

RESTORE BODY CENTRIFUGAL PUMPS

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Abstract. The article deals with the main types of wear and destructive effects of cavitation and hydroabrasive wear, as well as a way to restore the inner surface of a centrifugal pump.

Keywords: frame centrifugal pump, kinds wear, destructive impact cavitation And waterjet wear, way recovery.

Introduction. Working surface housing centrifugal pump simultaneously subject to the destructive effects of cavitation and waterjet wear caused by the carrying flow of water and solid particles (picture 1).

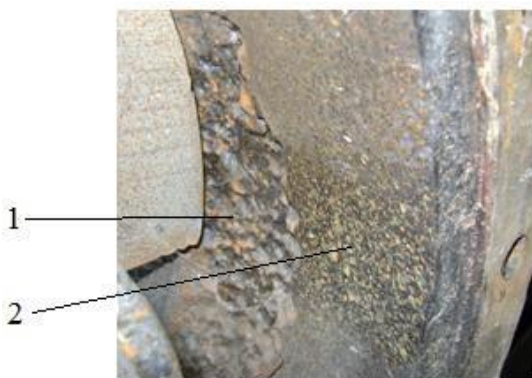


Figure 1 – Cavitation (1) and water jet wear of the internal surfaces working cameras housing centrifugal pump (2)

Abrasive wear – inevitable problem operation many species industrial equipment: pumps, screens, augers, gutters, cyclones. If V stream present liquid (water jet wear), That situation more more getting worse (except abrasive, impact provides cavitation) – technique very soon will require replacements.

Any mechanism that interacts with solid particle flows needs V effective protection from abrasive. How showed experience long-term operation, wear resistance buildings Welded-cast construction made of carbon steel grade 25L is insufficient. In the case, the end and side parts are subject to the most intense wear. Walls by everything perimeter spiral branch, and also divider the destruction of the hull is extensive, and in some cases the walls and divider have end-to-end destruction.

The material of the internal parts of the pumps is assigned based on the operating conditions (pressure, temperature, frequencies rotation workers wheels) and corrosivity pumped liquids.

The problems Most probable defects *housing centrifugal pump* are - defects castings, discovered V process operation pump wear and tear landing places, nicks and risks plane connector local cracks, corrosive and water-abrasive wear of individual places internal cavities (drawing 2)

Outcomes and achievements

Among advantages polymer repair materials stand out following [3]:

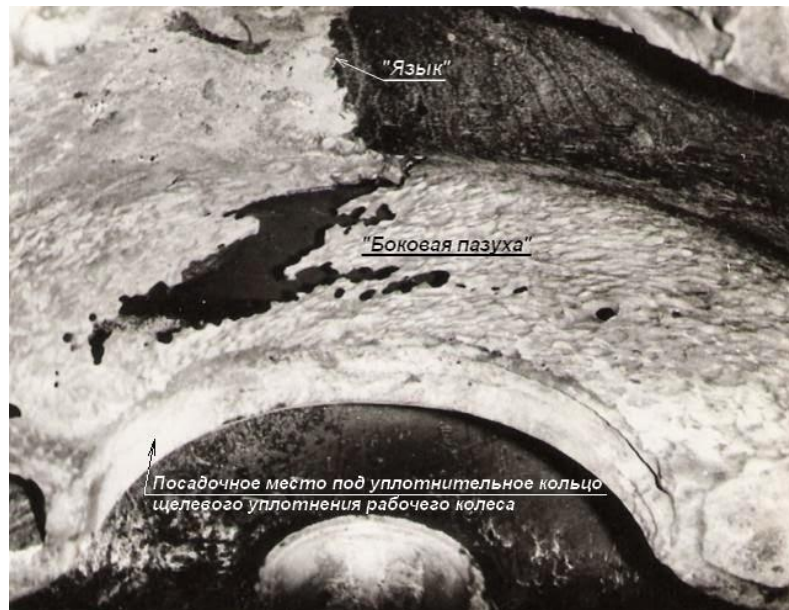
good adhesion with black and colored metals, rubber and others materials;

•row polymer materials It has such high strength and wear resistance, maybe processed only diamond incisors;

preservation properties materials V enough wide temperature range;

- high corrosive, erosive and abrasive durability;
- high durability to influence water, oils, petroleum products, gasoline and weak solutions acids and alkalis;
- unique property – opportunity execution restorative work without emptying containers with leaking liquid (water, oil, oil);
- dielectric properties;
- harmlessness for surrounding environment;
- security fire and explosion-proof repair works;
- non-toxic.

Figure 2 – Water-abrasive wear of a spiral outlet centrifugal pump



For repairs industry released kit synthetic materials, which include: epoxy resin ED-16 (binder) - 3 kg; deputy phthalate (plasticizer) - 0.5 kg; polyethylene polyamine (hardener) - 0.37 kg. Kit intended for preparations epoxy compositions used in the repair of equipment at repair plants and V workshops.

On practice V production have place separate kinds damage industrial equipment that either cannot be fixed traditional ways (welding, surfacing, soldering, electroplating) or require significant material, temporary costs because of labor-intensive repairs or searching for a suitable replacement.

The indicated advantages of polymer materials in combination with their high strength characteristics allow solving repair tasks without dismantling individual details, what reduces downtime equipment and saves significant facilities.

Essence technological process is V volume, what at restoration internal surfaces centrifugal pump, including restoration of the body surface to a given size, carrying out polymer compositional material on basis epoxy resins ED-16, additionally held manual electric arc surfacing local places wear and tear and all worn out surface exposed metallization, providing after mechanical processing surfaces increase adhesion polymer composite material and quality its covering [4].

Electric arc floating (metallization) received greatest application (75...80% of the total recovery volume). Application of this way expedient for recovery strongly worn out details.

Way recovery worn out surfaces housing centrifugal pump includes: equipment for electric arc surfacing (metallization), welding (steel wire brands: Sv-8A or Sv-08G2S) and polymer composite materials (epoxy resin stamps ED-16, elasticized - deputy phthalate, hardener - polyethylene polyamine (PEPA) and filler – iron powder) and putty knife. Options regime recovery must satisfy condition: at manual electric arc surfacing (metallization):

force welding current pick up by dependencies:

$$I_{cd} = kd \text{ u h} \text{ or } I_{cd} = (20+6 d e) d e$$

where k is a coefficient depending on the diameter of the electrode rod ($k = 45 \dots 60$); d e - diameter electrode rod, mm ($d e = 6 \text{ mm}$).

at thickness metal more 3 d e force welding current I cd is necessary increase on 10 ... 15% by comparison with calculated;

-permissible density current for d e =6 mm, $i=8.5 \dots 12.0 \text{ A/mm}^2$;

voltage arcs in within 6 ... thirty IN.

compositions epoxy compositions V Parts by weight:

epoxy resin ED-16 – 100 m.h.;

plasticizer (deputy phthalate) – 15 m.h.;

hardener (polyethylene polyamine "PEPA") – 10 m.h.;

filler (iron powder) – 160 m.ch.

Technological process recovery worn out surfaces housing centrifugal pump after cleaning and fault detection carried out V two stage and as follows (Figure 3):

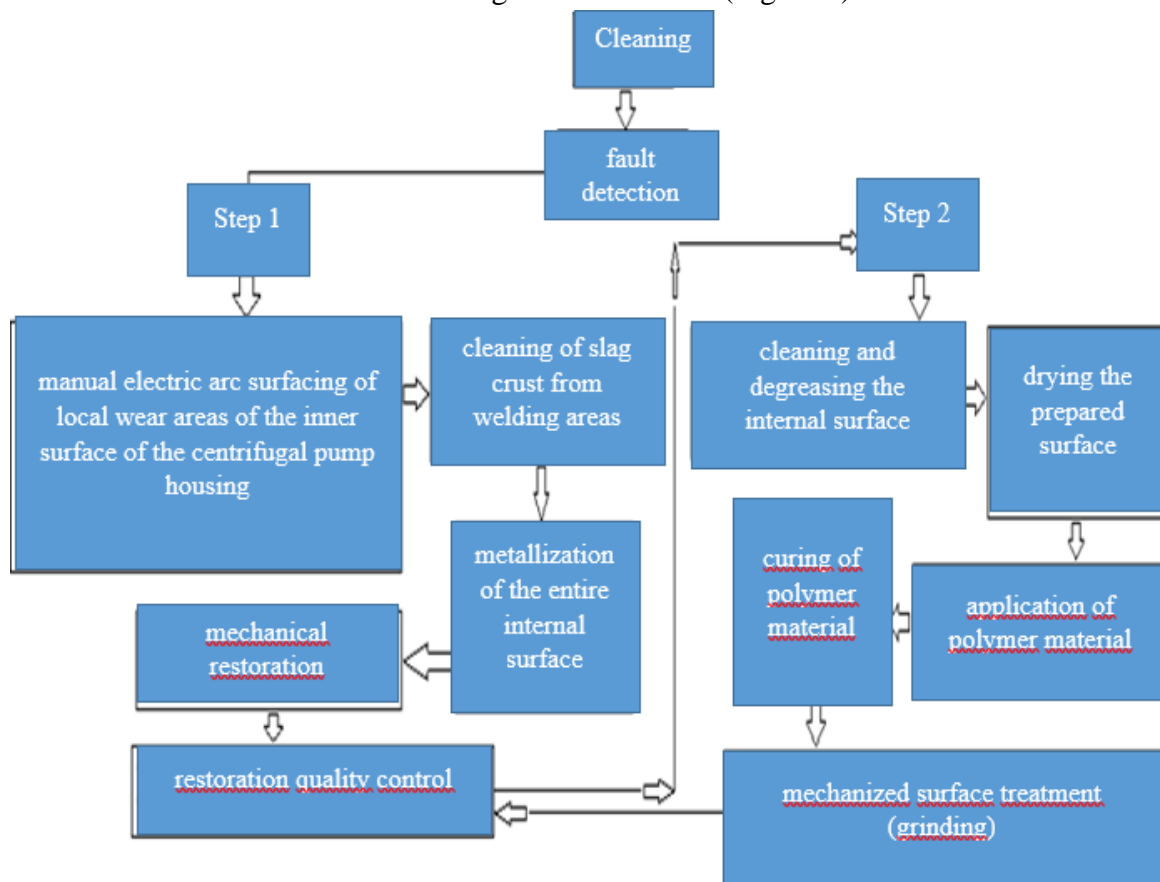


Figure 3 – Technological process for restoring the hull centrifugal pump

th stage – at manual electric arc surfacing molten metal electrode when transmitting translational-transverse-oscillatory movement fills in local places wear and tear with taking into account allowance on mechanical processing.

Conclusion

After surfacing, local wear areas are cleaned from the slag crust, and the rest of the worn inner surface housing exposed metallization, further surface exposed mechanical processing under polymer compositional coating and control quality recovery (Figure 4).



Drawing 4 – Mechanical treatment internal surfaces

th stage – after mechanical treatment, the surface is cleaned and degreased and after drying, spatula applied polymer compositional coating according to the given size (Figure 5).



Drawing 5 – Refurbished frame pump

Minimum time curing polymer compositions at using a hardener (polyethylene polyamine "PEPA") and a temperature of 40 °C, equal to 8...10 hours. Further all internal surface housing subjected to mechanical processing (grinding) and quality control recovery. Metallization is characterized by high performance, allows you to accurately adjust the thickness coatings and allowance for mechanical processing.

Thus, the proposed method improves the quality recovery housing and resource centrifugal pump V in general, those. improve technical and operational performance indicators and increase the service life its operation.

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