

# MIS ICS

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MIS WG

## Abstract

This CIP4 JDF Interoperability Conformance Specification (ICS) defines the interoperability requirements related to the communication between MIS and production equipment. It describes requirements that are generic for all stages of the production process (pre-press, press and post-press). It focuses on the main JDF structure and the way Workers communicate status information back to the MIS.



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# 1 Introduction

The MIS plays a central role in a MIS-managed print shop. The MIS normally is the conduit between the print shop’s customers and the print shop’s production facilities (and sub-contractors). As a result, an MIS supports two major interfaces:

- One with the print shop’s customers – primarily JDF Product Intent and specified in a separate *Product Description ICS*
- Another with the print shop’s production facilities – primarily JDF Process definitions. and specified in the *[MIS-ICS]* (**this document**)

JDF plays a major role in both interfaces.

**Note:** in this document, terms identified with ***bold-italics*** are defined in the [Base-ICS] if their definition does not appear immediately in this document.

Using [Base-ICS] terminology, the [MIS-ICS] specifies the generic parts of the ***Manager Interface*** (in an MIS) when it communicates with the ***Worker Interface*** (in production Workflow Components, such as Controllers and Devices). It also specifies the corresponding generic parts of the ***Worker Interface*** (in a Controller or Device) when it communicates with a ***Manager Interface*** (in an MIS).

This ICS includes:

- Specifications of JDF Elements that are not specific to either Prepress, Press or Postpress,
- AuditPool Elements for Job costing and
- Specifications JMF Messages used for *JobPartID* synchronization, Job Tracking and Device utilization statistics.

Definitions that are specific to either Prepress, Press and Postpress are described in separate domain ICS documents.

This ICS describes the data flow in a print shop in a MIS-managed environment. However, this data flow does not necessarily also apply to non-MIS-managed environments.

# 2 Glossary

This section defines terminology used throughout this document. References to other documents are indicated with square brackets, e.g. [JDF1.3]. For most terms, see the Terminology section in [JDF1.3] and [Base-ICS].

This section contains MIS-related terms that pertain to this ICS:

**Table 1: Glossary**

Term	Definition
<b><i>Gray Box</i></b>	<p>A <b><i>Gray Box</i></b> specifies a loose combination of several Processes with a specific goal. A <b><i>Gray Box</i></b> does not specify all Processes or all Resources – except for Output Resources.</p> <p>When an <b><i>MIS</i></b> (acting as a Manager) uses <b><i>Gray Boxes</i></b>, its specifies only the Processes and Resources that are of real interest to the <b><i>MIS</i></b>, that is, everything it needs to track the produced Output Resources. When a Worker receives a <b><i>Gray Box</i></b>, it fills in the details. See [JDF 1.3] 3.2.2.1 for more details.</p> <p>For more details, see:</p> <ul style="list-style-type: none"> <li>• Section 3.2.2.1 "Use of the Types Attribute in Process Group Nodes" of [JDF1.3].</li> <li>• The <b><i>Types</i></b> Attribute in table 3-4 "Contents of a JDF Node" of [JDF1.3].</li> </ul>

### 3 Conformance Levels

This ICS specifies three *Conformance Levels* of Conformance Requirements. These levels differ mainly in the type of communication between the *Manager* (in the *MIS*) and the *Worker* (in the Controller or Device).

See Appendix A “How to Read ICS Documents” in [Base-ICS] for an explanation of Conformance Tables.

To be conformant to a level of this ICS specified in the first column of Table 2, an *MIS* MUST conform to the Manager part and a Controller or Device MUST conform to the Worker part of the ICSs and levels specified in Table 2 below.

**Table 2: Conformance Levels**

Level of this ICS	[Base-ICS]	[JMF-ICS]	[MIS-ICS]	Description
1	2	-	-	This combination of ICS levels includes: <ul style="list-style-type: none"> <li>Job Submission using a Hot Folder.</li> </ul>
2	2	1	1	This combination of ICS levels includes: <ul style="list-style-type: none"> <li>All the functionality of the previous combination of ICS levels;</li> <li>Status reporting using JMF Signals using Query with Subscription in the NodeInfo/JMF;</li> <li><i>JobPartID</i> synchronization with NewJDF Query with Subscription using NodeInfo/JMF;</li> <li>Costing using the AuditPool in the JDF returned to the MIS using a Hot Folder.</li> </ul> This combination of levels does not require the Worker to implement a HTTP server.
		2	1	This combination of ICS levels includes: <ul style="list-style-type: none"> <li>All the functionality of the previous combination of ICS levels;</li> <li>Job Submission using the JMF SubmitQueueEntry Message;</li> <li>Returning the JDF to the MIS using the JMF ReturnQueueEntry Message;</li> <li>Creating persistent channels using Query with Subscription using separate JMF Messages;</li> <li>Other JMF Messages required by JMF level 2.</li> </ul> This combination of levels does require the Worker to implement a HTTP server.
3	2	2	2	This combination of ICS levels includes: <ul style="list-style-type: none"> <li>All the functionality of the previous combination of ICS levels;</li> <li>Costing using Snapshots in JMF Status Signal Messages;</li> <li>NewJDF Queries without Subscription Elements using separate JMF Messages;</li> <li><i>JobPartID</i> synchronization using a NewJDF Query in a separate JMF Message;</li> <li>Registration Messages for Resource Command Messages.</li> </ul>

## 4 Conformance Tables – JDF Instances

This ICS specifies the JDF Elements that are not specific to either prepress, press or postpress. These Elements include the JDF Root Node and a number of Elements close to the root. The ICS also includes guidelines (rules) on the use of certain Attributes in these and other Elements.

### 4.1 JDF Node

This section specifies conformance requirements for a JDF Instance. When Manager (in a MIS) submits a JDF Instance to a Worker (in a Controller or Device), all JDF Nodes contained within this JDF Instance MUST conform to these conformance requirements. When a Worker returns a JDF Instance to a Manager, all JDF Nodes contained within this JDF Instance MUST conform to these conformance requirements.

If the JDF Node is a *Gray Boxes* it MUST NOT be spawned by Partition. See [JDF 1.3] 4.4.3.

For more details, see Section 8 “Conformance Rules – Job Submission”.

Table 3 specifies the Attributes and Elements for a JDF Node, whether it is a Root Node or a Subnode. Some Attributes and Elements are specified only for a Root Node and are so noted in the first line of the Description.

**Table 3: JDF Node**  
**Root Node of:** JDF Instance  
**Referenced by:** JDF Node, JobPhase

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>Activation</i>			r?			w←	MUST be set if the JDF Instance is a snapshot in a JobPhase.
<i>Informative</i>			r			w←	MUST be set to " <i>Informative</i> " if the JDF Instance is a snapshot in a JobPhase.
<i>Category</i>	w←			r?			When the Node is a <i>Gray Box</i> defined by an ICS, the Manager MUST supply <i>Category</i> with the following syntax. <ICSShortName>.<rest of Gray Box name>  For example, the [MISPRE] defines the <i>Gray Box</i> name: " <i>MISPRE.PrePressPreparation</i> ".  The Manager MAY supply <i>Category</i> for any other Node type.
<i>all values</i>	w←			r?			
<i>ICSVersions</i>	w←			r?			MUST appear in the Root Node and MAY appear in Subnodes.  For example " <i>Base_L1-1.3 MIS_L1-1.3</i> ".
<i>MIS_L1-1.3</i>	w			r?			Specifies that the JDF Instance conforms to [MIS-ICS] level 1.
<i>MIS_L2-1.3</i>		w		r?			Specifies that the JDF Instance conforms to [MIS-ICS] level 2.
<i>MIS_L3-1.3</i>			w	r?			Specifies that the JDF Instance conforms to



Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
							[MIS-ICS] level 3.
<i>ProjectID</i>	w?			r?			MUST NOT be specified in Subnodes. An ID assigned by the <b>MIS</b> for grouping multiple Jobs into one "Customer Order".
<i>RelatedJobID</i>	w←			r?			MUST be present if <i>RelatedJobPartID</i> is present. MUST be present if the Node parameters are the same as the Node parameters of the <i>RelatedJobID</i> .
<i>RelatedJobPartID</i>	w?			r?			MAY be present if the Node parameters are the same as the Node parameters of the <i>RelatedJobPartID</i> .
<i>Type</i>	w			r			Worker conformance is further defined in domain ICSs.
<i>Product</i>	w←			r?			Specifies that this Node describes a final or Partial Product and it MAY have nested JDF Subnodes.
<i>ProcessGroup</i>	w←			r?			Specifies that this Node describes multiple Processes and that it may take several Devices to process them, possibly with spawning.
<i>Combined</i>	w←			r?			Specifies that this Node describes multiple Processes (specified by the <i>Types</i> Attribute).
<Process Name>	w←			r?			Specifies that this Node describes a single Process (specified by the value of this Attribute).
<i>Types</i>	w←			r?			MUST be specified if @Type="Combined".
<i>all values</i>	w?			r?			The Product-Sector ICSs specify particular values.
Comment	w?			r?			The Manager MAY supply one or more Comment Elements with information for the Worker. See Table 4: Comment – Manager Created.
Comment	r?			w?			The Worker MAY supply one or more additional Comment Elements with information for the Manager. See Table 5: Comment – Worker Created.
AuditPool	w r?	wr		r? w			<b>r-Test:</b> Manager MUST record actual processing time retrieved from PhaseTime Elements against the Job. See Table 7: List of Audit Elements and see [Base-ICS].
JDF	w?			r			Child JDF Nodes. <b>r-Test:</b> Worker MUST be able to read and process child Nodes.

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
							See Table 3: JDF Node.
ResourcePool	w←			r			The Product-Sector ICSs specify particular <b>Resource</b> children of this Element. See Table 6: List of Resources.

## 4.2 Comment – Manager Created

Table 4: Comment – Manager Created

Referenced by: JDF Node

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>AgentName</i>	w			r?			
<i>AgentVersion</i>	w			r?			
<i>Name</i>	w			r			<b>r-Test:</b> Worker MUST read and display the content of the Comment, if it has a graphical display.
<i>JobDescription</i>	w←			r?			For a comment that describes the overall Job. It MUST only be in JDF Root Node or in the AncestorPool/Ancestor of a spawned Job.
<i>Description</i>	w←			r?			For a comment that describes the Node. It MUST only be in JDF Subnodes.
<i>Instruction</i>	w←			r?			For instructions to the operator. It MUST only be JDF Nodes that are a Process Group Nodes (e.g. <i>Gray Box</i> ), Combined Process Nodes and Process Nodes.
<i>&lt;content of Element&gt;</i>	w			r←			The Worker MUST retain any white space and new line characters in the content of the Element when rendering it. Worker MUST read and display comment if it has a graphical display.

### 4.3 Comment – Worker Created

**Table 5: Comment – Worker Created**  
**Referenced by:** JDF Node, PhaseTime

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>AgentName</i>	w			r?			
<i>AgentVersion</i>	w			r?			
<i>Name</i>	r			w			<b>r-Test:</b> Manager MUST store the Comment in its database and allow retrieval and display via the user interface.
<i>OperatorText</i>	r			w←			For comments created by the operator to be placed in the JDF Root Node or Subnode that is returned to the <i>MIS</i> .
<content of Element>	r			w			The Manager MUST retain any white space and new line characters in the content of the Element when rendering it.

### 4.4 List of Resources

**Table 6: List of Resources**

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<b>CustomerInfo</b>	w←			r?			The Root Node MUST have a <b>CustomerInfo</b> Resource linked as an Input. Other Nodes in the same JDF Instance MAY link to the same <b>CustomerInfo</b> Resource but MUST NOT link to a different <b>CustomerInfo</b> Resource. See Table 19: CustomerInfo.
<b>NodeInfo</b>	w← r			r w←			The Root Node MUST have a <b>NodeInfo</b> Resource linked as an Input. Other Nodes MAY be required to have a <b>NodeInfo</b> Resource linked as an Input. See Table 24: NodeInfo.
<b>Component</b>	w?			r?			Conformance is further defined in domain ICSs. See Table 17: Component.
<b>ConsumableResource</b>	w?			r?			Conformance is further defined in domain ICSs. See Table 12: Abstract Consumable Resource.

## 4.5 List of Audit Elements

When a Worker returns a JDF Instance to its Manager, the Worker MUST return the same JDF Instance that it received from the Manager except for certain parts of the JDF Instance that a Worker MAY modify. In particular, the Worker MUST add information into the AuditPOOL of the Process Node that was executed.

For more details, see Section 10 “Conformance Rules – Job Completion”.

**Table 7: List of Audit Elements**

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
ProcessRun	r?			w			MUST be supplied once, as the last Audit Element relating to each execution of the Node, i.e. just before a ReturnQueueEntry Message is sent for the Node. See Table 8: ProcessRun.
PhaseTime		r			w		See Table 9: PhaseTime.
ResourceAudit		r			w←		The domain ICS for the Worker specifies the types of Consumable Resources for which consumption MUST be reported and therefore requires this Element to be written. See Table 11: ResourceAudit.

### 4.5.1 ProcessRun

**Table 8: ProcessRun**

Referenced by: List of Audit Elements

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>Duration</i>	r?			w			
<i>End</i>	r?			w			
<i>EndStatus</i>	r?			w			
<i>all values</i>	r?			w←			
<i>Start</i>	r?			w			
<i>Part</i>	r?			w←			If this Audit Element doesn't describe all parts of a Process, then the Worker MUST supply this PART Element and it MUST specify the parts of a Process that this Audit Element belongs to. See [JDF1.3].

### 4.5.2 PhaseTime

The following paragraphs discuss overlapping PhaseTime Elements versus overlapping ModulePhase Elements.

The errata to [JDF 1.3] has made it possible to write Audit Elements for Devices with Modules in two ways:

- with overlapping PhaseTime Elements (the post-errata method) and
- with overlapping ModulePhase Elements (the pre-errata method).

The PhaseTime Elements MAY only overlap if they contain one or more non-identical ModulePhase Elements that do not contain @DeviceStatus, @Start and @End. In this configuration the ModulePhase Elements indicate which modules were used during the entire PhaseTime. Status and duration of the phase and all modules contained is indicated by the respective Attributes of the PhaseTime.

The PhaseTime Elements MUST NOT overlap if they contain one or more ModulePhase Elements that each contain @DeviceStatus, @Start and @End. If one ModulePhase Element contains @DeviceStatus, @Start and @End then all ModulePhase Elements MUST contain @DeviceStatus, @Start and @End. In this configuration status and duration of the use of each module is indicated by @DeviceStatus, @Start and @End on each ModulePhase (and MAY overlap). Status and duration for the PhaseTime is to be calculated from the Attribute Values of the ModulePhase Elements. In this configuration PhaseTime/@Start MUST match at least one ModulePhase/@Start and PhaseTime/@End MUST match at least one ModulePhase/@End.

The configuration with overlapping PhaseTime Elements (the post-errata method) SHOULD be used when writing Audit Elements for Devices with Modules.

**Table 9: PhaseTime**  
**Referenced by:** List of Audit Elements

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>End</i>		r			w		<b>r-Test:</b> The Manager MUST create Job costing based on the PhaseTime Elements, calculating the duration specified by @Start and @End.
<i>ID</i>		r			w		Any Audit written by a Worker MUST have an <i>ID</i> Attribute whose value MUST be unique within the context of all Audit Elements in all JDF Instances that have the same <i>JobID</i> in the print shop's workflow.  <b>r-Test:</b> Manager MUST NOT create costing data from the same Audit more than once.
<i>refID</i>		r			w←		Once an Audit is written, it MUST NOT be modified. The only exception to this is that a Worker may "close" an "open" PhaseTime Audit Element by writing the <i>End</i> Attribute. If the Worker determines that a previously written Audit is incorrect, it MUST write another Audit with the correct data, and specify the incorrect Audit Element's <i>ID</i> value in this <i>refID</i> Attribute.  <b>r-Test:</b> Manager MUST update any costing data originally created by the Audit referenced by <i>refID</i> with the data in the Audit that references

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
							the original Audit.
Start		r			w		<b>r-Test:</b> See @End.
Status		r			w		<b>r-Test:</b> The Manager MUST show actual duration for the sum of all values of @Status or for individual values of @Status. The duration for @Status="Suspended" MUST be excluded from the costing. The duration for @Status="Stopped" MAY be excluded from the costing.  For values, see Table 46: JobPhase/@Status and PhaseTime/@Status.
Comment		r?			w?		See Table 5: Comment – Worker Created.
Device		r			w?		See Table 20: Device.
Employee		r?			w?		See Table 22: Employee – Operator.
MISDetails		r			w←		MUST be written is known to the Worker, either via the <b>NodeInfo</b> or by operator input.  See Table 23: MISDetails.
ModulePhase		r?			w?		See Table 10: ModulePhase.
Part		r?			w←		If this Audit Element doesn't describe all parts of a Process, then the Worker MUST supply this Part Element and it MUST specify the parts of a Process that this Audit Element belongs to.  See [JDF1.3].
ResourceLink (Output)		r?			w?		This ResourceLink is a copy of the ResourceLink that references the Resources that were produced during the execution of this PhaseTime.  Resource production SHOULD be recorded using ResourceAudit Elements. See Table 11: ResourceAudit.  See Table 13 (as Abstract ResourceLink) and see [Base-ICS].
ResourceLink (Input)		r?			w?		This ResourceLink is a copy of the ResourceLink that references the Resources that were consumed during the execution of this PhaseTime.  Resource consumption MUST be recorded using ResourceAudit Elements. See Table 11: ResourceAudit.  See Table 13 (as Abstract ResourceLink).

### 4.5.3 ModulePhase

See text above Table 9: PhaseTime for a discussion about overlapping PhaseTime Elements versus overlapping ModulePhase Elements.

**Table 10: ModulePhase**  
**Referenced by:** PhaseTime

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>DeviceStatus</i>		r?			w←		See [JDF1.3] Errata where this Attribute has been made optional.  MUST be written when Audit Elements are written with non-overlapping PhaseTime Elements. MUST NOT be written if Audit Elements are written with overlapping PhaseTime Elements.  PhaseTime Elements MUST NOT overlap if they do not contain ModulePhase Elements.  See discussion above in Table 9: PhaseTime.
<i>End</i>		r			w←		See @DeviceStatus.
<i>Start</i>		r			w←		See @DeviceStatus.

### 4.5.4 ResourceAudit

ResourceAudit Elements MUST be written for consumption of a **Resource** by the Worker.

**Table 11: ResourceAudit**  
**Referenced by:** List of Audit Elements

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>ID</i>		r			w		Any Audit written by a Worker MUST have an <i>ID</i> Attribute whose value MUST be unique within the context of all Audit Elements in all JDF Instances that have the same <i>JobID</i> in the print shop's workflow.  <b>r-Test:</b> Manager MUST NOT create costing data from the same Audit more than once.
<i>refID</i>		r			w←		Once an Audit is written, it MUST NOT be modified. The only exception to this is that a Worker may "close" an "open" PhaseTime Audit Element by writing the <i>End</i> Attribute. If the Worker determines that a previously written Audit is incorrect, it MUST write another Audit with the correct data, and specify the incorrect Audit Element's <i>ID</i> value in this <i>refID</i>

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
							Attribute. <b>r-Test:</b> Manager MUST update any costing data originally created by the Audit referenced by <i>refID</i> with the data in the Audit that references the original Audit.
<i>NodeStatus</i>		r?			w?		<b>Note:</b> This Attribute was added to this Element in the [JDF1.3Errata].
<i>Reason</i>		r			w?		<b>r-Test:</b> The Manager MUST NOT create costing entries for ResourceAudit Elements with @Reason="PlanChange".
<i>ProcessResult</i>		r			w		
<i>all remaining values</i>		r			w←		
Part		r?			w←		MUST be supplied if a Part was executed. <b>Note:</b> This Part Subelement was added to this Element in the [JDF1.3Errata]. See [JDF1.3].
ResourceLink		r			w		This ResourceLink is a copy of the ResourceLink that references a <b>Resource</b> that was consumed or modified during the execution of the Node.  See Table 13 (as Abstract ResourceLink) and see [Base-ICS].

## 5 Conformance Tables – Abstract Resources

### 5.1 Abstract Consumable Resource

Table 12: Abstract Consumable Resource  
Referenced by: List of Resources

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>DescriptiveName</i>	w			r←			<b>r-Test:</b> If the Worker identifies this Consumable Resource to the operator, the Worker MUST display this value.
<i>LotControl</i>			w?			r←	Domain ICS documents specify for which type of Resource lot control is required.  <b>r-Test:</b> If @LotControl="Controlled", the appropriate Lot Elements MUST be included in the returned JDF Instance and JMF Messages.



Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>Controlled</i>			w←			r	Lots are controlled.
<i>NotControlled</i>			w←			r?	
<i>ProductID</i>	w←			r			MUST be supplied if known by the MIS. <b>r-Test:</b> If the Manager supplies this Attribute and the Worker identifies this Consumable Resource to the operator, the Worker MUST include this value in the display.

## 5.2 Abstract ResourceLink and ResourceLink/AmountPool/PartAmount

**Table 13: Abstract ResourceLink and ResourceLink/AmountPool/PartAmount**

**Referenced by:** PhaseTime (for Abstract ResourceLink), ResourceAudit (for Abstract ResourceLink), AmountPool (for ResourceLink/AmountPool/PartAmount)

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>ActualAmount</i>		r			w		The Amount of the Resource that was produced or consumed during this PhaseTime. MUST NOT be written if AmountPool exists. <b>r-Test:</b> The Manager MUST create costing entries for quantity specified in this Attribute.
Lot			r			w←	MUST be specified if Resource is lot controlled. MUST NOT be written if AmountPool exists. <b>r-Test:</b> The Manager must create costing entries based on the specified LOT. See Table 15: Lot.
AmountPool		r?			w←		MUST NOT be specified in PartAmount. See Table 14: AmountPool (from Abstract ResourceLink).

## 5.2.1 AmountPool

**Table 14: AmountPool**

Referenced by: Abstract ResourceLink

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
PartAmount		r			w		See Table 13 (as ResourceLink/AmountPool/PartAmount).

## 5.2.2 Lot

**Table 15: Lot**

Referenced by: Abstract ResourceLink and ResourceLink/AmountPool/PartAmount

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
ActualAmount			r			w	<b>r-Test:</b> see @ActualAmount in Table 13.
LotID			r			w	<b>r-Test:</b> The Manager must create costing entries based on the specified LOT.
Consumption			r?			w	
Full			r?			w←	
Partial			r?			w←	

# 6 Conformance Tables – Resources

## 6.1 Company

**Table 16: Company**

Referenced by: Contact

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
OrganizationName		w			r?		Name of the customer's organization.

## 6.2 Component

Each Product Node's ResourceLinkPool MUST contain at least one output ComponentLink (which, of course, links to a **Component**). To put it more succinctly, each Product Node MUST link to at least one output **Component**. If a root Product Node links to an output **Component**, the **Component** is the Final Product. If

any other Product Node links to an Output **Component**, the **Component** is a Partial Product. Table 17 shows the Conformance Requirements for such Output **Component** Resources.

**Table 17: Component**  
**Referenced by:** List of Resources

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>ComponentType</i>	w			r?			
<i>FinalProduct</i>	w←			r?			MUST be the value of <i>ComponentType</i> for a <b>Component</b> that represents the single finished Product that the customer ordered.
<i>Dimensions</i>	w←			r?			MUST be written if (contains(@ComponentType,"FinalProduct")).
<i>ProductType</i>	w←			r?			The Manager MUST supply this Attribute for a Partial Product so that prepress systems can take special action based on the type of Product.
<i>BackCover</i>	w←			r?			
<i>Body</i>	w←			r?			For non-cover sections of bound Products.
<i>Cover</i>	w←			r?			For covers of bound Products.
<i>FrontCover</i>	w←			r?			
<i>all remaining values</i>	w?			r?			

### 6.3 Contact

**Table 18: Contact**  
**Referenced by:** CustomerInfo

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>ContactTypes</i>	w			r?			
<i>Customer</i>	w			r?			
<i>Administrator</i>	w			r?			
<b>Company</b>	w←			r?			See Table 16: Company.
<b>Person</b>	w			r?			See Table 25: Person.

## 6.4 CustomerInfo

**Table 19: CustomerInfo**  
**Referenced by:** List of Resources

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>CustomerID</i>	w			r?			
<i>CustomerJobName</i>	w←			r?			A specific Job name that is present if the customer provides it.
<i>CustomerOrderID</i>	w←			r?			Enables automated processing of the NewJDF command.
<i>CustomerProjectID</i>	w?			r?			An ID provided by the customer for grouping multiple Jobs into one “Customer Order”.
<b>Contact</b>	w			r?			The contact person for the customer. See Table 18: Contact.

## 6.5 Device

**Table 20: Device**  
**Referenced by:** PhaseTime

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>DeviceID</i>		r			w		<b>r-Test:</b> When costing a Job based on hours, the Manager MUST select the cost rate using the <i>DeviceID</i> .

## 6.6 Employee – CSR

**Table 21: Employee – CSR**  
**Referenced by:** NodeInfo

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>PersonallID</i>	w			r?			
<i>Roles</i>	w			r?			
<i>CSR</i>	w			r?			Customer Service Representative.

## 6.7 Employee – Operator

**Table 22: Employee – Operator**

Referenced by: DeviceInfo, ModuleStatus, PhaseTime

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>PersonalID</i>		r			w		<b>r-Test:</b> The Worker MUST retain the identification of the operator that is specified by @PersonalID.
<i>Roles</i>		r			w		<b>r-Test:</b> The Worker MUST at least retain the identification of the <b>Employee</b> with @Roles="Operator".
<i>Operator</i>		r			w←		
<i>Assistant</i>		r?			w?		<i>Assistant</i> means assistant operator.

## 6.8 MISDetails

**Table 23: MISDetails**

Referenced by: JobPhase, ResourceInfo, PhaseTime

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>CostType</i>		r			w?		<b>r-Test:</b> Manager MUST store the <i>CostType</i> against the actual hours.
<i>all values</i>		r			w←		
<i>DeviceOperationMode</i>		r			w←		The Worker MUST supply this Attribute for an attended Device. The Worker MAY supply it for an unattended Device. <b>r-Test:</b> The Manager MUST only create costing entries with @DeviceOperationMode = "Productive".
<i>all values</i>		r			w←		
<i>WorkType</i>		r			w?		<b>r-Test:</b> Manager MUST store the @WorkType against the actual hours.
<i>all values</i>		r			w←		

## 6.9 NodeInfo

**Table 24: NodeInfo**  
**Referenced by:** List of Resources

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
BusinessInfo	! w			r?			See [JDF1.3].
Employee	w←			r?			MUST appear in the Root Node and MAY appear in Subnodes. The employee is an internal customer service representative. See Table 21: Employee – CSR.
JMF		w←			r		MUST be supplied if level 2 of this ICS is combined with level 1 of the [JMF-ICS]. MAY be supplied if level 2 of this ICS is combined with level 2 of the [JMF-ICS]. <b>r-Test:</b> Worker MUST create persistent channels for the Query Elements contained. See [JDF1.3].

## 6.10 Person

**Table 25: Person**  
**Referenced by:** Contact

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
FamilyName	w←			r?			If the family name is known, it MUST be specified.
FirstName	w←			r?			If the first name is known, it MUST be specified.
DescriptiveName	w			r?			The full name MUST be specified in the <i>DescriptiveName</i> Attribute.

## 7 Conformance Tables – JMF Messages

This ICS describes how JMF Messages are used to:

- Provide information about Device utilization and Job progress.
- Provide information about actual production from a Worker in a production Controller or Device to a Manager in an MIS.
- Synchronize *JobPartID* values.

This ICS describes the conformance requirements for:

- Query Messages with Subscription Element to create a Persistent Channel for Status, Resource and NewJDF.
- Signal Messages for Status, Resource, Notification and NewJDF.

**Note:** the “w?” and “r?” values for Response Messages in Table 26 below emphasize that Query Elements with Subscription are an optional way to activate Signal Messages in Level 2.

For more details, see Section 9 “Conformance Rules – JMF Messages”.

**Table 26: List of JMF Messages**

Message Type	Family	Manager			Worker			Description
		Level →	1	2	3	1	2	
NewJDF	Query		w			r		See Table 27: Query – NewJDF.
NewJDF	Response		r			w		See Table 29: Response – NewJDF.
Notification	Signal		w←			r?		If the Manager can detect the completion of production stages, it MUST send a Signal Message after the completion of each stage. See Table 31: Signal – Notification.
Resource	Query		w			r		See Table 34: Query – Resource.
Resource	Response		r			w		A Response from a Query Message. See the Response table in the [JMF-ICS].
Resource	Registration			w			r	See Table 37: Registration – Resource.
Resource	Response			r			w	A Response from a Registration Message. See the Response table in the [JMF-ICS].
Resource	Signal		r			w		See Table 39: Signal – Resource.
Status	Query		w			r		See Table 41: Query – Status.
Status	Response		r			w		See the Response table in the [JMF-ICS].
Status	Signal		r			w		See Table 43: Signal – Status.

## 7.1 NewJDF

### 7.1.1 Query – NewJDF

**Table 27: Query – NewJDF**

In: List of JMF Messages

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
Type		w			r		

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>NewJDF</i>		w			r		
<i>xsi:type</i>		w			r?		
<i>QueryNewJDF</i>		w			r?		
NewJDFQuParams		w			r		See Table 28: NewJDFQuParams.

### 7.1.1.1 NewJDFQuParams

**Table 28: NewJDFQuParams**  
 Referenced by: Query – NewJDF

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>JobID</i>		w			r		<b>r-Test:</b> Worker MUST respond with information for the JDF Node with this <i>JobID</i> .
<i>JobPartID</i>		w			r		<b>r-Test:</b> Worker MUST respond with information for the JDF Node with this <i>JobPartID</i> .

### 7.1.2 Response – NewJDF Query

**Table 29: Response – NewJDF**  
 In: List of JMF Messages

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>Type</i>		r			w		
<i>NewJDF</i>		r			w		
<i>xsi:type</i>		r?			w		
<i>ResponseNewJDF</i>		r?			w		
IDInfo		r			w		See Table 30: IDInfo.



### 7.1.2.1 IDInfo

**Table 30: IDInfo**  
**Referenced by:** Response – NewJDF

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>JobID</i>		r?			w		The <i>JobID</i> of the JDF Instance containing the new JDF Node.
<i>JobPartID</i>		r?			w		The <i>JobPartID</i> of the new JDF Node.
<i>Type</i>		r?			w		
<i>Types</i>		r?			w←		MUST be written if JDF Node has a Types Attribute.

## 7.2 Notification

### 7.2.1 Signal – Notification

When a Job is completed and delivered to the customer, the various components are able to do housekeeping, archiving and cleanup of the Job’s assets. Because the final completion of the Job can be much later than the completion of the execution of a Process on a Device, all Devices need to be informed of the final completion of the Job when it happens. The *MIS* uses a JMF Signal of *Type* Notification for this purpose. See [JDF] section 5.6.1.1.

The Manager (*MIS*) sends the Notification Signal Message described in this section to all workflow components after the total completion of a Job. The Manager sends these Signal Messages to the Worker without the need for the Worker to subscribe or the Manager being able to accept Query Messages and subscriptions. The *MIS* MUST send the Signal Messages for a Job to all Workers that the *MIS* has submitted the JDF Instance to.

**Table 31: Signal – Notification**  
**In:** List of JMF Messages

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>refID</i>		w←			r?		If a Query causes the creation of a Subscription, the Worker MUST supply the ID of the subscription Query.
<i>Type</i>		w			r		
<i>Notification</i>		w			r		
<i>xsi:type</i>		w			r?		
<i>SignalNotification</i>		w			r?		
Notification		w			r		See Table 32: Notification.

### 7.2.1.1 Notification

**Table 32: Notification**  
**Referenced by:** Signal – Notification

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>Class</i>		W			r		
<i>Event</i>		W←			r		
<i>JobID</i>		W			r		<b>r-Test:</b> Worker MUST apply this notification to the specified <i>JobID</i> .
<i>Type</i>		W			r		
<i>Milestone</i>		W←			r		
Milestone		W←			r		MUST be written if @Type="Milestone". See Table 33: Milestone.

### 7.2.1.2 Milestone

**Table 33: Milestone**  
**Referenced by:** Notification

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>MilestoneType</i>		W			r		<b>r-Test:</b> Worker MUST mark Job as completed.
<i>JobCompletedSuccessfully</i>		W	W←		r		MUST always be the last Milestone for a Job.
<i>PostPressCompleted</i>			W←			r?	
<i>PrePressCompleted</i>			W←			r?	
<i>PressCompleted</i>			W←			r?	
<i>ShippingCompleted</i>			W←			r?	

## 7.3 Resource

### 7.3.1 Query – Resource

If level 2 of this ICS is combined with level 1 of the [JMF-ICS], both the Manager and the Worker MUST Support placing this Message in NodeInfo/JMF. If any level of this ICS is combined with level 2 of the [JMF-ICS], Manager and the Worker MUST Support sending this Message in a separate JMF Message.

**Table 34: Query – Resource**

In: List of JMF Messages

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
Type		w			r		
Resource		w			r		
xsi:type		w			r?		
QueryResource		w			r?		
ResourceQuParams		w			r		See Table 35: ResourceQuParams.
Subscription		w			r		See Table 36: Subscription.

### 7.3.1.1 ResourceQuParams

**Table 35: ResourceQuParams**

Referenced by: Query – Resource

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
Classes		w			r		<b>r-Test:</b> The Worker MUST respond or create a persistent channel. according to the filters as specified in this Element.
Consumable		w←			r←		The Manager requests all Consumable Resources for the Worker's Device. The domain ICS for the Worker specifies the types of Consumable Resources for which consumption MUST be reported.
Handling		w←			r		The Manager requests all Handling Resources from the Worker's Device.
Exact		w?			r		<b>r-Test:</b> If @Exact="false", the Signals MUST NOT include a copy of the Resources. If @Exact="true", the Signals MUST include a complete copy of the Resources that meet the filter.
false		w←			r		
true		w←			r		
JobID		w←			r		If the Query Message is in a <b>NodeInfo</b> , JobID MUST be supplied and the JobID MUST match at least one JobID in this JDF. <b>r-Test:</b> See @Classes.
JobPartID		w?			r		<b>r-Test:</b> See @Classes.
QueueEntryID		w?			r		<b>r-Test:</b> See @Classes.

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>ResourceName</i>		w?			r		<b>r-Test:</b> See @Classes.
<i>ResourceID</i>		w?			r		<b>r-Test:</b> See @Classes.

### 7.3.1.2 Subscription

This Element causes the Worker to create a Persistent Channel and to send Signal Messages to a specified *URL*.

**Table 36: Subscription**

**Referenced by:** Query – Resource, Query – Status

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>RepeatStep</i>		w?			r		For Query about Consumable Resource. <b>r-Test:</b> See [JDF1.3].
<i>RepeatTime</i>		w?			r		For a Status Query. If not supplied for a Status Query, the Worker MUST assume a value less than 10800 seconds (3 hours). <b>r-Test:</b> See [JDF1.3].
<a number > 6000>		w←			r		If JMF/Query[@Type="Status"]/ StatusQuParams/@JobDetails = "Full", the value of 10800 (i.e. 3 hours) is suggested.
<a number ≤ 6000>		w←			r		If JMF/Query[@Type= "Status"]/ StatusQuParams/@JobDetails ="Brief", the value of 600 (i.e. 10 minutes) is suggested.

### 7.3.2 Registration – Resource

If level 2 of this ICS is combined with level 1 of the [JMF-ICS], both the Manager and the Worker MUST Support placing this Message in NodeInfo/JMF. If any level of this ICS is combined with level 2 of the [JMF-ICS], Manager and the Worker MUST Support sending this Message in a separate JMF Message.

**Table 37: Registration – Resource**

**In:** List of JMF Messages

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>Type</i>			w			r	
<i>Resource</i>			w			r	

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>xsi:type</i>			w			r?	
<i>RegistrationResource</i>			w			r?	
ResourceCmdParams			w			r	See Table 38: ResourceCmdParams.
Subscription			w			r	See [JMF-ICS].

### 7.3.2.1 ResourceCmdParams

**Table 38: ResourceCmdParams**  
 Referenced by: Registration – Resource

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>Exact</i>			w?			r	<b>r-Test:</b> See [JDF1.3].
<i>false</i>			w←			r	
<i>true</i>			w←			r	
<i>JobID</i>			w←			r	If the Query Message is in <b>NodeInfo</b> , <i>JobID</i> MUST be supplied and the <i>JobID</i> MUST match at least one <i>JobID</i> in this JDF. <b>r-Test:</b> Worker MUST respond with information for the specified <i>JobID</i> .
<i>JobPartID</i>			w?			r	<b>r-Test:</b> Worker MUST respond with information for the specified <i>JobPartID</i> .
Part			w?			r	<b>r-Test:</b> Worker MUST respond with information for the specified Part. See [JDF1.3].

### 7.3.3 Signal – Resource

**Table 39: Signal – Resource**  
 In: List of JMF Messages

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>refID</i>		r?			w←		If the Subscription is created by a Query, the Worker MUST supply the ID of the subscription Query.
<i>Type</i>		r			w		
<i>Resource</i>		r			w		

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>xsi:type</i>		r?			w		
<i>SignalResource</i>		r?			w		
ResourceInfo		r			w		See Table 40: ResourceInfo.

### 7.3.3.1 ResourceInfo

**Table 40: ResourceInfo**  
**Referenced by:** Signal – Resource

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>ActualAmount</i>		r			w←		The current accumulated amount of the Resource that has been consumed or produced. MUST NOT be specified if AmountPool is present. <b>r-Test:</b> If Manager does costing using Signals, the Manager must record the Resource consumption in its database.
<i>ResourceID</i>		r			w←		The Worker MUST specify either this Attribute or the <b>Resource</b> Element, but not both. <i>ResourceID</i> was added as an erratum to [JDF1.3]. <b>r-Test:</b> The Manager must identify the Resource using the <i>ResourceID</i> .
AmountPool		r			w←		The current accumulated amount of the Resource that has been consumed per Part. MUST be specified if a Part is being executed. <b>r-Test:</b> If Manager does costing using Signals the Manager must record the Resource consumption in its database. See [JDF1.3].
MISDetails		r?			w?		See Table 23: MISDetails.
<b>Resource</b>		r			w←		The Worker MUST specify either this Element or the <i>ResourceID</i> Attribute, but not both. See [JDF1.3].

## 7.4 Status

### 7.4.1 Query – Status

If level 2 of this ICS is combined with level 1 of the [JMF-ICS], both the Manager and the Worker MUST Support placing this Message in NodeInfo/JMF. If any level of this ICS is combined with level 2 of the [JMF-ICS], Manager and the Worker MUST Support sending this Message in a separate JMF Message.

**Table 41: Query – Status**

**In:** List of JMF Messages

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>Type</i>		W			r		
<i>Status</i>		W			r		
<i>xsi:type</i>		W			r?		
<i>QueryStatus</i>		W			r?		
StatusQuParams		W			r		See Table 42: StatusQuParams.
Subscription		W			r		See Table 36: Subscription.

#### 7.4.1.1 StatusQuParams

**Table 42: StatusQuParams**

**Referenced by:** Query – Status

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>DeviceDetails</i>		W			r		<b>r-Test:</b> See [JDF1.3].
<i>None</i>		W←			r		
<i>Brief</i>		W←			r		
<i>Details</i>		W←			r		
<i>Modules</i>		W←			r		
<i>all remaining values</i>		W?			r?		
<i>EmployeeInfo</i>		W←			r?	r	The Product-Sector ICSs can specify stronger requirements. Employee details are essential for <b>MIS</b> . It is therefore highly recommended to include <b>Employee</b> Elements for Devices that have one or more operators.
<i>JobDetails</i>		W			r		<b>r-Test:</b> Worker MUST respond or create a persistent channel with the value supplied.
<i>Brief</i>		W←			r		With parent's Subscription/@RepeatTime > 60 and ≤ 600.

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>Full</i>			w←			r	With parent's Subscription/@RepeatTime > 6000 and ≤ 10800.
<i>JobID</i>		w←			r		If the Query Message is in <b>NodeInfo</b> , <i>JobID</i> MUST be supplied and the <i>JobID</i> MUST match at least one <i>JobID</i> in this JDF. <b>r-Test:</b> Worker MUST respond or create a persistent channel with the value supplied.
<i>JobPartID</i>		w?			r		<b>r-Test:</b> Worker MUST respond or create a persistent channel with the value supplied.
<i>QueueInfo</i>		w?			r		<b>r-Test:</b> The Worker MUST NOT return the Queue.
<i>false</i>		w			r		The Manager MUST NOT request a Queue, because there is no way to restrict the size of the returned Queue.

### 7.4.2 Signal – Status

**Table 43: Signal – Status**

**In:** List of JMF Messages

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>refID</i>		r?			w←		If the Subscription was created by a Query Message, the Worker MUST supply the <i>ID</i> of the subscription Query.
<i>Type</i>		r			w		
<i>Status</i>		r			w		
<i>xsi:type</i>		r?			w		
<i>SignalStatus</i>		r?			w		
<i>DeviceInfo</i>		r			w		See Table 44: DeviceInfo.

#### 7.4.2.1 DeviceInfo

**Table 44: DeviceInfo**

**Referenced by:** Signal – Status

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>DeviceID</i>		r			w		<b>r-Test:</b> Manager must identify Device using the



Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
							<i>DeviceID.</i>
<i>DeviceOperationMode</i>		r			w←		The Worker MUST supply this Attribute for an attended Device. The Worker MAY supply it for an unattended Device.  <b>r-Test:</b> Manager MUST only create costing from Messages with @DeviceOperationMode= "Productive".
<i>all values</i>		r			w←		
<i>DeviceStatus</i>		r			w		<b>r-Test:</b> Manager MUST update the displayed status of this Device.
<i>all values</i>		r			w←		
<i>ProductionCounter</i>		r?			w←		If a Worker's Device produces countable output (e.g. a Press or Folding Machine), the Worker MUST supply this Attribute.
<i>Speed</i>		r?			w←		If a Worker's Device produces countable output (e.g. a Press or Folding Machine), the Worker MUST supply this Attribute.
<i>TotalProductionCounter</i>		r?			w?		Counter since birth of the Machine – probably the best value for calculating interval quantities.  If a Worker's Device produces countable output (e.g. a Press or Folding Machine), the Worker MUST supply this Attribute.
<b>Employee</b>		r			w?	w←	If a Device requires an operator for normal operation, it MUST supply an Employee [contains(@Roles,"Operator")].  For unattended Devices, its Worker MUST NOT supply an <b>Employee</b> Element.  See Table 22: Employee – Operator.
<i>JobPhase</i>		r			w←		The Worker MUST supply one JobPhase Element for each Job on the Device that is Active or whose <i>Status</i> has just become "Completed" or "Aborted".  The Worker MUST NOT supply any JobPhase Elements during a non-productive time (e.g. maintenance or lack of Jobs) except to convey information about Jobs whose <i>Status</i> has just become "Completed", "Aborted" or "Suspended".  See Table 45: JobPhase.

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
ModuleStatus		r?			w?		<p>A Worker MAY supply ModuleStatus Elements to show the status of individual modules of its Device. Example of modules is: printing units of an offset press, or individual Machines for a Device that supports multiple physical Machines.</p> <p>See Table 47: ModuleStatus.</p>

### 7.4.2.2 JobPhase

**Table 45: JobPhase**  
 Referenced by: DeviceInfo

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
Amount		r?			w←		<p>The cumulative amount produced since the JDF Node started executing.</p> <p>If a Worker can distinguish between good and waste, it MUST write the waste amount in <i>Waste</i> and then exclude the waste amount from <i>Amount</i>.</p> <p>If a Worker's Device produces countable output (e.g. a Press or Folding Machine), the Worker MUST supply this Attribute.</p>
JobID		r			w←		<p>The <i>JobID</i> of the Node that is executing.</p> <p><i>JobID</i> MUST be provided if known.</p> <p><b>r-Test:</b> Manager MUST update status of this Job only.</p>
JobPartID		r			w←		<p>The <i>JobPartID</i> of the Node that is executing.</p> <p><i>JobPartID</i> MUST be provided if known.</p> <p><b>r-Test:</b> Manager MUST update status of this Job part only.</p>
PhaseAmount		r?			w?	w←	<p>The Amount produced during this JobPhase.</p> <p>If a Worker can distinguish between good and waste, it MUST write the waste amount in <i>PhaseWaste</i> and then exclude the waste amount from <i>PhaseAmount</i>.</p> <p>If a Worker's Device produces countable output (e.g. a Press or Folding Machine), the Worker MUST supply this Attribute.</p>
PhaseStartTime		r?			w?	w	Start time of this JobPhase.

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>PhaseWaste</i>		r?			w?	w←	<p>The Amount of Waste produced during this JobPhase.</p> <p>If a Worker can distinguish between good and waste, it MUST write the waste amount in <i>PhaseWaste</i> and then exclude the waste amount from <i>PhaseAmount</i>.</p> <p>If a Worker's Device produces countable output (e.g. a Press or Folding Machine), the Worker MUST supply this Attribute.</p>
<i>StartTime</i>		r?			w?	w	The date and time the Node started executing.
<i>Status</i>		r			w		<p><b>r-Test:</b> Manager MUST update displayed status of this JobPhase.</p> <p>For values, see Table 46: JobPhase/@Status and PhaseTime/@Status.</p>
<i>TotalAmount</i>		r?			w?		The Amount to be produced.
<i>Waste</i>		r?			w←		<p>The cumulative amount of waste produced since the Node started executing.</p> <p>If a Worker can distinguish between good and waste, it MUST write the waste amount in <i>Waste</i> and then exclude the waste amount from <i>Amount</i>.</p> <p>If a Worker's Device produces countable output (e.g. a Press or Folding Machine), the Worker MUST supply this Attribute.</p>
JDF			r			w←	<p>MUST be supplied if the StatusQuParams/@JobDetails = "Full".</p> <p>The Worker MUST include the complete JDF Instance that was submitted.</p> <p>The snapshot MUST include updated AuditPool Elements of the JDF Node including this JobPhase/PhaseTime. See 9.2.1.1 <i>Financial Period Costing / Analysis</i>.</p> <p>See Table 3: JDF Node.</p>
<i>MISDetails</i>		r?			w?		See Table 23: MISDetails.
<i>ModuleStatus</i>		r?			w?		<p>A Worker MAY supply ModuleStatus Elements to show the status of individual modules used for this JobPhase.</p> <p>See Table 47: ModuleStatus.</p>
<i>Part</i>		r?			w←		<p>Identification of the Part worked on.</p> <p>If the output Resource of the Process is Partitioned, the Worker MUST supply at least one Part. Each Part MUST have all levels of Partitioning for the JDF Node.</p> <p>The receiving Manager MAY consolidate the information from multiple Partitions into a</p>

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
							single Partition, e.g. it may consolidate the information on a per Separation to a per Sheet. Other ICS's specify the Attributes for the Part Element. See [JDF1.3].

### 7.4.2.3 JobPhase/@Status and PhaseTime/@Status

Table 46: JobPhase/@Status and PhaseTime/@Status

Referenced by: JobPhase, PhaseTime

Name or Value	Manager			Worker			Description
	Level →	1	2	3	1	2	
<i>Setup</i>		r			w←		A Worker MUST supply this value during the setup phase for a Device that has such a phase for each Job.
<i>InProgress</i>		r			w←		
<i>Cleanup</i>		r			w←		A Worker MUST supply this value during the cleanup phase for a Device that has such a phase for each Job.
<i>Stopped</i>		r			w←		
<i>Completed</i>		r			w←		JobPhase/@Status only.
<i>Aborted</i>		r			w←		JobPhase/@Status only.
<i>Suspended</i>		r			w←		
<i>all remaining values</i>		r			w?		.

### 7.4.2.4 ModuleStatus

Here are two options for using Modules. The second option SHOULD be used.

- A Status Signal Message is emitted on the change of status of each module. In this configuration ModulePhase/@DeviceStatus MAY be different from JobPhase/@Status.
- A separate JobPhase is included in the Signal for each combination of synchronized Modules, e.g. one for Ripping and one for Print + Stitch. With this option the ModulePhase/@DeviceStatus is always the same as JobPhase/@Status.

**Table 47: ModuleStatus**  
**Referenced by:** DeviceInfo, JobPhase

Name or Value Level →	Manager			Worker			Description
	1	2	3	1	2	3	
<i>DeviceStatus</i>		r			w		<b>r-Test:</b> Manager MUST update the displayed status of this module.
<i>all values</i>		r			w←		
<i>ModuleID</i>		r			w←		At least one of <i>ModuleID</i> or <i>ModuleIndex</i> MUST be specified. <b>r-Test:</b> Manager MUST update the displayed status of this module.
<i>ModuleIndex</i>		r			w←		Zero-based. At least one of <i>ModuleID</i> or <i>ModuleIndex</i> MUST be specified. <b>r-Test:</b> Manager MUST update the displayed status of this module.
<i>Employee</i>		r?			w?		See Table 22: Employee – Operator.

## 8 Conformance Rules – Job Submission

In the normal case, the *MIS* creates a Print Job and submits it to the production Device. In some cases, a production Device, such as a prepress Device, creates a Print Job. In this case, the customer submits a content file for a Job that the *MIS* has not yet created. In other cases, the Device splits an existing Job into different production Jobs. In these cases where the *MIS* doesn't initially create a Job, the *Device Worker* (the Worker part of a Device – see the Glossary section of [JDF1.3]) MUST ask the *MIS Manager* to create a Job and submit it to the Device Worker.

### 8.1 JDF Instance Structure

JDF Instances consist of Product, Process Group, and Process Nodes. A Product Node describes the Final Product the Customer will receive. The JDF Product Intent Resources define the characteristics of this Final Product.

JDF Product Nodes MUST contain Product Intent Resources. In other words, if the Intent cannot be described or is not available, the Root Node of the JDF Instance MUST be a Process or a Process Group. Product Intent Resources MUST only describe Product characteristics that the Customer supplies. Product Intent Resources MUST describe the Customer's view of a Job. Intent Resources MUST NOT describe details of the production Process of which the Customer has no knowledge (e.g. the individual printed sheets that make up the text of a brochure).

## 9 Conformance Rules – JMF Messages

### 9.1 Goals

Within the scope of this ICS, the description is limited to the use of JMF Messages for the following main goals:

1. Job Tracking
2. Job Costing (limited)
3. Device monitoring and (utilization) analysis

#### 4. Material consumption

### 9.1.1 Job Tracking

The *MIS* has to generate the Job tracking information from the combination of the Attribute Values in the DeviceInfo and JobPhase Elements.

### 9.1.2 Job Costing

The *MIS* MAY generate the Job costing information from the combination of the Attribute Values in the DeviceInfo and JobPhase Elements. However, there is no guarantee that the MIS will be provided with a complete set of Messages. The communication between a Device and the *MIS* may be down for a period of time, for whatever reason. In such a situation, a Device MAY retry sending the Messages.

Therefore, after a Device has completed a Job and returned the JDF Instance to the *MIS*, the *MIS* MAY interpret the AuditPOOL information in the JDF Instance to create, update and/or modify the costing information that was gathered from previous JMF Messages. The MIS may use business rules to limit updates and/or modifications to costing information.

### 9.1.3 Device Monitoring and Analysis

The *MIS* must generate the Device monitoring and analysis information from a combination of the Attribute Values in the DeviceInfo and JobPhase Elements.

Because non-productive time is not related any particular production Job, non-productive time will not appear in the AuditPOOL information of any JDF Instances returned to the *MIS*. Therefore the *MIS* has to rely solely of the information retrieved from JMF Messages to create complete Device monitoring and analysis information.

### 9.1.4 Resource Consumption

A Device that, during the execution of a Node, consumes Resources of Class *Consumable* MUST notify the MIS by sending a JMF Signal Resource Message. See Table 39: Signal – Resource.

## 9.2 When to Send a Status Signal

A Device MUST send a JMF Status Signal to the *MIS* each time one of the Attributes of the previous Signal has changed. These changes include (but are not limited to) a change in the:

- Status of a Job,
- Part of the Job that is being produced (either identified by *JobPartID* or potentially by Partition Key),
- Employee(s) operating the Device,
- Shift of the Employee(s) operating the Device,

If a Device sends Status Signal Messages in response to a Subscription, the Device MUST honor the *RepeatTime* Attribute. It is up to the *MIS* to decide how to handle Status Signal Messages that do not indicate a change in status and/or Job. The *MIS* MAY merge the data from the intermediate Signal Messages or ignore them all together.

The Status Signal Message indicates to the *MIS* the moment in time when a transition takes place, like the indication of the start of a new status. Please note that the JobPhase/@PhaseAmount and JobPhase/@PhaseWaste Attributes indicate the amount produced since the start of the phase. Special attention is required for the transition between a JobPhase with production Amounts to a JobPhase without productions Amounts, such as from "*Running*" to "*Stopped*". For these transitions the Device MUST generate two Status Signal Messages. The first one is a copy of the previous Signal Messages, except for the values of JobPhase/@PhaseAmount and JobPhase/@PhaseWaste. In the second one, the Attributes are updated to show the new status of the Device. This will give *MIS* immediate feedback about the produced amounts in the closed phase.

### 9.2.1.1 Financial Period Costing / Analysis

The *MIS* cannot solely rely on the JMF Status Signal Messages to produce complete and accurate costing of a Job, but it has the requirement to provide (nearly) real-time costing and work-in-progress (WIP) information. Therefore, a Device **MUST** send, via a Status Signal Message, a “snapshot” JDF Instance with an AuditPool, at least once every 3 hours (for Jobs that run for more than 3 hours). The AuditPool **MUST** be complete up to and including the current PhaseTime, however the current PhaseTime **NEED NOT** be complete and **MAY** continue after the snapshot. In other words, the PhaseTime/@End in the Node's final AuditPool **MAY** be different from the PhaseTime/@End in the snapshot. If a Job goes to @Status = "Suspended", a snapshot **MUST** be send to the Manager.

## 10 Conformance Rules – Job Completion

In a complete JDF workflow, the Manager that submits a JDF Instance to a Queue will get back the JDF Instance when the processing of the JDF Instance on the Device has completed. The returned JDF Instance **MUST** contain information generated by the production Device. This information consists of:

- AuditPool Element about the actual processing at the Device
- Updated ResourceLink information (for example amounts)
- Information required by subsequent Processes (for example **Preview** Resources)

The *MIS* can use this information to update the status of the Job and to provide updated Resource information to the next production Process for the Job.

### 10.1 AuditPool in JDF Elements Returned to the MIS

The MIS **MAY** generate the Job costing information from the combination of the Attribute Values in the DeviceInfo and JobPhase Elements of JMF Status Signals. However, there is no guarantee that the Device will provide the *MIS* with a complete set of Messages. For example, the communication between a Device and the *MIS* may be down for a period of time, for whatever reason. Therefore, the Device **MUST** write a complete AuditPool as defined in section 4.5 of this ICS.

The MIS **MAY** interpret the AuditPool information in the JDF either to create the costing information or to update and/or modify the costing information that the MIS gathered from JMF Messages.

#### 10.1.1 When to Close Audits

The Device **MUST** close an Audit (PhaseTime) and start a new one each time one of the Attributes of the previous Audit has changed. These changes include (but are not limited to) a change in the:

- Status of a Job,
- Part of the Job that is being produced (either identified by *JobPartID* or by Partition Key),
- Employee(s) operating the Device,
- Shift of the Employee(s) operating the Device.

## 11 References

### 11.1 Normative References

- [Base-ICS] Base ICS, Version 1.3, published July 2007. Available at: <http://www.cip4.org>.
- [JMF-ICS] JMF ICS, Version 1.3, published July 2007. Available at: <http://www.cip4.org>.
- [JDF1.3] JDF Specification, Version 1.3, published September 30, 2005, and Errata, JDF Specification, Version 1.3. Available at: <http://www.cip4.org>.
- [JDF1.3Errata] Errata for JDF Specification, Version 1.3, published October 11, 2006. Available at: <http://www.cip4.org>.