METHOD OF INCREASE THE IMPULSE FACE SEAL RELIABILITY

Alexey Zhukov
Scientific advisor – Dr Sc, Prof. Viacheslav Tarelnyk
Sumy National Agrarian University
(40021, Sumy, G. Kondratyev St. 160, Technical Services Department,
(0542) 62-78-35) E-mail: technology@i.ua

Explosive technology development is followed not only by operating machine parameters increase but also by the existence of new, cheaper but not less reliable composite materials, combining surface protective properties with mechanical base strength. Search for less scarce and cheap materials but not less reliable, applied in manufacture of noncontact face seals, as impulse face seal (IFS).

Traditionally the rings of IFS were manufactured of silicified graphites that imposed restrictions on the range of their application, sliding speed and pressure value. These materials are expensive, possess impact resistance and subject to cracking under power and thermal load.

The analysis of the locking impulse seal operation was made. It was noted that the application of such impulses provided energy and resource conservation, including ecological safety improving of the pump and compressor equipment. In some aggressive environments, where application of non-metallic seals is limited or impossible, metal seals are used.

Reliability and service life of IFS depends on clearance width between friction surfaces and on the surface alignment of the end friction couple. The clearance between the friction couples depends on many factors: operation conditions (rotation frequency and differential pressure), contraction ratio, and thermal-physical properties of sealed fluid, material performance, geometry of O-rings, force and temperature deformations. Change of protective and tribological properties of workpiece surfaces can be achieved through formation of the special surface texture of friction pairs. Extension of the application range of impulse seals to the mode parameters increase has made necessary to create new composite materials of “base- coating”, combining protective coating peculiarities with mechanical base strength.

The advanced way of wear-resistance increase of IFS rings may be the formation of quasimultilayer coatings with lubricating and antiwear properties on the working surfaces using electroerosion alloying. Such coatings may be combined electroerosion coatings, combining solid wear-resistant and soft antifriction materials.

A new method of electroerosion alloying is proposed, which is different: the coating layer is applied firstly with antifriction low-melting metal with the purpose of wear resistance increase and surface roughness decrease, and afterwards the coating layer of wear resistant highly rigid metal is applied. In order to increase the coating thickness and uniformity, the quasimultilayer combined electroerosion coatings were proposed, formed in the sequence of BK8+ Cu+ BK8. In this case the thickness of the hardened layer increases up to 30-40 micron, microhardness remains 8740 MPa, uniformity comprises 100% .