



ENERGY ASSETS MANAGEMENT

BY DATOS ENERGY

History



1993 year. Start of research and development in the field of stationary diagnostic systems for power equipment of industrial enterprises. Development of diagnostic and SCADA algorithms.



2002 year. Start of work on the supply and implementation of automated systems for diagnostic monitoring of insulation (and not only!) of high-voltage equipment and rotating equipment with control vibration, (and not only!), temperature and pressure, hereinafter referred to as AC-D-HVE and AC-D-CVTP, at the enterprises of the chemical, oil and manufacturing industries in Ukraine and abroad. Entry into the systems of the state register of measuring instruments of Ukraine and abroad.



2005 year. A subsystem for predicting the development of defects "Prognosis" was created and put into commercial operation, which makes it possible to predict the residual life of the equipment of the Assets serviced by the AS-DIAGNOSTICS-CVTP and AS-DIAGNOSTICS-HVE systems with a probability of up to 90% at a time interval of 1000 hours.

2009 year. A system of economic analysis (the principle of what is profitable: "change" or "repair") of the residual life of the equipment "Assets of the enterprise", corresponding to the ISO 55000-2014 standard, was created and put into commercial operation.

MAIN ACCENTS

High-Voltage Diagnostics

- Diagnostic systems AS-D-HVE
- Diagnostic monitoring of high-voltage equipment under operating voltage and load:
- Transformers 35-750 kV - Electric machines 6-33 kV - Cable lines 6-110 kV

Vibration Diagnostics

- Diagnostic systems AS-D-CVTP
- Diagnostic monitoring of rotary equipment:
- Electrical machines
- Pumps, etc.

OUR MISSION

To provide our customers with modern tools for the implementation of the energy asset management system - based on the ISO 55000-2014 series of standards.

This will ensure the following:

- Safety of Asset Operation
- Conditions for the continuous development of Assets
- Economic efficiency of the operation of Assets.



The customer will receive:

The high level of our Product in the field of technologies for monitoring the technical condition of Assets, State-of-the-art services and assistance 24/7.




The customer will be able to:

- Minimize operating costs for maintaining Assets.
- Exclude the "human factor" as much as possible from the decision-making conditions for the continued operation of the Assets.

We have always strived for expansion of experience and high professionalism. This is our main goal and mission, in which we strongly believe and continue to focus on improving joint products and services

OUR SERVICES

In the development of stationary diagnostic monitoring systems rotary and high-voltage equipment, we carry out detailed inspection of the equipment of energy assets. Together with the customer's engineering team, we develop the terms of reference for the stationary System for Diagnostic Monitoring of the Assets of the Enterprise and prepare the Project for linking the system to the equipment of the Assets.



Working closely with customer's engineers , we ensure the supply of the System's equipment, installation and commissioning.

We train the Customer's personnel to get the maximum benefits from our solutions. These solutions are: correct and efficient operation of the System and minimizing operating costs due to the fact that all repair and service actions on the Asset will be carried out on time and in a minimum volume. Also, we share our knowledge in the field of diagnostic monitoring of specific equipment of the Assets. We provide continuous - 24/7 consultation process regarding the technical condition of the Assets. Additionally, we offer joint seminar programs for the exchange of experience and the development of the Customer's specialists

IMPORTANT TO KNOW

Most often asked questions:

- "What is the life cycle of your System equipment?"

The answer is: at least 100 000 hours of continuous operation, i.e. 24/7.

"But the life cycle of a power transformer guaranteed by the transformer manufacturer is 45 years or approx. 400,000 hours. How does this figure correlate with your stated life cycle?"

The answer is: The stationary diagnostic monitoring systems supplied by the company (delivery code 9031 80 39 98) fully comply with the international standard ISO 13849-1 – 2014 "Basic safety requirements for machines and mechanisms". This means that the confirmed time between dangerous failures of the System (MTTFd) is at least 15 years or 131400 hours of continuous operation of the System as a diagnostic complex.

From the point of view of the correlation of these figures, this means that each officially declared calculation component of our system has life cycle values of more than 100 years! And this is easy to check using the formula from the specified standard:

$$\frac{1}{MTTF_{\sigma}} = \sum_{j=1}^N \frac{1}{MTTF_{\sigma j}} = \sum_{j=1}^N \frac{n_j}{MTTF_{\sigma j}}$$

where MTTFd is the MTBF of each i-th component of the system. If we take the two most important components of the System - an industrial workstation computer and an intelligent controller with a corresponding estimated MTTFd time of 114 years and 120 years, we get: $1/Wob = 1/114 + 1/120 = 0.0087 + 0.0083 = 0.017$ or 58.8 years, which significantly exceeds the design life cycle of a power transformer!

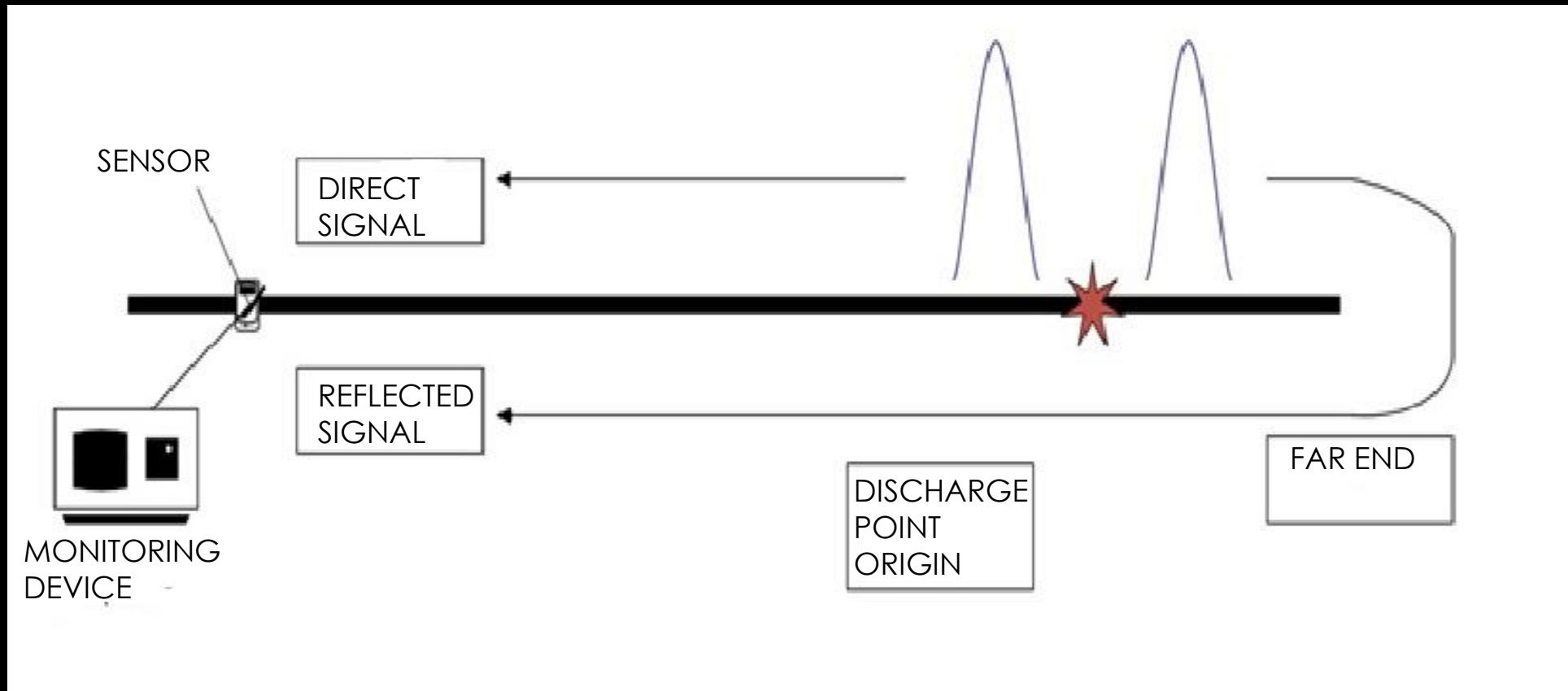
HIGH VOLTAGE CABLE MONITORING

One of the key activities of DATOS is stationary diagnostic monitoring of cable lines with an operating voltage of 6 kV and above.

The implementation of the AS-D-HVE system provides for the installation of sensors on power lines, connecting them to an intelligent controller, filtering signals, separating and diagnosing them.

The controller is connected via fiber-optic communication lines to the industrial workstation. The application software on the workstation displays the current technical condition of the cable line in real time and predicts the development of identified defects.

The software of DATOS systems allows you to predict the time of occurrence of a defect in the diagnosed equipment with an accuracy of up to 90% and indicate the place of its occurrence online.



Solutions provided with stationary diagnostic systems monitoring

- Operational control of the technical condition of monitoring objects.
- Detection of defects at the earliest stages of development (years before the accident!).
- Prediction and control of the development of defects.
- Ability to proactively plan repairs and maintenance of monitoring facilities.
- Ensuring the uninterrupted operation of the Company's Assets that depend on the objects of monitoring.
- Analytics of the expediency of repairs of monitoring objects.



Principals of operation

In stationary monitoring systems offered by DATOS, methods of predictive diagnostics are used, including methods and means of recording partial discharges. For diagnostic monitoring of transformers, the temperatures of the upper and lower layers of oil, gases dissolved in transformer oil, etc., are also analyzed.



Manifestation of partial discharge on the switch

sensors

Data acquisition device



Transformer under test



Diagnostic expansion

Data base



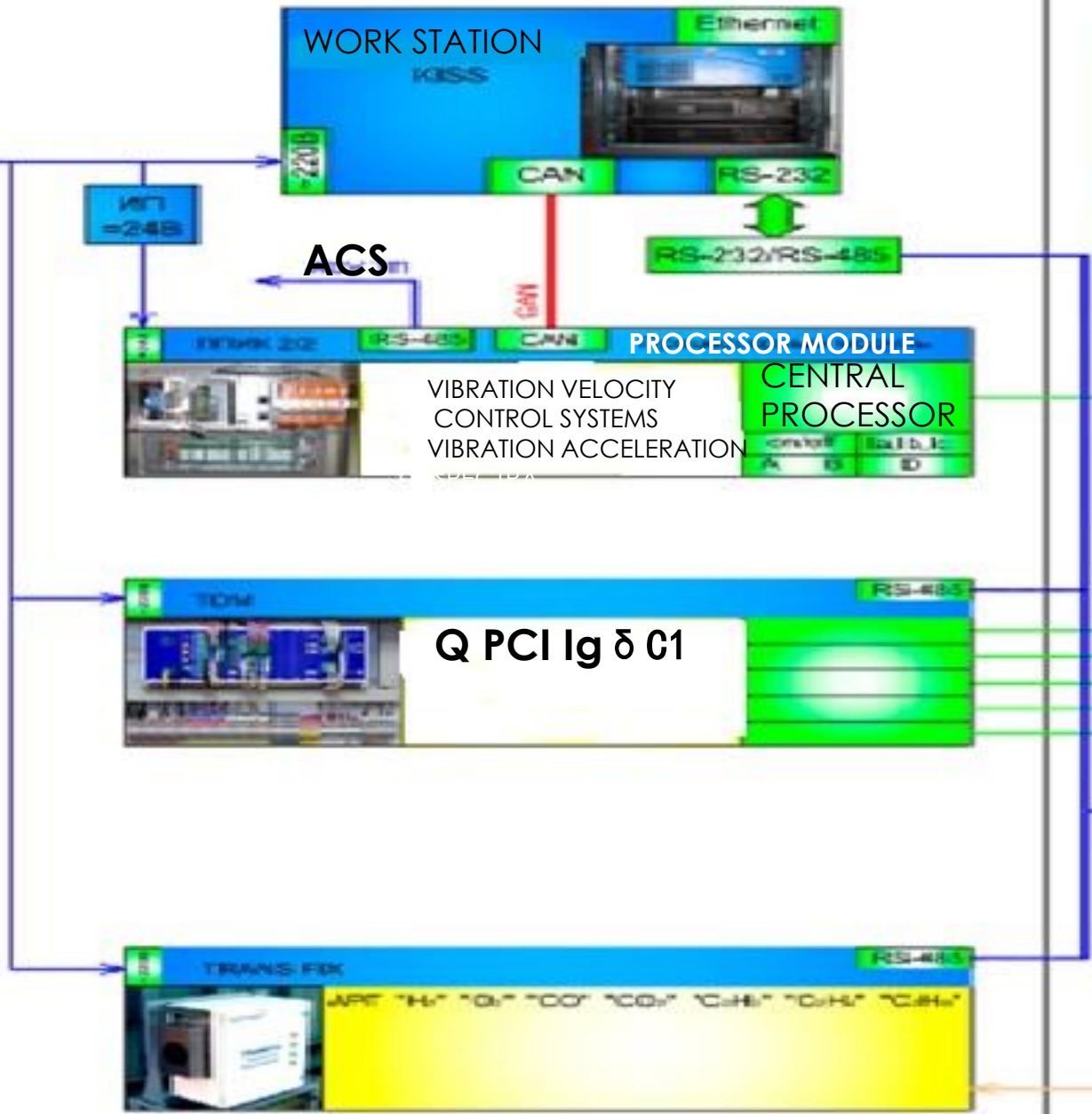
COMPUTATION



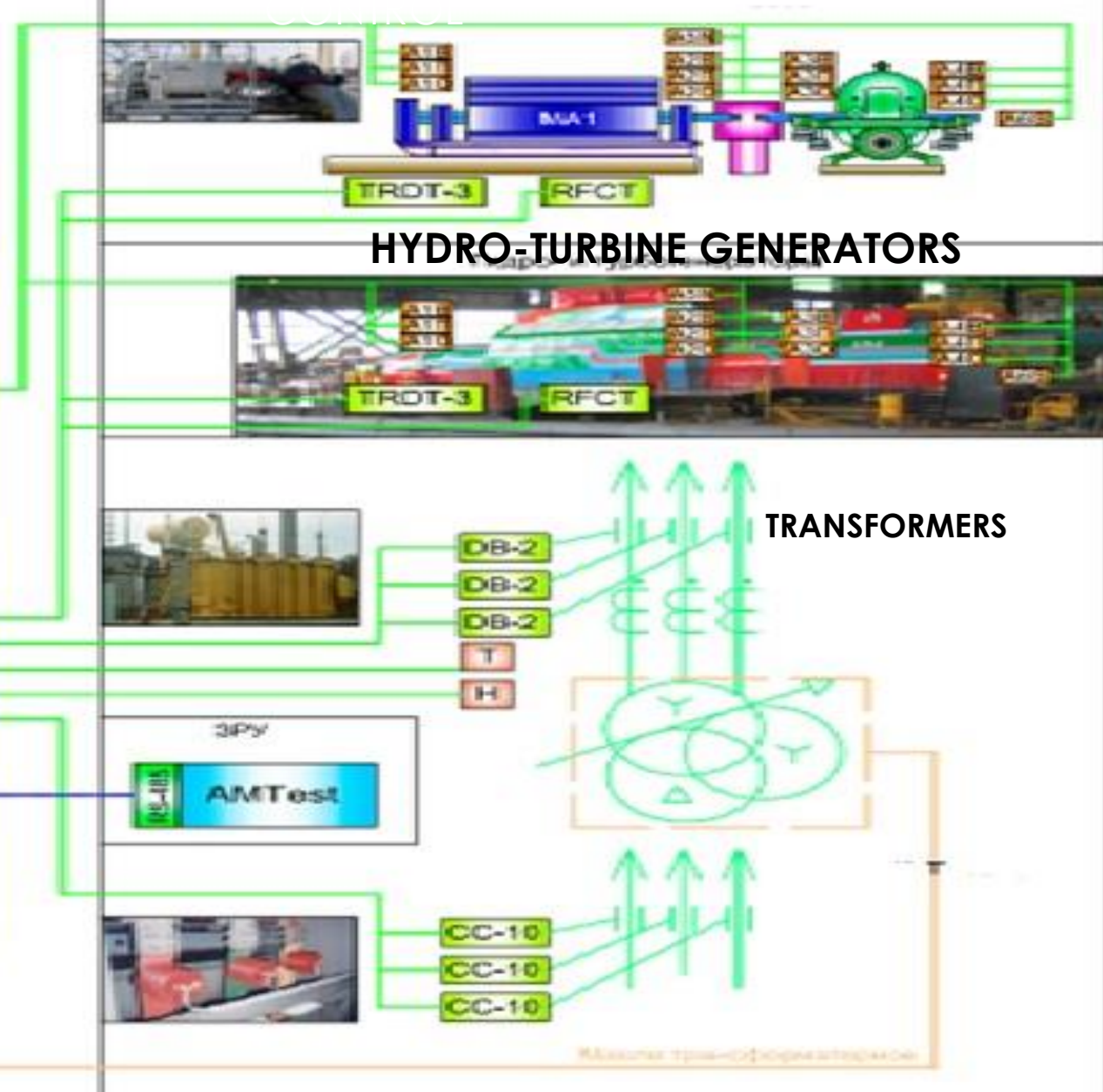
DIAGNOSTIC ACCURACY

For the most accurate detection of defects, vibration diagnostics and electrodiagnostic systems are combined into a single complex, which allows you to increase the accuracy of diagnostics over 90%

ACQUISITION SYSTEMS



OBJECTS OF MONITORING

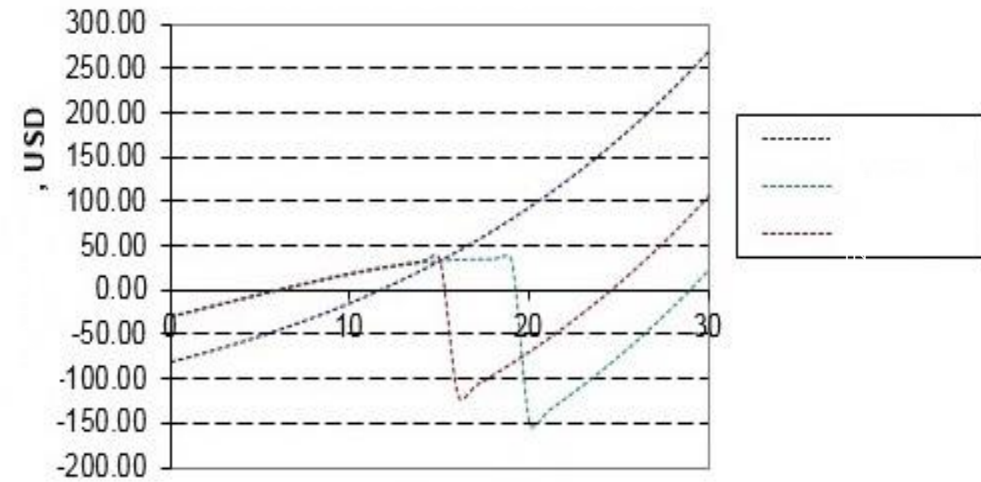
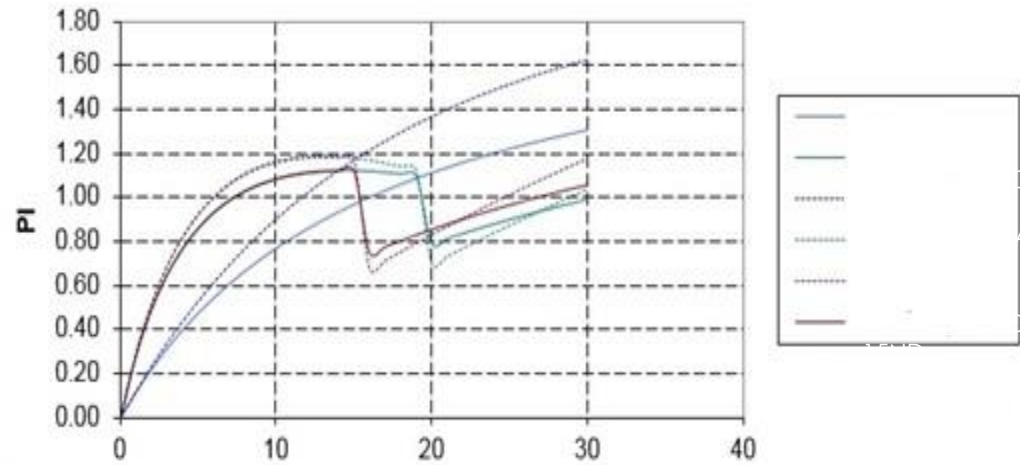
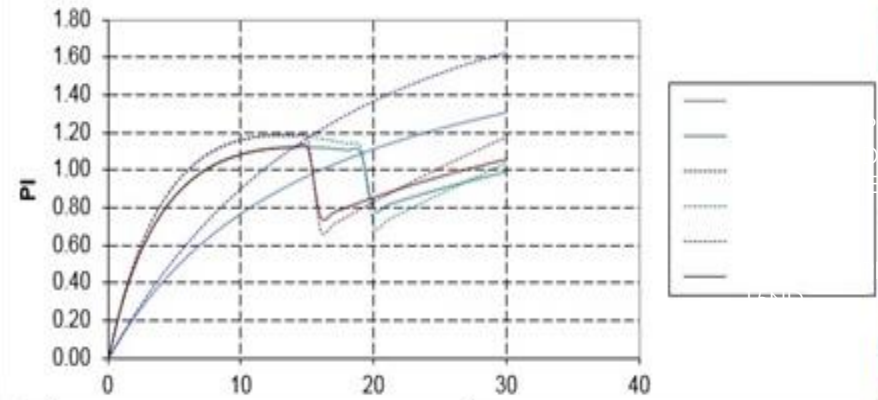
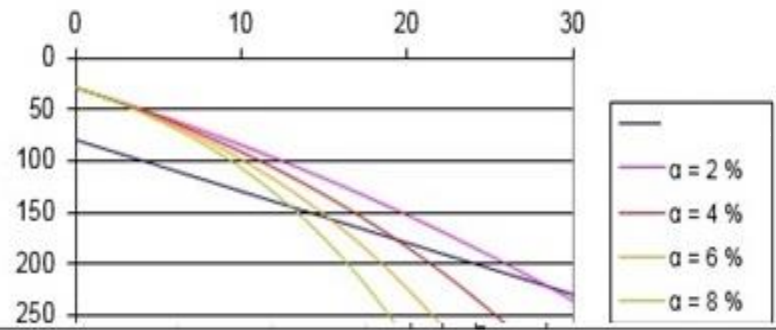


"FORECAST" SYTEM

The system for predicting the development of defects, developed by DATOS, works on dozens of Assets. The results of the analysis do not depend on the human factor and can change dynamically depending on the influence of external factors. The mathematical apparatus of the "forecast" system is based on the analysis of even minor deviations in the technical condition that occur at the monitoring facilities with the prediction of malfunctions to which these deviations can lead in a few years. When analyzing cable lines, the result is displayed in the form of an indication of the location of the identified defect and an indication of the timing when this defect can lead to an emergency.

“ENTERPRISE ASSETS” SYSTEM

The system of economic analysis of the residual life of the equipment, developed by DATOS. The results of the analysis make it possible to assess the economic feasibility of repairs of diagnostic objects - the principle is implemented - what is beneficial to the Enterprise - to "change" or "repair" Assets.



SYSTEM COSTS

The basic cost of AS-D-HVE systems for diagnostic monitoring of Cable Lines starts from \$ 100,000 and depends on the number of cable lines under stationary diagnostic monitoring.



The cost of a comprehensive transformer diagnostic system depends on a large number of factors, such as: type of transformer, depth of diagnosis, distance from the control room and many others. For example, the estimated cost of the AS-D-HVE system with the expansion of the AS-D-CVTP for autotransformer 200 MVA, for alternating voltage 330/110/35 with forced circulation of transformer oil and air (OFAF) type is \$ 200,000



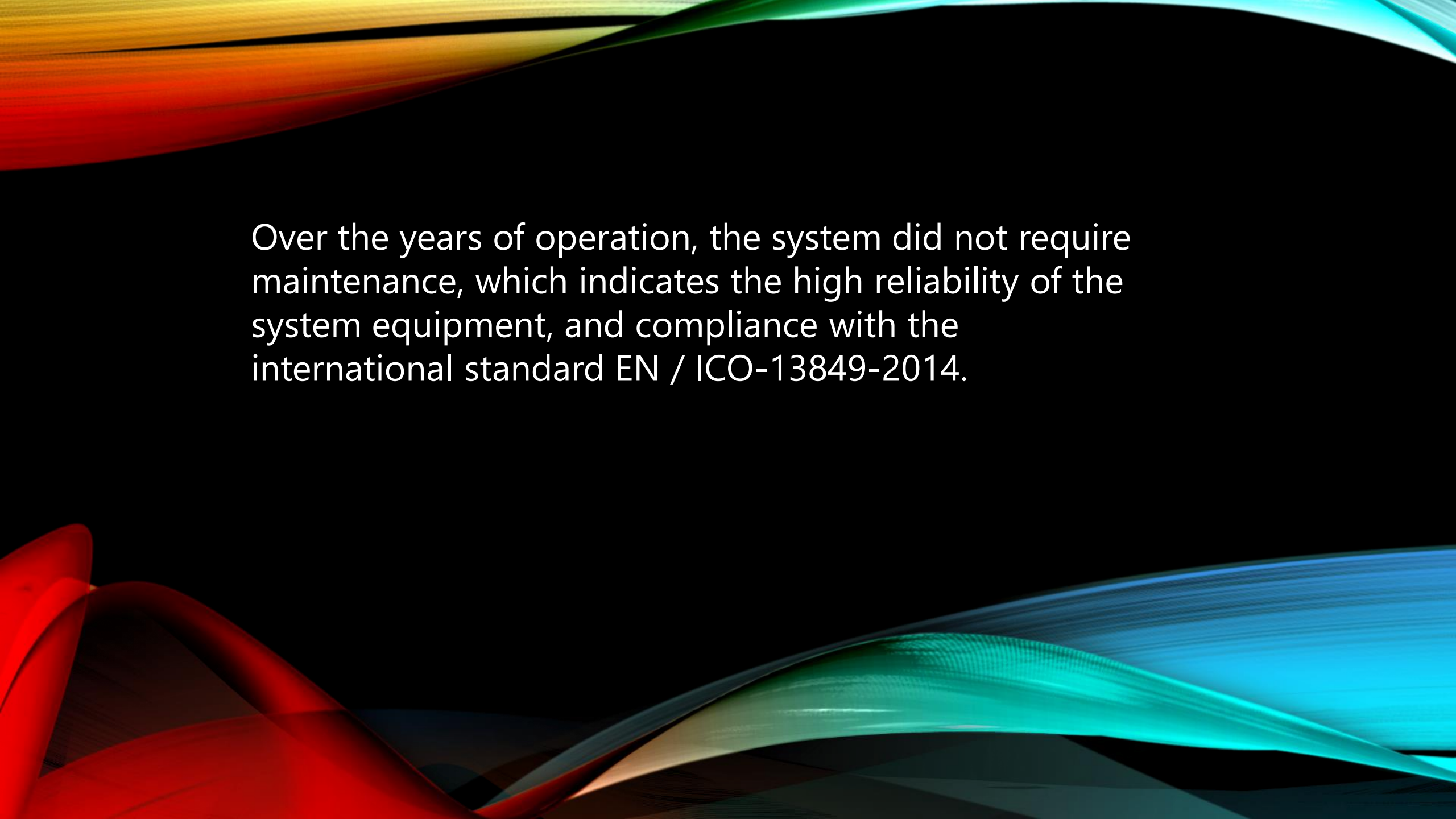
EXPERIENCE

In 2003-2008, a diagnostic monitoring system for asset management was supplied and put into operation at the enterprise of JSC "Gomeltransneft Druzhba", Belarus (a total of 149 objects): - high-voltage equipment; - pumping units; - condition of foundations;

This allowed the company to:

- increase the overhaul cycle from 5,000 to 25,000 hours;
- carry out repair work in the place and at the time when it is absolutely necessary;
- reduce the operating costs of the enterprise by 4 times.

The equipment of the software technical complex "AS-Diagnostic-CVTP/HVE" has been successfully operated up to the present day, 17 years. The operating time exceeded 100,000 hours.



Over the years of operation, the system did not require maintenance, which indicates the high reliability of the system equipment, and compliance with the international standard EN / ICO-13849-2014.

CONCLUSION

Ensuring the uninterrupted operation of the main workshops and facilities of the enterprise is a priority, because losses from unplanned production downtime can be many times higher than the cost of most equipment. The use of proactive stationary monitoring systems allows you to avoid emergency situations in the operation of enterprise assets associated with monitoring objects and reduce the number of costs in relation to the practice of periodic inspections by at least 2-3 times.

Since the 1970s, a variety of diagnostic monitoring systems have been used at the enterprises of metallurgical complexes and power generating companies in the United States, which today is the standard of the market of developed countries. According to CIGRE and the IEEE subcommittee, stationary advanced diagnostic monitoring (SDM) systems in use prevent most failures of electrical equipment in use.



THANK YOU