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OIL-PROCESSING PUMP UNITS VIBROMONITORING SYSTEM

Yousef Abdul Halek, Ph.D., Associate Professor

Amman Arab University, Amman, The Hashemite Kingdom of Jordan

M. Zenkin, Doctor Sciences Technical, the Professor

Kyiv National University of Technologies and Design

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In the petrochemical and oil refining industries, tens of thousands of pumping units are operated, mainly centrifugal pumps of domestic and foreign manufacturers with a unit capacity from tens of kilowatts to units of megawatts. Process plants for primary oil refining, catalytic cracking, catalytic reforming and others contain a different number of aggregates, which varies from tens to hundreds of units depending on the power of the installation. High concentration of pumping units in process plants Petrochemical industries often served as the cause of accidents and other manufacturing problems. Indeed, if we take the probability of failure-free operation of the pump unit per day equal to 0.99, then for a team of machines containing 100 units the probability failure is close to 1, that is, the technological system at this is practically inoperative.

To achieve technological sustainability systems to various kinds of disturbances, including failures of pumping units, it is necessary to ensure observation of external and internal factors characterizing its technical condition, and managing its condition through the timely adoption of technical and organizational measures. The main direction of ensuring resource-saving and safe operation dynamic equipment for oil refining production, as shown by many years of experience, is the introduction of stationary continuous monitoring, diagnostics and predicting its technical condition.

Stationary monitoring systems. System continuous computer monitoring for accident prevention and status management COMPACS® represents a distributed measurement and control system in which the signals of sensors located on the equipment are transmitted for processing, display, accumulation, storage and registration on diagnostic station, based on industrial computer installed in the operator's technological installation. Jordan's plant operators usually don't have air conditioning and air purification systems. Sensors consistent with the station using universal remote modules. The systems implement vibroacoustic, thermal, acoustic emission, current and parametric (pressure, level, flow, temperature) diagnostic methods for machines, vessels and apparatuses, the novelty of which is protected by a number of patents for inventions, industrial designs and trademarks.

Modules and sensors adapted for the harsh Russian climate and personnel, certified for use in explosive areas in which the formation of hydrogen-air mixtures is possible. The system collects information about the status of equipment without additional repeaters within a radius of less than 1500 m. Power, control and signals between computer and modules are transmitted in just two coaxial cables or twisted pairs, which provides ease of design, quick

installation and large-scale implementation of the entire system and its maintenance. The "op line" system diagnoses the condition of each machine around the clock, excluding manual work of highly qualified data collection specialists. The system provides full self-diagnosis of all measuring channels, including sensors. The results of the system are displayed on six color screens, working under the control of the main and the series Drop-down menus. Information on the condition of equipment is presented on the mainscreen of the "Monitor" system, which contains several windows according to the "look & feel" principle (see and perceive) that practically does not require time for training, similarly to the principles of the standard MIMOSA [1].

COMPACS® expert system provides fast enough, complete and reliable in-place diagnostics of technical condition of the pump unit by identifying the following faults: loosening the pump and engine to the foundation; violation of alignment and balancing of rotating parts; unacceptable fluctuations in the foundation and pipelines; cavitation and water hammer ("surge") in the pump; defects in the bearings of the pump and motor; coupler wear; Pass the mechanical seal of the pump; unacceptable temperature of machine components; unacceptable ripple, frequency composition and current amplitudes of drive motors.

The system continuously measures, diagnoses and accumulates data in five time bases lasting from 12 hours to 9 years. This allows not only to observe the "life path" of the unit, but also to restore and analyze in detail the behavior of equipment and personnel in emergency situations.

On technological installations provides (online) objective automatic monitoring of dynamic equipment, troubleshooting, resource forecast, personnel warning about a malfunctioning accident or a malfunction, issuing instructions to personnel on working with equipment that is critical at a given time, removing equipment to repair and its acceptance from repair. Protective monitoring mode with automatic disabling hazardous objects based on dialogue with staff.

Personal Systems - Diagnostic Workstation -COMPACS-MICRO™ provide (off line) objective monitoring of quasi-static equipment with automatic on-line diagnostics of units and assemblies on site, balancing the assembled unit on location, transmit information to stationary systems for wide alert and remind staff about the state of quasi-static equipment, preparation of reports WORD, EXCEL, advantages WINDOWS 7, 8, 10.

Continuous monitoring vibration conditions of the equipment and automatic diagnostics with the indication of defects led to a decrease crashes and manufacturing equipment malfunctions (taking into account the "unfriendly" actions of the staff) in eight or more times; reduction of failures of mechanical seals of pumps by 3 - 8 (when working on gas condensate) and more than once; to reduce the volume of repairs and the number of parts replaced during repair more than 3 times.

REFERENCES

1. Mitchell J.S. MIMOSA Building the Foundation for 21st Century Optimized Asset Management - S&V, September, 1995.