emission methods analysis reflects the above-mentioned matters. Emission diagnostics methods are based on the effect of radiation of elastic deformation waves, electrons and electromagnetic waves by studied object. Object condition is identified registration and analysis of radiation parameters based on the condition change can be made. The above methods represent so called inner energy methods and have a number of advantages allied with anomalies of material structure.

Amongst diagnostic methods the most widely spread in field of machinery construction is an acoustic emission method based on generation of elastic deformation waves in solid body caused by defect development, phase transformation and other elapsing processes. Analysis of all parameters allows to make judgement, regarding damage dynamics of material. It is used effectively for undamaging control while testing and using articles.

It is necessary to mention that an acoustic emission method is one of the newest and most prospective diagnostic methods. It is physical nature causes expanding fields of application for the method in technology.

First works by acoustic emission method appeared in 70s. This works fulfilled in the late 70s and early 80s are characterized by fairly narrow range of technological tasks, connected mostly with tool wear control.

Sources of an acoustic emission are divided into internal and external. First ones are sources located on object’s surface. For example, acoustic emission caused by friction, blow, turbulent fluid and gas streams. Processes of local dynamic redistribution of tension fields in material apply to internal sources of acoustic emission. For example, acts of plastic deformation, micro- and macro destruction and phase transformation. Analyzing the cut zone from these positions can make a conclusion about existence in this zone whole number of acoustic emission sources of different power and spectral density. Acoustic emission parameters depend on a way plastic deformation, destruction and friction processes go. It is possible to carry out acoustic emission diagnostic. Beside, frequency range of registration of acoustic emission parameters usually estimates in tens, hundreds and thousands kilohertz and is well protected from noises, which accompany work of technological equipment units.

In many aspects the acoustic emission method reminds those of low-frequency acoustic spectrometry, although in other aspects it is completely different. Acoustic emission methods are a clear shown wave process accompanied by variable space-time localization of elastic energy.

The increase of mechanical processing efficiency is tied with search and realization of new speeding-up methods of technological preparation for shape forming processes. Methods of rational carving conditions determination are being developed as one of the most important tendencies in practical use of emissive technological diagnostic means.

An important direction in the practical use of progressive technology diagnostic methods for carving process is the quality analysis of surface detail layer during the processing. The quality of a surface processed is formed as a result of friction, plastic deformation and the destruction of ingot material in carving zone. This is the reason why emissive process parameters must contain information regarding surface’s condition. It is possible to use acoustic emission method to identify the moment of contact between a tool and an ingot.

Thus, as shown by preliminary analysis, the acoustic emission method has great technological potential, which needs to be yet studied. The lack of knowledge regarding method’s opportunities constrains its effective use in theory and practice of mechanical carving of materials.