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ИСПЫТАНИЕ МЕХАНИЧЕСКИХ СВОЙСТВ АЛЮМИНИЕВО-КРЕМНИЕВЫХ СПЛАВОВ НА ОТДЕЛЬНО ОТЛИТЫХ ОБРАЗЦАХ

Механические свойства алюминиевых сплавов перед заливкой определялись на отдельных контрольных образцах, отлитых в горизонтальные и вертикальные формы. Сравнение механических свойств (прочность σ_t, удлинение δ, твердость НВ) отдельно отлитых из сплава АК7ч образцов диаметром 12 мм и плотности в твердом состоянии (ρ) показало, что для оценки качества отливок необходимо применять образцы, отлитые в горизонтальные формы.

Установлено, что положение в литейной металлической форме отдельно отлитых испытательных образцов влияет на показатели механических свойств алюминиево-кремниевых сплавов.

Ключевые слова: алюминиево-кремниевые сплавы, испытательные образцы, механические свойства.

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THE ASSESSMENT OF HIGH PRESSURE PIPELINES OF THERMAL STATIONS STATE BY NONDESTRUCTIVE METHODS

The method of the monitoring of the thermal stations high pressure pipeline is described.

Keywords: thermal stations, high pressure pipeline, monitoring.

High pressure pipelines are widely used in thermal stations. Parameters of pipeline usage reach $T = 560$ °C and $P = 14$ MPa. The special steels and alloys applicable for the fabrication element of these pipelines work in creeping conditions [1], i. e. to the maximum of their capabilities. Creep is the significant factor that caused failure of steam pipelines with high temperature and high pressure in the period of long-term service [2].

Besides, pipelines have large extent (dozens and hundreds of meters) and present a complex of volume-spatial construction requiring increased attention, not only by the strong feature of separate elements, but also to construction as a whole.

Breach to integrity of separate elements brings, as a rule, serious consequence, not only as breaches of the production process, but also creates a serious threat to lives and health of the personnel of the enterprise.

For ensuring the reliable usage of such pipelines, it is necessary to implement many components of a system of the monitoring for their condition in the enterprise [3; 4].

It contains the incoming control of pipeline elements and planned-preventive control the condition of the metal these elements and control the condition supporting-hanging system for performing the conditions to toughness, acerbity and self compensation of the pipeline as a whole. Besides, in obligatory order, the presence is necessary in the enterprise of instruments uncompromising control and the other special equipment, accounting methods and skilled personnel capable to analyze the information, received by control the condition of the equipment.

The assessment of the condition of the pipeline as a whole is formed from estimation of the condition forming its elements. Such elements can number from dozens to several hundreds. Each element of the pipeline is checked by several methods of uncompromising control. Depending on the type of element, from one to seven of such methods can be used. Moreover, during the usage period of the element, with determined by periodicity, several (approximately ten) planned estimates of its conditions are conducted. Therefore, a large volume of information is received, which is necessary to analyze as in approach at the time of undertaking the control, so and track record of the change characteristic for the whole period of the usages. In addition, in process of the pipeline usages it is necessary to trace constantly its spatial position and take into account receiving dates when scheduling the accounting schemes of the adjustment supporting-hanging system.

After collection and systematization of data, received in the course of uncompromising control, it is necessary to use received information as raw data for accounting methods, by means of which is defined the remaining resource pipeline elements, and are revealed the tensest places for adjustment of the methods and volumes of the control.

As a whole, the picture of the condition of the pipeline forms on base collected for the whole period of the work dates and their analysis by means of special accounting methods. Further, it is necessary to take into account the parameters to usages, for instance such as temperature and pressure, and their detours from the given level for the whole period of the usages of the pipeline.

The work period of such a pipeline is several decades. Therefore, for making a decision about possibility and period to further usage of the pipeline, as well as for the purpose of the most optimum volumes and methods of the control its elements is necessary to process the enormous volume of information. Herewith, the entire information must be analyzed in its entirety. It means for instance data collected to move uncompromising control and data, received in the process of monitoring moving of the pipeline, permanently bound and are only different manifestations of one process.

Collected information in the monitoring course has a heterogeneous nature and it is difficult to generalize. For its analysis is necessary joint simultaneous work several narrow specialists. These requirements in assessing the process of the pipeline's condition are relatively labor and time consuming. Moreover, each specialist works out its wording of the pipeline condition in accordance with its specialization. Therefore, total estimation of the pipeline condition presents itself several features including restrictions and tolerances each of specialists.

Such approach obstructs the further work with result, receiving in the course of the condition estimations since that only first stage in providing reliable equipment usage. Hereinafter goes a repair planning, calculation labor and financial expenses required for the equipment maintenance and etc.

In modern conditions for an enterprise rational use labor and financial resources for provision of maximum efficiency of the use the available equipment become specifically important, i. e. it is necessary to determine the optimum way of the distribution resources when undertaking repair-reconstruction action. Moreover, for production technical politicians for the further period necessary possibility motivated forecasting of the change the condition of the equipment and accordingly error economic variant provision to reliable usage of the equipment.

Therefore, today system allowing generalize heterogeneous information, collected in the monitoring process and present it in the manner of suitable for the further analysis (financial- economic, material-technical, technological and etc.) is urgently required.

Coming from aforesaid, is possible to formulate the approximate requirements to such system.

The description principles of the equipment must be universal and could be used for any type of the equipment.

The condition description principles of the equipment being the basis of such systems must be simple and must be based on generally accepted term and determinations.

The description wordings of the condition objects must be simple and comprehensible for any following analysis connected with production activity of the enterprise.

In accordance with these requirements possible more detailed to formulate the principles being the basis of systems.

1. Principles of the equipment description:

1.1. Hierarchical model «Unit-Node-Element» must be used at the equipment description:

1.1.1. The largest object in this model is «Unit».

1.1.2. The unit list is formed on functional signs.

1.1.3. «Unit» consists of «Nodes». «Node» is an integral part of «Unit».

1.1.4. Between itself «Nodes» can differ or design, or nature and parameter to usages. Or that, and others together.

1.1.5. «Element» is the smallest indivisible part of «Node» and accordingly of «Unit».

1.2. For each element of the hierarchies are possible three signs:

1.2.1. Sort.

1.2.2. Type.

1.2.3. Specific name (own unique name).

2. The description principles of the equipment condition:

2.1. The main way of the determination of the object condition is technical diagnostics. When undertaking technical diagnostics must be used notions specified state standard GOST RF 20911–89 «Technical diagnostics. Terms and definitions».

2.2. All parameters, defining technical condition of the object must be determined existing normative-technical documentation.

2.3. The condition of the equipment object is described by means of notion specified GOST RF 27.002–89 «Reliability in technology. Main notions. Terms and definitions».

2.4. As the description term of the condition must be used terms:

2.4.1. Fault-free condition.

2.4.2. Fault condition.

2.4.3. Workable condition.

2.4.4. Unworkable condition.

2.4.5. Limiting condition.

3. Total conditional wording of the equipment object:

3.1. The object condition is described three features formed from five possible meanings described in points 1.4.1–1.4.5.

It is possible to realize these principles only with use of modern information technology. It means by development and introduction of program and hardware complex. Moreover, under hardware this complex facility to switching of the computing facilities in local-area network of the enterprise scale is understood. For these integers, specially designed networks as well as existing ones can be used.

The programmed part of such complex function must consist of the equipment database, database results of technical diagnostic and special designed programmed modules, by means of which is realized information handling in accordance with description principles of the equipment condition.

The total several years of the group working the authors became the attempt to realize all aforesaid with reference to pipeline of the high pressure. The result of the work became making the programmed complex «Control the metal» [5].

The purpose of the complex is collection and systematization of information about the condition of equipment of object control, about result technical diagnostics for the whole usage period, about its condition and parameters of pipeline usages.

In composition of the complex is included a module, allowing the realization of the system of assessment of conditions of elements and the pipeline as a whole, in accordance with principle stated above.

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ОЦЕНКА СОСТОЯНИЯ ТРУБОПРОВОДОВ ВЫСОКОГО ДАВЛЕНИЯ ТЕПЛОВЫХ ЭЛЕКТРОСТАНЦИЙ НЕРАЗРУШАЮЩИМИ МЕТОДАМИ

Описан метод мониторинга трубопроводов высокого давления тепловых электростанций.

Ключевые слова: тепловые электростанции, трубопровод высокого давления, мониторинг.