



SLOVENSKI STANDARD

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Vzdrževanje - Vzdrževanje znotraj obvladovanja premoženja

Maintenance - Maintenance within physical asset management

Instandhaltung - Instandhaltung im Rahmen des Asset-Managements

Maintenance - Maintenance dans le cadre de la gestion des actifs physiques

Ta slovenski standard je istoveten z: EN 16646:2014

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ICS:

03.100.10 Nabava. Dobava. Logistika Purchasing. Procurement.
Logistics

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EUROPEAN STANDARD

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Maintenance - Maintenance within physical asset management

Maintenance - Maintenance dans le cadre de la gestion des actifs physiques

Instandhaltung - Instandhaltung im Rahmen des Anlagenmanagements

This European Standard was approved by CEN on 8 November 2014.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 16646:2014) has been prepared by Technical Committee CEN/TC 319 "Maintenance", the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2015 and conflicting national standards shall be withdrawn at the latest by June 2015.

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Introduction

Why do we need 'physical asset management' today more than before? There are some very good reasons to develop 'physical asset management' in all its aspects. There are also good reasons to clarify interrelationship between physical asset management processes and maintenance processes. Some of the reasons why physical asset management and maintenance as a part of physical asset management has become a more essential part of the organizations' activities during the last decades are for example:

- globalization and increasing competition;
- growing financial, safety and environmental risks;
- radical change in business strategy – long term vs. short term;
- attitudes towards physical assets have changed – nowadays it is more common that the length of the ownership is not the same as the length of the whole item life;
- growth of capital intensity in some areas of industry;
- growing turbulence in the market;
- pressure for higher profitability and return on assets;
- aging of asset systems;
- increased pressure to improve added value of maintenance;
- more complicated and uncertain decision environment;
- increased requirements from the safety and environmental point of view;
- 'silo' behaviour which keeps maintenance and other life cycle processes separated.

In addition to the above mentioned trends in the market behaviour and technological development, there are many benefits which can be achieved with physical asset management activities:

- economically more efficient and effective use of capital: "turnover of capital";
- more profitable business: "return on assets";
- more sustainable use of capital;
- more accurate long term life cycle decisions;
- direction to maintenance strategies and operations;
- integrated investment and maintenance planning;
- influence of maintenance function on asset creation development (design and engineering);
- integrated approach for production function (assets, operation and maintenance);
- improved position for the maintenance function among the other company functions;
- improved assessment of performance and control;

— enhanced reputation.

Further and maybe even greater benefits are now being found through improved credibility in the eyes of customers, regulators and other stakeholders. Physical asset management also results in much greater engagement and motivation of the workforce, and in more sustainable, continual improvement business processes. Physical asset management builds up the required link between maintenance management and organizational strategic plan and gives direction to maintenance activities.

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EN 16646:2014 (E)**1 Scope**

This European Standard introduces physical asset management as a framework for maintenance activities. It also introduces the relationship between organizational strategic plan and maintenance management system and describes the interrelations between maintenance process and all the other physical asset management processes. It addresses the role and importance of maintenance within physical asset management system during the whole life cycle of an item.

This European Standard can be applied to production organizations of all sizes. However, if specific standards exist for a particular application or field of industry, those documents should also be considered.

This European Standard consists of guidance and recommendations and is not intended to be used for certification, regulatory, or contractual use.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13306, *Maintenance - Maintenance terminology*

ISO 55000, *Asset management — Overview, principles and terminology*

ISO 55001, *Asset management — Management systems — Requirements*

ISO 55002, *Asset management — Management systems — Guidelines for the application of ISO 55001*

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EN 60300-3-3, *Dependability management - Part 3-3: Application guide - Life cycle costing (IEC 60300-3-3)*

3 Terms, definitions and abbreviations**3.1 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 13306, ISO 55000, EN 60300-3-3 and the following apply.

3.1.1**asset solution**

the result of concept definition

3.1.2**business environment**

all the external factors within the market, technology and community influencing on the decision making of the organization

3.1.3**creation of physical asset**

acquisition process, which can include concept definition, design, manufacturing, installation, commissioning

3.1.4**key success factor**

attribute required for an organization to ensure the success of an organization

3.1.5**life cycle of a physical asset**

period of value realization from a physical asset by an organization including needs identification, creation or acquisition, utilization, maintenance, modernization and disposal

Note 1 to entry: Life cycle of an item may contain several life cycles of a physical asset. An item can have several sequential owners during its life cycle.

Note 2 to entry: Realization of value will normally involve a balancing of costs, risks, opportunities and benefits.

3.1.6**life cycle of an item**

series of stages through which an item goes, from its conception to disposal

3.1.7**maintenance task****maintenance action**

sequence of elementary maintenance activities carried out for a given purpose

3.1.8**modernization**

modification or improvement in the case of nonconformity of the asset, taking into account technological advances, to meet new or changed requirements

3.1.9**operating conditions**

physical loads and environmental conditions as experienced by the asset during the entire life cycle

Note 1 to entry: Operating conditions can vary during the asset's life cycle.

3.1.10**operating constraints**

characteristics of the asset, which set limits for the use of the asset and may determine requirements for maintenance activities

Note 1 to entry: These characteristics are the results of design and construction of the assets and are influenced by the operational mode and operation conditions.

3.1.11**operational mode**

way a physical asset is operated and utilized during the entire life cycle determined by the numbers of units of use (hours, starts/stops, transients)

Note 1 to entry: Operational mode determines the frequency, load, continuity and performance rate of utilization.

3.1.12**physical asset**

item that has potential or actual value to an organization

Note 1 to entry: Examples of physical assets are components, machines, plants, construction works, buildings.

EN 16646:2014 (E)**3.1.13****physical asset management**

coordinated activities of an organization to realize value from physical assets

Note 1 to entry: Realization of value will normally involve a balancing of costs, risks, opportunities and benefits.

Note 2 to entry: In the life cycle context, physical asset management is the optimal life cycle management of physical assets to sustainably achieve the stated business objectives.

3.1.14**technical depreciation**

difference between the asset replacement value and actual value

Note 1 to entry: Technical depreciation should be based on the asset replacement value but not on asset book value.

Note 2 to entry: Technical depreciation can be calculated as a ratio of asset replacement value and expected life.

Note 3 to entry: Technical depreciation measures and depicts technical aging of the assets in money terms.

3.2 Abbreviations

List of abbreviations used in this standard is given in Table 1.

Table 1 — List of abbreviations

Abbreviation	Meaning
CMMS	Computerized maintenance management system
KPI	Key performance indicator
OEE	Overall equipment effectiveness
TCO	Total cost of ownership

4 Overview of physical asset management**4.1 What is physical asset management**

Physical asset management is defined as coordinated activities of an organization to realize value from physical assets. More specifically physical asset management is “the optimal life cycle management of physical assets to sustainably achieve the stated business objectives”. Physical asset management does not focus on the asset itself, but on the value that the asset can provide to the organization. Value is organization specific and depends on the organizational context. In the general context, asset is something that has potential or actual value to an organization.

The nature and purpose of the organization and the internal and external environment where it operates have a strong bearing on the type of assets that the organization requires and the physical asset management capabilities that it needs to develop in delivering its business objectives. The market dynamics and speed of technological change varies from one sector to another and this fact has a great influence on the physical asset management challenges and activities.

4.2 Hierarchy of physical assets: asset portfolio, asset systems and individual assets

An “individual physical asset” is defined as a physical item that has potential or actual value to an organization. A “physical asset system” refers to a set of interconnected assets (of one or multiple asset types) working together and can be regarded as an asset in itself. Examples of asset systems are production plants and production lines. Grouping of several physical asset systems into a “physical asset portfolio”

enables a holistic approach to be used in the delivery of organizational objectives. Examples of the asset portfolios are the fleet of production plants of a business division and corporate production system which is a collection of several plants. Assets form often a hierarchical system.

4.3 Item and asset life and life cycle of physical assets

The life of an item is defined as the period from its conception to its disposal. An item can be an asset for several organizations during its lifetime. The life of physical asset is defined as a period from its conception or acquisition to its disposal or hand over to the other responsible organization. They often pass through identifiable life stages. The description (and naming) of the stages can differ between assets or items, their applications and organizations.

When managing its physical assets the organization should consider all the life cycle stages (these stages are explained in detail for all the three asset levels in Clause 6):

- a) needs and feasibility assessments for assets;
- b) concept definition;
- c) determination of asset solutions;
- d) design of assets;
- e) manufacturing or acquisition of assets;
- f) installation and commencing;
- g) utilization of assets;
- h) maintenance of assets;
- i) modernization;
- j) decommissioning, retirement, and/or disposal of assets.

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However, one shall notice that the detailed structures of life cycle stages are different at the three levels of physical assets: asset portfolio, asset system and individual asset. Also, different kinds of technological environments may demand for different kind of stage structure. In the case of standard machines the stages - b), d) and e) can be replaced by the acquisition of an individual asset.

4.4 Organizational context

The role of maintenance management contains two-way influence:

- the organizations' business environment, strategies, plans and decisions direct maintenance activities, but
- on the other hand the maintenance functions influences organizations strategies, plans and decisions on the physical assets.

The maintenance management system is a part of management system for physical assets. The activities which the maintenance management plans, decides and implements depend directly from the organizations' business and technological environment. In the stable market and technological environment maintenance activities have different focus compared with the dynamic business and technological environment. On the other hand at the early stages of equipment life cycle maintenance priorities differ from the priorities of the aged equipment having overtime compared with planned useful life.

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The maintenance function should:

- have significant role when planning and deciding physical asset solutions (however, a less significant role at asset portfolio level);
- have sufficient power to affect the design solutions during the investment process in order to optimize life cycle activities of the investment and meet safety and environmental requirements;
- contribute to the mode of operations of the production function in question in order to assist the whole organization to optimize its operations.

5 Management system for physical assets**5.1 Purpose of physical asset management system**

An asset management system (management system for physical asset) is a set of interrelated or interacting elements of an organization, that establish asset management policies and objectives, and the processes needed to achieve those objectives. A physical asset management system is not simply an information system; it also includes the organization structure, roles, responsibilities, business processes, plans, operation.

Organizations should establish, utilize and improve asset management system for physical assets. The elements of asset management system are described in details in ISO 55000 and ISO 55001 following the general structure of ISO management systems standards. Guidelines of for the application of ISO 55001 are illustrated in ISO 55002. The asset management system requirements in ISO 55001 have been organized into seven specific elements:

- organizational context; [SIST EN 16646:2015](https://standards.iteh.ai/catalog/standards/sist/9ea8ec7e-a22e-41dc-bb21-7912c2e90d17/sist-en-16646-2015)
- leadership; <https://standards.iteh.ai/catalog/standards/sist/9ea8ec7e-a22e-41dc-bb21-7912c2e90d17/sist-en-16646-2015>
- planning;
- support;
- operation;
- performance evaluation and
- improvement.

5.2 Interaction between organizational context, physical asset management and maintenance management

Four factors affect significantly requirements which should be defined for physical asset management activities:

- characteristic and objectives of the company in question;
- market;
- community and
- technology.