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IREDES General Data Types and Commonly Used Objects

Version 1.2

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1 Introduction and Purpose

This document describes the use of „Commonly used Objects“ in the IREDES standard. It is assumed that the reader is familiar with the IREDES architecture and principles discussed in the document „IRArchit.pdf“.

This document is an additional textual documentation to all generic data elements used in multiple profiles throughout the standard (Commonly Used Objects - CuO). It supplements the corresponding xml schema files.

In case of ambiguities, the standard's XML schema documents supercede all other information as they are the normative basis.

2 Document history

2002-10	V0.96	Initial preparation of CuO document
2003-11	V1.0	First release
2004-12	V1.2	Layout changes and minor changes in text

3 Referenced Standards

ISO 8859-1: 1987, Part 1: Latin Alphabet No 1

[XML Schema Part 0: Primer](http://www.w3.org/TR/xmlschema-0/): <http://www.w3.org/TR/xmlschema-0/>

[XML Schema Part 1: Structures](http://www.w3.org/TR/xmlschema-1/): <http://www.w3.org/TR/xmlschema-1/>

[XML Schema Part 2: Datatypes](http://www.w3.org/TR/xmlschema-2/): <http://www.w3.org/TR/xmlschema-2/>

[XML Base](http://www.w3.org/TR/xmlbase/): <http://www.w3.org/TR/xmlbase/>

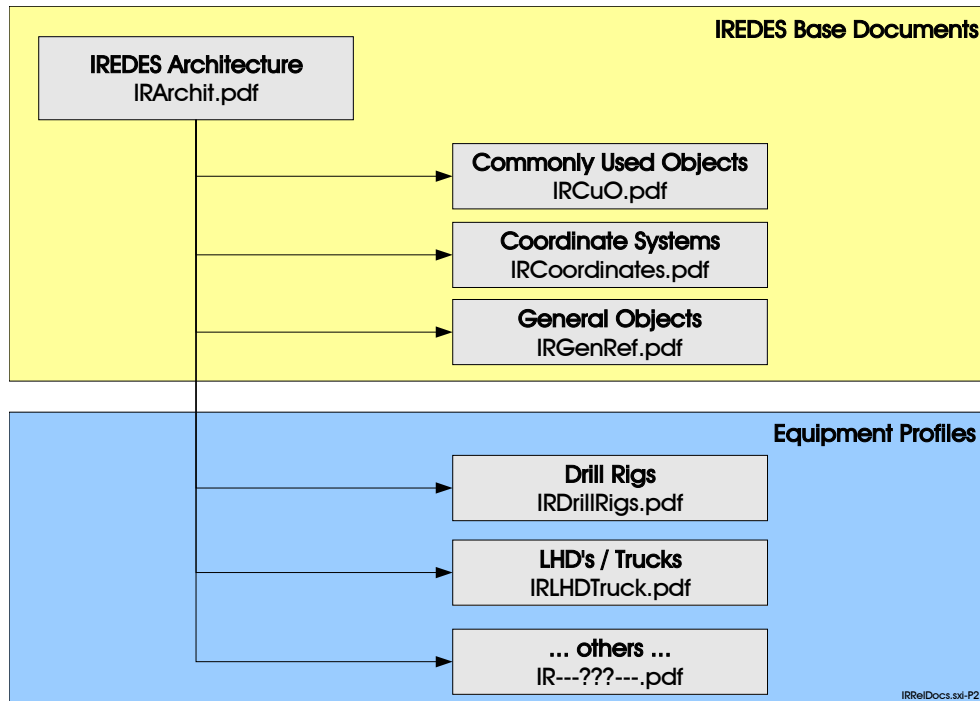
[Extensible Markup Language \(XML\) 1.0](http://www.w3.org/TR/2000/REC-xml-20001006): <http://www.w3.org/TR/2000/REC-xml-20001006>

[XML Namespaces](http://www.w3.org/TR/REC-xml-names): <http://www.w3.org/TR/REC-xml-names>

[RFC1321](http://www.faqs.org/rfcs/rfc1321.html): <http://www.faqs.org/rfcs/rfc1321.html>

4 Related Documents

This document is a part of a set of documents describing the different parts of the IREDES standard:



The uppermost document is the IREDES Architecture description explaining the general setup and collaboration of the different parts of the standard. The „IREDES Architecture“ document will be the best choice to start with as it gives an overview and basic information needed to understand the structure of IREDES.

Detail information about single parts of the IREDES standard are available from separate documents. Readers of these documents should be familiar with XML, XML schemas and implementation relevant issues.

Standard definitions used in common throughout multiple equipment profiles are covered by the corresponding documentation of the „General Objects“ (Application Profiles, General Data Types etc) and „Commonly used Objects“ (CuO's).

All standard information concerning a particular equipment type (Drill Rigs, LHD's,...) is contained in a separate document related to the equipment profile.

Beside the textual descriptions, the entire standard is available as xml schemas as they contain the formal description of the standard. In case of ambiguities, the definitions in the xml schema override all definitions made in the accompanying textual documentation. Textual description available for different IREDES profiles is additional information mainly containing parts of the standards not defineable in xml schemas. Implementors should take care of these documents as they may contain important information which must be defined basing on „mutual agreement“ to make the standard work.

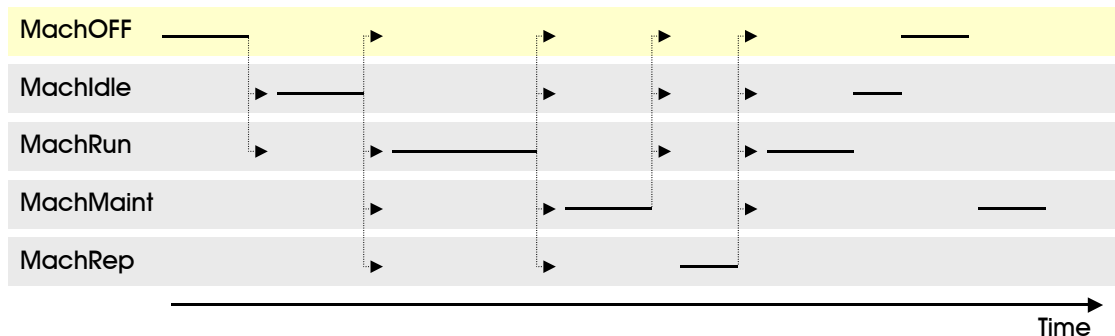
5 Operation Time Reporting

To make operation and performance of machinery comparable, a common understanding, definition and reporting of all operation relevant timing is required.

5.1 Generic Time Reporting

IREDES distinguishes between machine type independent times and machine type specific times to be used throughout the standard. For machine type independent, generic, timing, a sub-element of the generic performance reporting object „IRp-PerfGenType“ is used. This element is called OpPerfLog.

All generic time reporting bases on generic machine operation modes to be reported separately. It is set up as described in the following state / transition diagram:



IREDES generic machine states

In this chart, the horizontal lines represent the time a machine spent in the particular mode. All time reporting starts at the absolute time given in the tag IRpPerfGenType:StartLogTime.

MachOff: The machine is in OFF state, the machine is intentionally unused. This duration is not reported explicitly as it can be calculated by the absolute time elapsed since StartLogTime minus the sum of all other durations reported in the following tags.

MachIdle: The machine is ready to start. All external preconditions (supplies,...) are fulfilled to start the machine at any time. All machine internal systems are ready to run. This state may also be called as „Standby mode“.

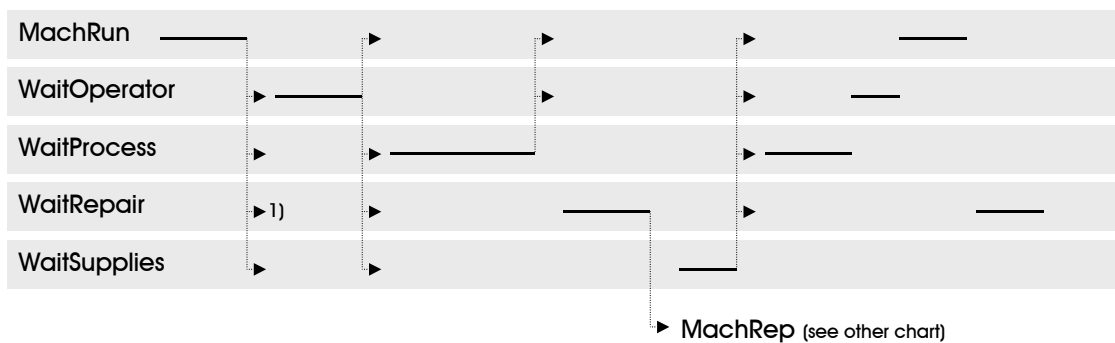
MachRun: Machine is running. This tag is the sum of machine type specific detailed reporting periods (see below!).

MachMaint All time a machine spent in preventive, pre planned maintenance mode. This concerns regular service and preventive maintenance which IS NOT CAUSED by a previous machine stop or error.

MachRep The duration a machine was subject to repair due to an unplanned stop or breakdown during operation. MachRep starts to count as soon as the

maintenance staff arrives at the machine. (Please note that waiting time is covered in separate tags!)

To complete these states there are waiting times required especially during transition between the single states and during operation. These waiting times are reported separately to enable the machine user to optimize processes:



IREDES Waiting time reporting

In this chart, the parameters are used as follows:

MachRun (see above)

WaitOperator The machine is waiting for operator assistance: Taking over manual operation, to acknowledge a stop on error or similar situation. Any time the machine is (automatically) stopped and waits for human assistance to continue operation is accumulated in this parameter.

WaitProcess All time elapsed while the machine is waiting for other equipment or preconditions in the process chain: E.g. an LHD waiting for entry into a drift shared with other LHD's, an LHD waiting for a dump shaft or a truck to become available etc.

WaitRepair All time elapsed between the service organization is noticed of a breakdown and the service staff arriving at the machine.

Please note:

If the service organization is informed via the operator, the time between the machine stop and operator acknowledgement is counted as „WaitOperator“. From the acknowledgement until the service staff arrives, it will be counted as „WaitRepair“.

If the service organization (for this particular error) is informed automatically by the machine (e.g. via network based messaging) all time from message issuing until start of repair will be counted as „WaitRepair“.

WaitSupplies All time elapsed while the machine was waiting for external supplies required for continueing operation: Electrical Power, Water, Fuel, Electronic communication links,...

It is important that a machine following these reporting rules has only one single machine operation state at one time. Mode - overlapping reporting (time is accounted for more than one single parameter) is not allowed.

As these are the generic operation modes, machine type specific modes are to be added. However, all these machine specific modes are sub-modes to the „MachOper“ tag. Consequently, the sum of all machine specific values has to be equal to the value reported as „MachOper“.

5.2 Adding machine specific reporting

In addition to the generic operation modes, machine type specific reporting (e.g. for every single boom of a drill rig) is added. However, all machine specific modes are sub-modes to the „MachRun“ tag. So there are two possibilities to generate the MachRun tag value:

1. Runtime of central aggregates

As soon as the main power supply for a central aggregate of the machine is running, the machine is to be regarded as „running“. This time is reported as „MachRun“.

This is the preferred reporting method.

2. Calculation from sub-aggregates

If the previous method is not applicable, e.g. as the machine consists of independently supplied sub-aggregates, the time reported as „MachRun“ will be counted if at least one single sub-aggregate is running. If multiple sub-aggregates are running simultaneously, the counted time is NOT factorized. Only the really elapsed time is counted as „MachRun“

All machine specific reporting is to be defined in the corresponding equipment profiles.

5.3 General Procedure of Time Reporting

All reporting starts at the absolute time given in the tag **StartLogTime**.

All reporting ends at the absolute time given in the tag **EndLogTime**.

As StartLogTime not necessarily is identical with the start of a reporting period, the user may choose between two methods of using time reporting in IREDES:

1. Accumulative Reporting

Regardless of the number of reports generated since the reporting started, any single value is an accumulated time a machine spent in the corresponding mode since StartLogTime. Thereby it is possible to permanently get total times reported since a project started, if StartLogTime was only reset once upon project start.

In every single report, the times are added to the previously reported values and the new totals are reported when the report is generated.

If this method is used for reporting, the machine supplier has to assure a continuous handling of all accumulated values even in case of memory loss or spare part exchange!

2. Relative Reporting

By resetting StartLogTime any time when a new reporting period is started, relative reporting may be achieved. All reported time values are reset to zero when the report starts. When the report is generated, all values cover the elapsed time spent in the corresponding mode since the reporting period (which in this case is identical to StartLogTime) started.

Machine manufacturers are recommended to provide both automatic and manual functionality in their automation systems to allow both ways of time reporting.

For post processing of reporting data stored in databases it is crucial to decide for one single mode to be used exclusively for all machines throughout a project or company. Otherwise the advantage of getting standardized information exchange may be lost due to different content residing in identical database fields!