

1.7.17. TECHNICAL STATE MONITORING OF HYDRAULIC SYSTEMS EQUIPMENT USING ACOUSTICS EMISSION INSTRUMENT

Tararaksin S.A., Manzhaj S.A., Medvedev A.N.,
CJSC NPF Diaton, Moscow, Russia;
Chudnov I.V., Bolshakov A.C., JSC VMZ, Vyksa, Russia.

The report focuses on the acoustic emission (AE) equipment and control techniques that are used for the technical state monitoring of hydraulic systems, which are widely used in technological lines of press and rolling production at Vyksa steelworks. Even the failure of single hydraulic system element, for example, the distributor controlling the blank feeder, can paralyze the whole workshop.

Frequent defect of the hydraulic systems nodes is leak and leaking of working fluid from one cavity to another. Leaks appear due to wear of interfaced surfaces of shut-off-and-regulating elements and may result in increased flow of fluid coming from the high pressure supply system, and the unauthorized function of executing mechanisms.

Leaking can be detected by acoustic noise, arising at passage of a liquid through the slit, which is forming leak. Timely detection of leaks at the early stages of defects development, allows making the replacement of hydraulic systems defective units during the planned maintenance and repair of equipment, not waiting for equipment failure and the production suspension.

The developed technique of control and technical state monitoring of hydraulic system equipment allows making acoustic measurements in operating conditions, without stopping the production process. Studies of acoustic noise have been carried out during the technique creation. This noise is due to the fluids movement and the work of mechanisms at various sites of production lines. Levels of leakage signal were measured. The necessary configuration of equipment, frequency range, the type of AE sensors were selected. The order of measurements was defined. Significant experience in AE diagnostics of hydraulic elements (hydrodistributors, working cylinders, valves, pipelines) was accumulated.

Small two-channel AE systems Malahit AS-14A, operating in the mode of acoustic noise signals registration, are used for monitoring. In the process of measurement, in particular, dependence of acoustic noise level versus time is recorded in graphic form. This allows registering the increasing of noise signal from leaking during short breaks in the operation of surrounding equipment against the significant industrial acoustic noise.

The developed technique of periodic monitoring is introduced in Vyksa steelworks. In 2008, the experts of technical diagnostics laboratory performed AE inspection of 380 objects located in six factory workshops. 114 significant imperfections were revealed in the operation of hydraulic systems. The information on leak detection and estimation of leakage value in the controlled equipment was provided to the operational personnel of workshops.

The picture shows one of the controlled objects – assembly of hydraulic distributors, which operate automated control line of railway wheels.

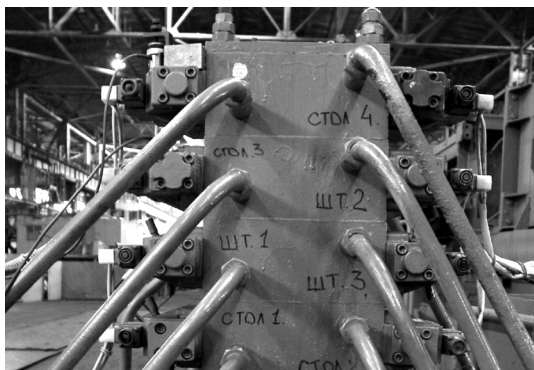


Fig. 1