IRIS Guideline 5: Obsolescence Management

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English

Table of Contents

1. Introduction

The lifetimes associated with components and spare parts used in rail industry can stretch out over several decades. The expected level of performance and lifetime within the rail industry can only be achieved if products/equipment involved are supported by structured maintenance programs that rely on the availability of spare parts. The specific challenge within the rail industry is the variety of rolling stock and infrastructure ranging from very old to very modern design. They cannot all be treated in the same way. The answer lies in a proactive, rather than a reactive approach and needs to be addressed through each level of external provider within the whole supply chain and supported by engineering services. To mitigate problems, all spare parts potentially affected by obsolescence need to be identified, the various means of supporting or replacing them fully evaluated and their availability has to be monitored on a regular basis.

Obsolescence still affects all products, is inevitable and cannot be completely prevented, but careful and foresighted planning can minimize its impact. Obsolescence management must be applied as an integral part of the design, development, procurement, production and service processes, in order to minimize costs and unavailability of components and vehicles over the entire rolling stock life cycle. The purpose of this guideline is to provide guidance on the planning of an efficient obsolescence management process taking into account that product life cycle costs are considered.

2. Terms and definitions, abbreviations

2.1. Terms and definitions

Equipment:	The totality of all tools necessary for an activity or work or contract.
Obsolescence (IEC 62402)	Transition from availability of products by the original manufacturer or external provider to unavailability. (Permanent transition from operability to non-functionality due to external reasons.)
Obsolescence Management (IEC 62402):	Coordinated activities to direct and control an organization with regard to obsolescence.
Obsolescence management plan (IEC 62402):	description of the strategies for the identification and mitigation of the effects of obsolescence through all stages of the life of a product.
Obsolete:	no longer in production from the manufacturer in accordance with the original specification [IEC 62402]
Products:	Investment goods, infrastructure, durables, consumables, software products etc.

2.2. Abbreviations

OM   Obsolescence Management

3. Obsolescence management requirements

According to ISO/TS 22163 chapter 8.10, a process for obsolescence management needs to be established, implemented and maintained, to ensure the availability of the components and spare parts within the whole product life cycle.

This process may be part of the change management or configuration management process. Spare parts may be of the same product configuration or coming from alternative solutions which have been developed, validated and qualified according to the original requirements.

4. Responsibility

According to the needs related to the organization, project and product objectives as well as responsibilities such as quality and technical requirements are to be defined by the organization's top management. Obsolescence principles are to be set in consistence with the overall business strategy. These are also to be derived from the needs and expectations of customers. Adequate resources need to be provided to support operations of the organization in accordance with obsolescence activities. These include availability monitoring of external components and services. Obsolescence activities may also be related to legal, regulatory or statutory requirements. Top management needs to appoint a process owner for the obsolescence management process. Obsolescence management may be implemented as an integral part of other organization's management systems such as quality or safety management. This may promote the effective and efficient process and continual improvement.

Following this approach, it is suggested to set up an obsolescence management team with appropriate power and resources, consisting of purchasing, production, development, quality, sales and any additional needed department.

5. Process of obsolescence management

5.1. Management of obsolescence

An overall obsolescence management process needs to be developed by the organization, to ensure adequate choice and timely implementation of required key obsolescence activities. The aim of the obsolescence management process is to develop strategies for the identification and mitigation of potential obsolescence impacts through all stages of products life cycle. Potentially affected products may be identified and evaluated by an obsolescence risk analysis. To ensure availability of the products, even product alternatives (replacements) on a higher level may be considered as necessary part of the total lifetime solution.

5.2. Applicability

5.2.1. Technical obsolescence

Technical obsolescence may occur when a new product or technology supersedes the old one. Historical examples of superseding technologies causing obsolescence include higher-quality

multimedia DVD over videocassette recorder and the telephone, with audio transmission, over the telegraph's coded electrical signals. On a smaller scale, particular products may become obsolete due to replacement by a newer version of the product. Many products in the computer industry become obsolete in this manner; for example, central processing units frequently become obsolete in favour of newer, faster or feature enriched units. Singularly, rapid obsolescence of data formats along with their supporting hardware and software can lead to loss of critical information, a process known as digital obsolescence.

Additional reasons for obsolescence can be that supporting technologies may no longer be available to produce or even repair a product. For example, many integrated circuits, including CPUs, memory and even some relatively simple logic chips may no longer be produced because the technology has been superseded.

5.2.2. Functional obsolescence

Products items may become functionally obsolete, if customer requirements or supporting processes lead to new technologies or features. For example, if a new mobile phone technology is adopted and there is no longer a provider who supports the original technology, any mobile phone using that technology would be rendered obsolete due to the inability to access service.

Products which naturally wear out may become obsolete if replacement parts are no longer available, even though the component still fulfils the customer requirements.

5.2.3. Knowledge obsolescence

Besides the technical and functional obsolescence, the loss of personnel expertise, relevant knowledge and skill based sets can be also a matter of obsolescence. It may be prevented by competence management:

-     monitoring of skills,
-     frequent and repetitive trainings,
-     succession planning,
-     qualification matrix,
-     internal organizational Wikis or databases

NOTE: you can also refer to ISO/TS 22163 chapter 6.4, 7.1.6 and 7.2

5.2.4. Economic obsolescence

Next to technical and functional obsolescence, economic reasons can lead to products or services becoming obsolete. For instance, the original developer has gone out of business or a competitor acquires business branches while buying them up, but on the long term adapts the product range.

In terms of unstable forecasting and predicting production quantities, hosting manufacturing equipment, producing and servicing may become non-profitable.

Also, an increasing time and effort in more complex repair or replacement parts can lead to economic obsolescence. Yet, the follow-up costs due to replacement of an original component or spare part have to be considered carefully.

5.2.5. Software obsolescence

Obsolescence management is also applicable to software. In this case it can be considered if software codes are also part of the contractual deliverables that are shared between the external providers and the organizations.

5.3.   Arrangement and planning

To ensure an efficient and effective process, a close cooperation between all related interested parties such as original equipment manufacturers, system integrators as well as operators is required. In principle, there are three approaches concerning obsolescence management:

Strategic: Integrating obsolescence criteria in the development process

Proactive: Development and implementation of an obsolescence management program as well as availability monitoring.

Reactive: React to obsolescence problems as and when they occur, generating alternative supply strategies.

The strategic approach requires a product development process, that integrates systematic life cycle management, as well as using elements and modules that may be exchanged by future generations of elements and modules efficiently, without adapting interfaces, environments and electronic supplies.

The proactive approach may prevent bottlenecks and problems that could result from obsolescence within the supply chain and sets up avoidance strategies or solving concepts in anticipation of obsolescence. The application and integration of the strategic and proactive OM approach is essential within the product development & life cycle management process. Both result in a "Design to OM" strategy, which is the basis to fulfil customer requirements in concerns of longterm-availability and system-stability and in combination with spare part availability monitoring reduces the implication of reactive OM sustainably in the dimensions of complexity, cost and time criticality.

The reactive approach only serves to solve the problems caused by an existing obsolescence or product discontinuation.

Below, some examples of obsolescence activities along the stages of product life cycle are listed.

5.3.1. Strategic Obsolescence in development and product management

The activities include an active management as well as their continuous evaluation of the core assortment according to following criteria:

- Ensure modularity of products
- Ensure downward compatibility of products (form, fit and function)
- Ensure a high level of standardization by definition of assortment classifications (standard assortment)
- Creation of interface standards to ensure compatibility of products at function level (form, fit, function)
- Standardization of product or system specific tools
- Focusing on few strategic important external providers
- Minor / major redesigns
- Updating system terms

- Check for possible system upgrades
- Manage and preserve know how of engineering, maintenance and field service personnel

With these preventive measures, the risk using "non-standard products" at project engineering will be reduced.

5.3.2. Proactive obsolescence management in supply chain and product management

Proactive OM is linked to supply chain management in the following points:

- Creation of long term external providers frame contracts and definition of requirements for obsolescence management to be shared with external providers.
- Active external provider risk management for minimization of supply risks
- Detailed external provider's selection and qualification, with focus on obsolescence management of delivered products
- Establish consideration "obsolescence management ability" of potential external providers, in selection or annual audit process (if applicable) with regards to the delivered products
- Continuous availability evaluation of the standard assortment
- Establish an observation process for critical parts concerning general availability and especially towards their end of life
- Plan system (mid-life) upgrades for vehicles and sub-systems
- Dual sourcing
- Buying a strategic stock to be stored in conditioned warehouse if necessary

5.3.3. Reactive obsolescence management activities (if all preventive approaches failed)

As product life cycles of elements, components and assembled modules may vary and product innovations cycles develop differently in certain technologies, reactive obsolescence will always be part of every day's problem solving competences, for both external providers and customers. This situation can occur if the products original developer has gone out of business or a competitor has bought him out.

A solution must be developed individually and can be based on one of the following modules:

- Last time buy (done by external provider or customer)
- Last time buy to cover a certain time – range, while technical replacement processes or development processes are ongoing.
- Find component replacement
- Authorize broker purchase (component dealer)
- Upgrade of stored components
- Refurbishment
- Additive techniques as 3D-Printing
- Product repair
- Re-Design etc.

5.3.4. Prevention and risk mitigation in sales

In sales, following activities may be done for risk mitigation:

- The frame contracts and respectively projects have a clause to the delivery commitment of components
- A clause in the general terms and conditions about obsolescence exists (concerning manufacturing, maintenance, spares etc.)
- Project engineering takes place by using a standard assortment and suitable assortment classifications

5.3.5. Other types of preventive management

- Tooling management (e.g. keeping forging tools for further spare part productions to avoid high cost for rebuilding these tools)
- Shelf life management (e.g. keep tooling or equipment for production of spare parts that are commonly reordered by customers)

5.4. Execution

All activities related to obsolescence are to be realized as early as possible within the product life cycle to minimize potential risks.

Based on risk management process as described in IEC 62198, the steps of risk assessment may be listed as follows:

- Identify the stage of product life cycle, product type and constitution, life expectancy
- Analyse potential risk of affected products and customers as well as statutory requirements
- Evaluate potential risk and related impact, costs and likelihood of obsolescence
- Re-develop follow-up products in case of technical and functional obsolescence by applying adequate processes such as ISO/TS 22163 chapters 8.3 and 8.5
- Control and mitigate potential risk derived from obsolete products in a proactive or reactive way
- Monitor and review potential risk of obsolete parts and act accordingly
- Network with other relevant interested parties to share information on potential obsolescence and applied solutions

5.5.   Review of the process management

To assure a proper execution of the obsolescence management it is key to have a regular communication to the customers about obsolete items. It can also be considered to actively communicate with external providers who are planning to step out of the rail business regarding the transfer of tooling, data, technical documents etc.

Additionally, it must be assured that the obsolescence management process is covered in the audit program of the internal audits.

6. Bibliography

IEC 62402:2019   Obsolescence management