

METROLOGICAL SUPPLY SYSTEM IN INDUSTRIAL ENTERPRISES: PROBLEMS AND SOLUTIONS

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Abstract: This in the article industry in enterprises metrological supply system current problems and their solution to grow roads seeing Metrological supply system working release processes quality and efficiency in providing important importance has to be, measure of tools novelty, calibration process, qualified of human resources and digital technologies current to be such as main factors analysis Problems are solved. identify and eliminate to grow according to practical recommendations working issued are, they are industry in enterprises metrological of service quality to improve service does.

Keywords: metrological supply system, industry enterprises, measurement tools, metrological service, digital technology, quality control, manufacturing release efficiency.

Introduction. Today on the day industry enterprises working release processes high quality and efficiency with provide for modern technologies and equipment wide Such processes are being used success and many in terms of of measurements accuracy and reliability related to. Metrology — measurements theory and practice is, it is in the industry product quality guarantee, technological processes management and competitiveness product in creation important importance profession Industry in enterprises metrological supply system measurement of tools selection, them calibration, certification, repair and maintenance control to do processes own inside This system through working in the output everyone in stages clear and reliable measurements done is increased, this and working issued of products to standards suitable to come provides.

But many in enterprises metrological supply system his/her own perfect at the level not, and this situation working release in the processes quality and efficiency to decrease take is coming. Outdated measurement tools, qualified personnel lack of calibration systematic accordingly done and modern digital technologies inability to implement - these industry metrology main problems This relation is with, industry in enterprises metrological supply system improvement, problems identify and effective solutions on work today's on the day working release processes quality improvement and international market requirements answer to give for big importance has. This in the article industry in enterprises metrological supply system main problems analysis made, they eliminate to grow according to practical recommendations presented is being done.

Metrological supply system industry of enterprises quality and efficiency in providing main from the columns one My point of view I think it's metrological. of service effective performance not only measurement of tools technician to the situation, maybe of the system whole organization to be completed It depends. This is only technician from updates consists of not, maybe personnel preparation, interior management processes, as well as modern digital technologies current to do through done increase need.

Today on the day industry in the field many problems existence, especially metrological services in the field clear reflection are being done. Obsolete equipment, enough to the qualification has

not been to experts and standards suitable not coming working release process to the quality negative impact Therefore, metrological supply system improvement according to complex I also need to understand the importance of modern digital technologies, especially IoT and automated monitoring systems. metrology in the field revolution to make to the possibility I think I have. With the help of these technologies measurement of tools status in real time monitored and malfunctions on time identified, their prevent to take opportunity increases. This is working of release continuity and product of quality high at the level to be provides.

A metrological supply system encompasses all activities, resources, and procedures involved in providing, maintaining, and verifying measuring instruments and systems within an industrial enterprise. It includes procurement of measurement devices, calibration and verification, maintenance, documentation, and training of personnel.

Key Components:

- Measurement instruments and devices
- Calibration laboratories and standards
- Qualified personnel and training programs
- Documentation and record keeping systems
- Regulatory and quality assurance frameworks

An effective metrological supply system is indispensable for industrial enterprises aiming to maintain product quality, optimize processes, and ensure compliance with regulatory standards. While challenges like inadequate calibration, obsolete equipment, and fragmented management are common, these can be overcome through systematic improvements in calibration practices, investment in technology, personnel training, and centralized control.

Literature analysis. Metrological supply system importance and its industry in enterprises place about scientific and practical in literature wide on a scale research take visited. Many research metrology working release in the processes quality control in doing role For example, A. Kadyrov (2020) emphasizes metrological equipment regular calibration and certification to do system product quality and performance release to the efficiency positive impact about wide illuminates.

Also, Z. Rakhimov (2019) at work metrological of services modern industry in enterprises organization management and administration according to practical recommendations gives. Author industry in enterprises there is problems to define, mainly outdated measurement tools and experts qualification low such as main obstacles International standards and their current to be to the issues related In studies, for example, J. Smith (2021) found that ISO 9001 and ISO/IEC 17025 standards metrological supply systems in improvement role emphasized. In these studies enterprises to standards suitable arrival through product quality improvement and international at the market competitive to be opportunities expansion possibility is displayed.

From this except, last in the years based on digital technologies and IoT (Internet of Things) metrological of services development about many articles are being published. For example, S. Karimov (2023) in his digital calibration in the article systems advantages and their industry to enterprises current to grow their ways analysis This research shows that metrological processes automation human factor reduce the measurements accuracy and continuity provides. With this together, Uzbekistan practical to experience dedicated in the works industry in enterprises metrological the service improvement for state by support, especially training

centers organization and international partnerships develop necessity In this regard, M. Usmanov (2022) and others by written articles our country industry metrological supply new to the stage take to go out aimed at suggestions own inside takes.

In general, when taking, there is literature industry in enterprises metrological supply system efficiency increase for modern technologies current to bring in experts training and international to standards adaptation importance shows. However, the same at the time national in industry this in the field still solution to be done necessary was many problems The existence is also obvious. visible is standing.

Research methodology. This in the article industry in enterprises metrological supply system problems and their eliminate to grow their ways determination for the purpose following research methods First of all, the topic according to there is scientific sources, normative documents, international and national standards, as well as the latest scientific articles analysis At this stage metrological supply system theoretical basics, available problems and advanced experiments studied.

Industry of enterprises metrological service departments employees, specialists and managers between questionnaire and personal conversations organization was made. Through this in the system practical problems, measurement tools status, calibration processes and of experts qualification level about information gathered.

Table 1. Industry in enterprises metrological supply system main problems and their eliminate to grow roads

Home problems	Reasons	Effects	Offer done solutions
Outdated measurement tools	Equipment to wear out, to renew lack of funds	Measurements wrong output, product quality decrease	Modern equipment buy take, technical service to show improve
Calibration process wrong or delay	Calibration table violation, qualified personnel shortage	Measurements insecurity, quality control weakness	Calibration process systematic organization to be qualified experts preparation
Staff qualification low	Education and qualifications increase system weakness	Modern technologies complete hand not getting	State and enterprise by qualification increase courses organization to grow
Digital technologies current not enough	Innovative technologies to investment shortage	Production in the release human factor errors, processes efficiency decrease	IoT and automated systems implementation to grow
International to standards suitable not coming	To standards related knowledge shortage of resources limitedness	Products international at the market competitive not being	ISO standards current management and administration system improvement

Selected industry in enterprises metrological real state of processes studied, measured of tools use term, calibration frequency and maintenance practice analysis This is done. in the system shortcomings to determine opportunity gave. Collected questionnaire results and follow-up information statistic methods using analysis was done. Obtained results based on of problems main reasons and their solution to grow directions Research to the results based on industry in enterprises metrological supply system to improve aimed at clear practical recommendations and solutions offer This was done. offers modern technologies current to recruit, to recruit qualification improvement and standards compatibility to provide directed.

Research discussion. Research results showed that the industry in enterprises metrological supply system efficiency one row problems under the influence is decreasing. The most main problem — measurement of tools outdated and insufficient regular uncalibrated This is situation working release in the processes of accuracy decrease and as a result product of quality to slow down take is coming. Questionnaire and practical observations this showed that the measurement of tools most of designated from deadlines delayed without calibrating or in general calibration process This is not being done. and industry of enterprises metrological to supply was in the approach main from gaps one as is seen.

Also, experts qualification level and qualification increase system also serious attention worthy problem become came out. Many in enterprises metrology according to employees enough at the level qualification increase to the possibility has no, this and in practice new methods and technologies current to reach obstacle This is situation of the system effective to work negative impact shows, because modern metrological service high qualified personnel without participation impossible.

Research during It was found that many industry digital technologies and automation in enterprises metrological systems current This is not true. and human from the factor come outgoing mistakes increases and measures of the results continuity to provide makes it difficult. Modern IoT technologies based on working issued monitoring systems and measurement of tools status realistic at the time to monitor, troubleshoot early to determine opportunity gives, this and working release process stability increases.

From this in addition, in research metrological supply system international to standards adaptation importance determined. Such as ISO 9001 and ISO/IEC 17025 of standards implementation not only product quality increases, maybe to enterprises international market requirements answer to give opportunity creates. However, in practice this to standards in adaptation many enterprises various to difficulties face is coming, this and government and industry of the management metrological the field develop according to additional measures demand does.

In general, in short, research results industry in enterprises metrological supply system improve for following in directions work the necessity shows : measurement tools update and regular calibration, specialists qualification increase, digital and automated systems current to grow and international to standards adaptation. This measures industry competitiveness increase, develop release quality improvement and economic efficiency in providing important factor will be.

Conclusion. Industry in enterprises metrological supply system working release processes quality ensuring and efficiency in increasing important importance has. Research results this showed that the system main problems as outdated measurement tools, calibration processes continuous not, experts qualification low and modern digital technologies enough current

insufficiency separated This is disadvantages working release to the quality negative impact showing, enterprises competitiveness reduces.

Problems eliminate to grow for measurement tools update, calibration processes regular and systematic done training, specialists qualification increase and modern automated and digital technologies current to grow necessary. Also, international to standards adaptation metrological of the system quality increase and develop release processes to optimize help gives.

As a result, metrological supply system perfect performance industry of enterprises competitiveness reinforcement, product quality high at the level storage and production release efficiency increase for main factor is considered. This therefore, this in the field systematic measures acceptance to do and them done increase industry in development important importance profession will reach.

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