



The Printer Working Group

December 19, 2014
Candidate Standard PWG 5100.1-2014

IPP Finishings 2.0 (FIN)

Status: Stable

Abstract: This document defines new "finishings" and "finishings-col" Job Template attribute values to specify additional finishing intent, including the placement of finishings with respect to the corners and edges of portrait and landscape documents.

This document is a PWG Candidate Standard. For a definition of a "PWG Candidate Standard", see: <http://ftp.pwg.org/pub/pwg/general/pwg-process30.pdf>

This document is available electronically at:

<http://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings20-20141219-5100.1.docx>
<http://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings20-20141219-5100.1.pdf>

Copyright © 2001, 2004, 2013-2014 The Printer Working Group. All rights reserved.

This document may be copied and furnished to others, and derivative works that comment on, or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice, this paragraph and the title of the Document as referenced below are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the IEEE-ISTO and the Printer Working Group, a program of the IEEE-ISTO.

Title: *IPP Finishings 2.0 (FIN)*

The IEEE-ISTO and the Printer Working Group DISCLAIM ANY AND ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED INCLUDING (WITHOUT LIMITATION) ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

The Printer Working Group, a program of the IEEE-ISTO, reserves the right to make changes to the document without further notice. The document may be updated, replaced or made obsolete by other documents at any time.

The IEEE-ISTO takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights.

The IEEE-ISTO invites any interested party to bring to its attention any copyrights, patents, or patent applications, or other proprietary rights which may cover technology that may be required to implement the contents of this document. The IEEE-ISTO and its programs shall not be responsible for identifying patents for which a license may be required by a document and/or IEEE-ISTO Industry Group Standard or for conducting inquiries into the legal validity or scope of those patents that are brought to its attention. Inquiries may be submitted to the IEEE-ISTO by e-mail at: ieee-isto@ieee.org.

The Printer Working Group acknowledges that the IEEE-ISTO (acting itself or through its designees) is, and shall at all times, be the sole entity that may authorize the use of certification marks, trademarks, or other special designations to indicate compliance with these materials.

Use of this document is wholly voluntary. The existence of this document does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to its scope.

About the IEEE-ISTO

The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and flexible operational forum and support services. The IEEE-ISTO provides a forum not only to develop standards, but also to facilitate activities that support the implementation and acceptance of standards in the marketplace. The organization is affiliated with the IEEE (<http://www.ieee.org/>) and the IEEE Standards Association (<http://standards.ieee.org/>).

For additional information regarding the IEEE-ISTO and its industry programs visit:

<http://www.ieee-isto.org>

About the IEEE-ISTO PWG

The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology Organization (ISTO) with member organizations including printer manufacturers, print server developers, operating system providers, network operating systems providers, network connectivity vendors, and print management application developers. The group is chartered to make printers and the applications and operating systems supporting them work together better. All references to the PWG in this document implicitly mean “The Printer Working Group, a Program of the IEEE ISTO.” In order to meet this objective, the PWG will document the results of their work as open standards that define print related protocols, interfaces, procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from the interoperability provided by voluntary conformance to these standards.

In general, a PWG standard is a specification that is stable, well understood, and is technically competent, has multiple, independent and interoperable implementations with substantial operational experience, and enjoys significant public support.

For additional information regarding the Printer Working Group visit:

<http://www.pwg.org>

Contact information:

The Printer Working Group
c/o The IEEE Industry Standards and Technology Organization
445 Hoes Lane
Piscataway, NJ 08854
USA

About the Internet Printing Protocol Workgroup

The Internet Printing Protocol (IPP) workgroup has developed a modern, full-featured network printing protocol, which is now the industry standard. IPP allows a print client to query a printer for its supported capabilities, features, and parameters to allow the selection of an appropriate printer for each print job. IPP also provides job information prior to, during, and at the end of job processing.

For additional information regarding IPP visit:

<http://www.pwg.org/ipp/>

Implementers of this specification are encouraged to join the IPP mailing list in order to participate in any discussions of the specification. Suggested additions, changes, or clarification to this specification, should be sent to the IPP mailing list for consideration.

Table of Contents

1. Introduction	8
2. Terminology	9
2.1 Conformance Terminology	9
2.2 Protocol Role Terminology	9
2.3 Printing Terminology.....	9
2.4 Acronyms and Organizations	10
3. Requirements.....	11
3.1 Rationale for IPP Finishings 2.0	11
3.2 Use Cases.....	11
3.2.1 Band	11
3.2.2 Bind.....	11
3.2.3 Booklet Maker.....	11
3.2.4 Coat	12
3.2.5 Cover	12
3.2.6 Edge Stitch	12
3.2.7 Fold.....	12
3.2.8 Jog Offset	12
3.2.9 Laminate	12
3.2.10 Punch.....	12
3.2.11 Saddle Stitch.....	12
3.2.12 Staple.....	13
3.2.13 Trim.....	13
3.2.14 Wrap	13
3.2.15 Multiple Finishing Options.....	13
3.2.16 Finishing of Multiple Copies	13
3.3 Exceptions.....	13
3.3.1 Unsupported Media.....	13
3.3.2 Unsupported Combinations of Finishing Options	13
3.4 Out of Scope	14
3.5 Design Requirements	14
4. Overview of Finishing.....	15
4.1 Bale (or Band) and Wrap.....	15
4.2 Bind	15
4.3 Booklet Making.....	15
4.4 Coat and Laminate	16
4.5 Cover.....	16
4.6 Fold	16
4.7 Jog.....	16
4.8 Punch	16
4.9 Staple, Edge Stitch, and Saddle Stitch	16
4.10 Trim (Cut, Perforate, or Score)	16
5. Job Template Attributes	18
5.1 finishings (1setOf type2 enum).....	18
5.1.1 RFC 2911 “finishings” Values	20
5.1.2 PWG 5100.1-2001 “finishings” Values	21

5.1.3 PWG 5100.1-2014 “finishings” Values	22
5.1.4 PWG 5100.13 “finishings” Values	24
5.2 finishings-col (no-value 1setOf collection)	25
5.2.1 finishing-template (type2 keyword name(MAX))	26
5.2.2 baling (collection)	27
5.2.3 binding (collection)	28
5.2.4 coating (collection)	29
5.2.5 covering (collection)	30
5.2.6 folding (1setOf collection)	31
5.2.7 imposition-template (type2 keyword name(MAX))	33
5.2.8 laminating (collection)	33
5.2.9 media-size (collection)	34
5.2.10 media-size-name (type2 keyword)	34
5.2.11 punching (collection)	35
5.2.12 stitching (collection)	36
5.2.13 trimming (1setOf collection)	38
5.3 job-pages-per-set (integer(1:MAX))	39
6. Printer Description Attributes	40
6.1 baling-type-supported (1setOf (type2 keyword name(MAX)))	40
6.2 baling-when-supported (1setOf type2 keyword)	40
6.3 binding-reference-edge-supported (1setOf type1 keyword)	40
6.4 binding-type-supported (1setOf type2 keyword)	40
6.5 coating-sides-supported (1setOf type1 keyword)	40
6.6 coating-type-supported (1setOf (type2 keyword name(MAX)))	40
6.7 covering-name-supported (1setOf (type2 keyword name(MAX)))	40
6.8 finishing-template-supported (1setOf (name(MAX) type2 keyword))	40
6.9 finishings-col-database (1setOf collection)	41
6.10 finishings-col-default (1setOf collection no-value)	42
6.11 finishings-col-ready (1setOf collection)	42
6.12 folding-direction-supported (1setOf type1 keyword)	42
6.13 folding-offset-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX)))	42
6.14 folding-reference-edge-supported (1setOf type1 keyword)	43
6.15 laminating-sides-supported (1setOf type1 keyword)	43
6.16 laminating-type-supported (1setOf (type2 keyword name(MAX)))	43
6.17 job-pages-per-set-supported (boolean)	43
6.18 printer-finisher (1setOf octetString(MAX))	43
6.18.1 Keywords for printer-finisher	43
6.18.2 Encoding of printer-finisher	43
6.18.3 Examples of printer-finisher	44
6.19 printer-finisher-description (1setOf text(MAX))	46
6.19.1 Encoding of printer-finisher-description	46
6.19.2 Example of printer-finisher-description	46
6.20 punching-locations-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX)))	46
6.21 punching-offset-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX)))	46
6.22 punching-reference-edge-supported (1setOf type1 keyword)	47
6.23 stitching-locations-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX)))	47

- 6.24 stitching-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX))) 47
- 6.25 stitching-reference-edge-supported (1setOf type1 keyword) 47
- 6.26 trimming-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX))) 47
- 6.27 trimming-reference-edge-supported (1setOf type1 keyword) 47
- 6.28 trimming-type-supported (1setOf type2 keyword) 47
- 6.29 trimming-when-supported (1setOf type2 keyword) 47
- 7. Conformance Requirements 48
 - 7.1 Conformance Requirements for Clients 48
 - 7.2 Conformance Requirements for Printers 48
- 8. Internationalization Considerations 48
- 9. Security Considerations 49
- 10. IANA and PWG Considerations 49
 - 10.1 Attribute Registrations 49
 - 10.2 Attribute Value Registrations 50
 - 10.3 Type2 enum Attribute Value Registrations 56
 - 10.4 PWG Semantic Model Registrations 56
- 11. References 57
 - 11.1 Normative References 57
 - 11.2 Informative References 58
- 12. Author's Address 59

List of Figures

- Figure 1 - Standard Folds 17
- Figure 2 - Effect of "orientation-requested" on Output 19
- Figure 3 - Handling of "job-pages-per-set" Job Template Attribute 39
- Figure 4 - ABNF for "printer-finisher" Values 45

List of Tables

- Table 1 - "finishings-col" Member Attributes 25
- Table 2 - Keywords for "printer-finisher" 44

1. Introduction

The Internet Printing Protocol/1.1: Model and Semantics [RFC2911] and Internet Printing Protocol (IPP): Production Printing Attributes - Set 1 [PWG5100.3] specifications define the basic attributes and values needed to support advanced finishing processes on printed output. This specification, originally titled 'IPP: "finishings" attribute values extension', defines additional values and member attributes needed to support the full breadth of finishing options available in modern Printers. It also revisits the original definitions of the "finishings" and "finishings-col" attributes in order to provide a holistic view of the various finishing processes that are supported by Printers.

The "finishings" Job Template attribute [RFC2911] allows Clients to specify simple intent - staple, fold, trim, etc. This specification extends the original values to include positional characteristics, e.g., staple top-left, as well as common variations, e.g., Z fold.

The "finishings-col" Job Template attribute [PWG5100.3] allows Clients to specify detailed intent - staple at the following coordinates, fold at the following positions and directions, trim at the following positions and cut types, etc. This specification extends the original "finishing-template" member attribute to include standard names and adds member attributes for each type of finishing.

The coordinate system scheme used in this specification agrees with the Finisher MIB [RFC3806], which in turn follows the ISO DPA [ISO10175] approach of using a coordinate system as if the document were portrait. The approach for coordinate system being relative to the intended reading direction depends on the device being able to understand the orientation embedded in the PDL, which is too problematic for many PDLs. The approach for the coordinate system of being relative to the media feed direction is too dependent on the way the device is configured, i.e., pulling short edge first vs. long edge first, and can vary between different output bins in the same device.

2. Terminology

2.1 Conformance Terminology

Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED, SHOULD, SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to conformance as defined in Key words for use in RFCs to Indicate Requirement Levels [RFC2119]. The term CONDITIONALLY REQUIRED is additionally defined for a conformance requirement that applies to a particular capability or feature.

2.2 Protocol Role Terminology

This document defines the following protocol roles in order to specify unambiguous conformance requirements:

Client: Initiator of outgoing IPP session requests and sender of outgoing IPP operation requests (Hypertext Transfer Protocol -- HTTP/1.1 [RFC7230] User Agent).

Printer: Listener for incoming IPP session requests and receiver of incoming IPP operation requests (Hypertext Transfer Protocol -- HTTP/1.1 [RFC7230] Server) that represents one or more Physical Devices or a Logical Device.

2.3 Printing Terminology

Normative definitions and semantics of printing terms are imported from the Printer MIB v2 [RFC3805], Printer Finishings MIB [RFC3806], Internet Printing Protocol/1.1: Model and Semantics [RFC2911], and IPP: Job Progress Attributes [RFC3381].

Document: An object created and managed by a Printer that contains the description, processing, and status information. A Document object may have attached data and is bound to a single Job.

Job: An object created and managed by a Printer that contains description, processing, and status information. The Job also contains zero or more Document objects.

Finishing Location: The distance along the Finishing Reference Edge as measured from the bottom or left of the media sheet.

Finishing Offset: The distance from the Finishing Reference Edge.

Finishing Reference Edge: The edge or side of the media sheets that is used for finishing processes. For example, when staples are placed along the left side of a set of sheets, the Finishing Reference Edge is 'left'.

Set: A logical boundary between the delivered media sheets of a printed job. For example, in the case of a ten page single document with collated pages and a request for 50 copies,

each of the 50 printed copies of the document constitutes a "set". If the pages were uncollated, then 50 copies of each of the individual pages within the document would represent each "set". [RFC3381]

2.4 Acronyms and Organizations

CIP4: The International Cooperation for the Integration of Processes in Prepress, Press, and Postpress Organization, <http://www.cip4.org/>

IANA: Internet Assigned Numbers Authority, <http://www.iana.org/>

IETF: Internet Engineering Task Force, <http://www.ietf.org/>

ISO: International Organization for Standardization, <http://www.iso.org/>

PWG: Printer Working Group, <http://www.pwg.org/>

3. Requirements

3.1 Rationale for IPP Finishings 2.0

Existing specifications define the following:

1. The Internet Printing Protocol/1.1: Model and Semantics [RFC2911] defines the "finishings" Job Template attribute and basic values.
2. The Internet Printing Protocol (IPP): Production Printing Attributes - Set 1 [PWG5100.3] defines the "finishings-col" Job Template attribute for stapling.

In order to allow Clients to use and clearly specify finishing intent, this IPP Finishings 2.0 specification:

1. Defines Job Template attributes and values needed to clearly express finishing intent; and
2. Defines Printer Description attributes and values needed to allow a Client to determine the type and extent of finishing options supported by the Printer as well as preview the results of finishing processes for the User.

3.2 Use Cases

The following use cases are derived in part from the list of finishing processes defined in section 2.2 of [RFC3806].

3.2.1 Band

Jane needs to ship ten copies of a fifty page report. Using software on her Client device, she specifies a finishing intent that will band wrap each copy and submits the print request.

3.2.2 Bind

Jane is self-publishing a book on lawn ornaments. Using software on her Client device, she specifies a finishing intent that will bind the long edge of each book and submits the print request.

3.2.3 Booklet Maker

Jane is producing an orientation guide for new students. Using software on her Client device, she specifies a finishing intent that will impose the pages from her Document onto folded sheets and submits the print request.

3.2.4 Coat

Jane needs to protect a digital photographic print from sunlight. Using software on her Client device, she specifies a finishing intent that coats the media sheet with an archival UV protectant and submits the print request.

3.2.5 Cover

Jane needs to print an investor report for an upcoming meeting with the preprinted company report cover. Using software on her Client device, she specifies a finishing intent that will add the report cover to each Set and submits the print request.

3.2.6 Edge Stitch

Jane wants to print a multi-page checklist. Using software on her Client device, she specifies a finishing intent that will stitch the tops of the pages in the output and submits the print request.

3.2.7 Fold

Jane has a set of attendee cards she wants to print. Using software on her Client device, she specifies a finishing intent that will fold the cardstock in half after printing and submits the print request.

3.2.8 Jog Offset

Jane is printing several copies of a report and would like each copy separated. Using software on her Client device, she specifies a finishing intent that will offset each Set in the output bin and submits the print request.

3.2.9 Laminate

Jane is printing operating procedure checklists that will be used many times. Using software on her Client device, she specifies a finishing intent that will laminate each checklist and submits the print request.

3.2.10 Punch

Jane is printing invoices that must be placed in a 3-ring binder. Using software on her Client device, she specifies a finishing intent that will punch three holes along the left side of each sheet and submits the print request.

3.2.11 Saddle Stitch

Jane is printing a short informational booklet. Using software on her Client device, she specifies a finishing intent that will place two staples along the midline of each Set and submits the print request.

3.2.12 Staple

Jane is printing an accounts-receivable report. Using software on her Client device, she specifies a finishing intent that will place a single staple at the top left corner of each Set and submits the print request.

3.2.13 Trim

Jane is printing a large photograph on her roll-fed printer. Using software on her Client device, she specifies a finishing intent that will cut the roll at the end of the printed photograph and submits the print request.

3.2.14 Wrap

Jane is printing documentation for a software product. Using software on her Client device, she specifies a finishing intent that will shrinkwrap each Set and submits the print request.

3.2.15 Multiple Finishing Options

Jane is printing an eight page brochure booklet. Using software on her Client device, she specifies finishing intent to first impose the pages from her Document onto folded sheets, then staple the sheets along the midline, fold the sheets along the midline, and finally shrinkwrap each booklet. She then submits the print request.

3.2.16 Finishing of Multiple Copies

Jane is printing a seven page report to a Printer that only supports a raster format. Using software on her Client device, she specifies a copy count of 10 and finishing intent to staple each Set. She then submits the print request. Her Client device generates and submits 70 pages of raster data to the Printer.

3.3 Exceptions

3.3.1 Unsupported Media

After submitting the orientation guide for printing (section 3.2.3), the printer returns an error indicating that the requested media cannot be used with the booklet maker.

3.3.2 Unsupported Combinations of Finishing Options

After submitting an eight page brochure booklet for printing (section 3.2.15), the printer returns an error indicating that the requested finishing intent cannot be combined as requested.

3.4 Out of Scope

The following are considered out of scope for this specification:

1. Explicitly specifying the order of finishing processes, i.e., processing instructions instead of intent;
2. Support for folds not parallel to a Finishing Reference Edge;
3. Support for cuts not parallel to a Finishing Reference Edge; and
4. Support for cuts that do not extend the full width or length of the media

3.5 Design Requirements

The design requirements for this specification are:

1. Follow the naming conventions defined in the IPP/1.1 Model and Semantics [RFC2911], including keyword value (lowercase) and hyphenation requirements;
2. Optimize compatibility with existing IETF and PWG IPP operations when making design decisions in defining new operations and attributes;
3. Define values for the "finishings" Job Template attribute to support the full range of finishing options supported by modern Printers;
4. Define Printer Description and member attributes for the "finishings-col" Job Template attribute to support the full range of finishing options supported by modern Printers;
5. Update the definition of the "finishing-template" member attribute for all of the standard finishing options supported by modern Printers; and
6. Register all attributes and values with IANA and the PWG.

4. Overview of Finishing

The finishing processes supported by Printers are identified in the Printer Finishing MIB [RFC3806]. Loosely stated, IPP finishing is any post-processing of the hardcopy output that is performed by any of the Subunits of the Printer. Common finishing processes include baling, binding, booklet making, coating, covering, folding, jogging, laminating, punching, stapling, stitching, trimming, and wrapping. As in [RFC3806], all IPP finishing processes are specified with respect to portrait media orientation. The "multiple-document-handling" Job Template attribute [RFC2911] defines how multiple copies and Documents are combined into sets for finishing.

A key concept with IPP finishing processes is that the "finishings" and "finishings-col" Job Template attributes define the Client's intent and not the processing order of finishing processes. That is, a Client can specify the intent that a Document be covered and bound or bound and covered and get the intended output – the Printer is responsible for determining the correct processing order for a sequence of finishing values.

The original finishing support in IPP/1.1: Model and Semantics [RFC2911] only allows a Printer to list and a Client to specify simple finishing intent using the "finishings" attribute - staple, fold, punch, and so forth. The IPP Production Printing Extensions, Set 1 [PWG5100.3] provided the first definition of the "finishings-col" Job Template attribute to provide explicit intent for the number and location of staples. This specification expands the "finishings-col" attribute so that it is possible to specify explicit intent for all finishing processes. In addition, the "finishings-col-database" and "finishings-col-ready" Printer Description attributes allow the Client to discover which "finishings-col" values are supported and to provide an accurate preview of those values.

The following subsections describe each of the finishing processes supported by this specification.

4.1 Bale (or Band) and Wrap

Bale finishers bundle hardcopy output with string or straps. Wrap finishings completely enclose the output, such as with a shrink-wrap material.

4.2 Bind

Bind finishers join hardcopy output along one edge. Binding can be performed by gluing the edge, joining using plastic or wire loops, padded, or taped.

4.3 Booklet Making

Booklet making combines a half fold with signature imposition, placing and ordering input pages so that the resulting output can be read as a booklet. Booklet making is often combined with a saddle stitch to hold the hardcopy output together.

4.4 Coat and Laminate

Coating finishers apply a liquid or powdered material to the surface of the hardcopy output, e.g., a clear UV light and weather resistant paint over a sign, while laminator finishers combine a solid material with the hardcopy output using heat and/or adhesives.

4.5 Cover

Cover finishers place cover media over the hardcopy output, either as two separate sheets or a single sheet that covers the binding edge.

4.6 Fold

A fold finisher places folds in hardcopy output at certain positions and directions. Figure 1 shows common fold styles that are supported by this specification.

4.7 Jog

A jog finisher offsets the stack of sheets for each Set by a fixed distance so that each Set can be retrieved separately.

4.8 Punch

A punch finisher creates holes in the hardcopy Set by drilling or punching with a die. The number and location of holes varies and is not well standardized [PUNCH].

4.9 Staple, Edge Stitch, and Saddle Stitch

Staple and stitch finishers bind Sets of hardcopy output using 'U' shaped pieces of metal wire ("staples"). Staples are placed in a corner, along an edge, or along the middle fold (for saddle stitching). IPP uses the keyword 'edge-stitch' when multiple staples are used along an edge and 'saddle-stitch' when multiple staples are placed along the middle fold.

4.10 Trim (Cut, Perforate, or Score)

Trim finishers cut, perforate, or score hardcopy output along a straight line - most only support trimming along lines parallel or perpendicular to the feed direction.

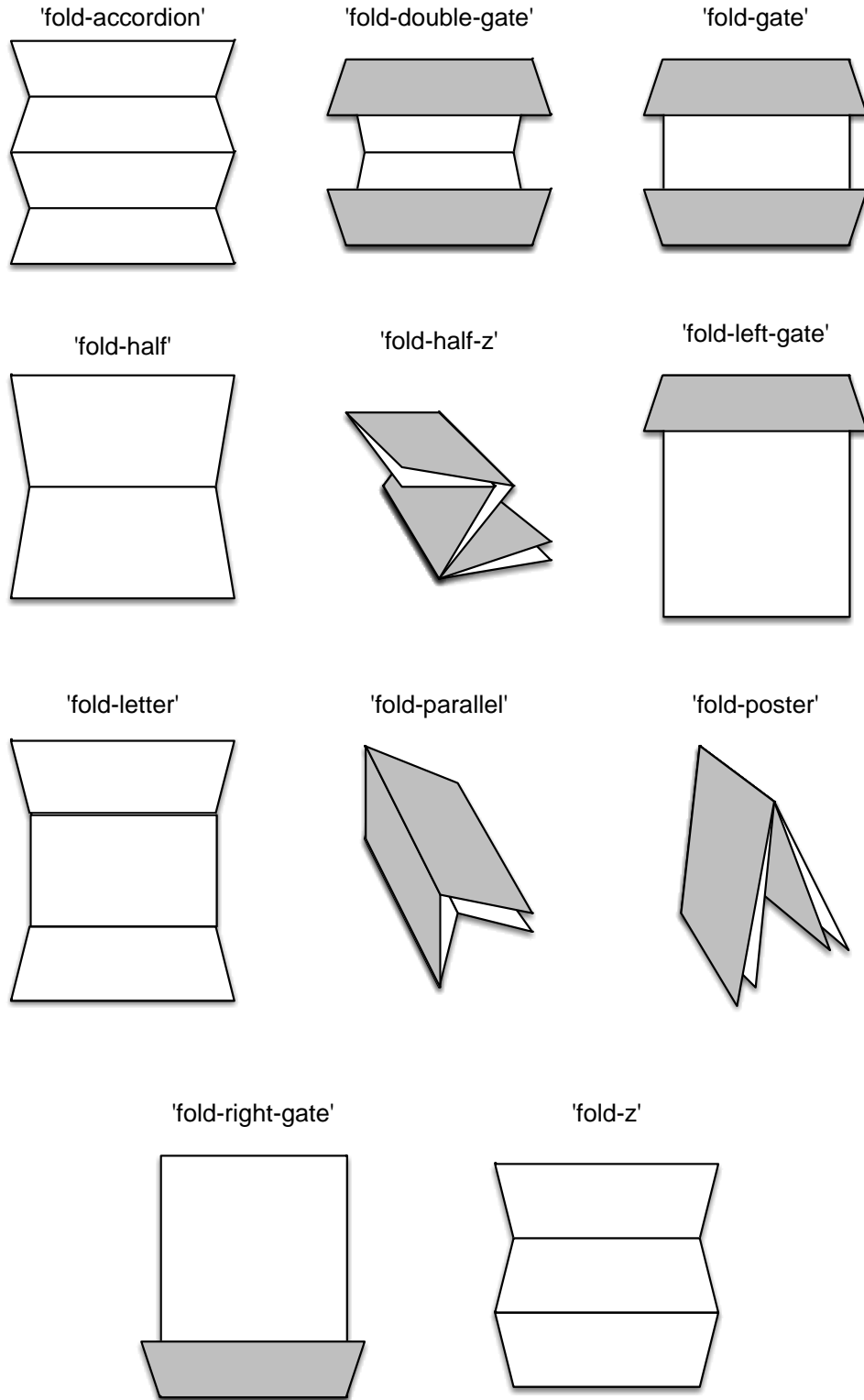


Figure 1 - Standard Folds

5. Job Template Attributes

5.1 finishings (1setOf type2 enum)

The "finishings" Job Template attribute [RFC2911] identifies the finishing processes that the Printer uses for each copy of each printed Document in the Job. Printers that support any of the finishing processes listed in section 4 MUST support this attribute.

The order of values supplied in the "finishings" attribute is not significant. Printers MUST NOT require Clients to supply values in a particular order. If the Client supplies a value of 'none' along with any other combination of values, it is the same as if only that other combination of values had been supplied, i.e., the 'none' value has no effect.

The positional values are specified with respect to the Document as if the Document were a portrait Document. If the Document is actually a landscape or a reverse-landscape Document, the Client supplies the appropriate transformed value. For example, to position a staple in the upper left hand corner of a landscape Document when held for reading, the Client supplies the 'staple-bottom-left' value since landscape is defined as an anti-clockwise rotation from portrait. On the other hand, to position a staple in the upper left hand corner of a reverse-landscape Document when held for reading, the Client supplies the 'staple-top-right' value since reverse-landscape is defined as a clockwise rotation from portrait. Figure 2 shows how content is placed on sheets for each "orientation-requested" value.

Note: The effect of this attribute on Jobs with multiple copies and Documents is controlled by the "multiple-document-handling" Job Template attribute (section 4.2.4 [RFC2911]) and the relationship of this attribute and the other attributes that control Document processing is described in section 15.3 [RFC2911].

Lorem ipsum
dolor sit amet,
consectetur
adipiscing elit.
Pellentesque vitae
orci ut quam
sagittis porttitor.
Sed vel dapibus
sem, ac ultricies

portrait

Lorem ipsum dolor sit
amet, consectetur
adipiscing elit.
Pellentesque vitae orci
ut quam sagittis
porttitor. Sed vel
dapibus sem, ac

landscape

>Lorem ipsum
dolor sit amet,
consectetur
adipiscing elit.
Pellentesque vitae
orci ut quam
sagittis porttitor.
Sed vel dapibus
sem, ac ultricies

reverse-portrait

>Lorem ipsum dolor sit
amet, consectetur
adipiscing elit.
Pellentesque vitae orci
ut quam sagittis
porttitor. Sed vel
dapibus sem, ac

reverse-landscape

Leading Edge of Sheet

Figure 2 - Effect of "orientation-requested" on Output

5.1.1 RFC 2911 “finishings” Values

The Internet Printing Protocol/1.1: Model and Semantics [RFC2911] defines the following standard enum values:

‘none’ (3): Perform no finishing

‘staple’ (4): Bind the Set(s) with one or more staples. The exact number, placement, and orientation of the staples are implementation and/or site-defined.

‘punch’ (5): This value indicates that holes are required in the finished hardcopy output. The exact number and placement of the holes are implementation and/or site-defined. The punch specification MAY be satisfied (in a site- and implementation-specific manner) either by drilling/punching, or by substituting pre-drilled media.

‘cover’ (6): This value is specified when it is desired to select a non-printed (or pre-printed) cover for each Set. This does not supplant the specification of a printed cover (on cover stock medium) by the Document itself.

‘bind’ (7): This value indicates that a binding is to be applied to the Set; the type and placement of the binding are implementation and/or site-defined.

‘saddle-stitch’ (8): Bind the Set(s) with two or more staples (wire stitches) along the middle fold. The exact number and placement of the staples and the middle fold are implementation and/or site-defined.

‘edge-stitch’ (9): Bind the Set(s) with two or more staples (wire stitches) along one edge. The exact number and placement of the staples are implementation and/or site-defined.

‘staple-top-left’ (20): Bind the Set(s) with one or more staples in the top left corner.

‘staple-bottom-left’ (21): Bind the Set(s) with one or more staples in the bottom left corner.

‘staple-top-right’ (22): Bind the Set(s) with one or more staples in the top right corner.

‘staple-bottom-right’ (23): Bind the Set(s) with one or more staples in the bottom right corner.

‘edge-stitch-left’ (24): Bind the Set(s) with two or more staples (wire stitches) along the left edge. The exact number and placement of the staples are implementation and/or site-defined.

'edge-stitch-top' (25): Bind the Set(s) with two or more staples (wire stitches) along the top edge. The exact number and placement of the staples are implementation and/or site-defined.

'edge-stitch-right' (26): Bind the Set(s) with two or more staples (wire stitches) along the right edge. The exact number and placement of the staples are implementation and/or site-defined.

'edge-stitch-bottom' (27): Bind the Set(s) with two or more staples (wire stitches) along the bottom edge. The exact number and placement of the staples are implementation and/or site-defined.

'staple-dual-left' (28): Bind the Set(s) with two staples (wire stitches) along the left edge assuming a portrait document (see section 0).

'staple-dual-top' (29): Bind the Set(s) with two staples (wire stitches) along the top edge assuming a portrait document (see section 0).

'staple-dual-right' (30): Bind the Set(s) with two staples (wire stitches) along the right edge assuming a portrait document (see section 0).

'staple-dual-bottom' (31): Bind the Set(s) with two staples (wire stitches) along the bottom edge assuming a portrait document (see section 0).

5.1.2 PWG 5100.1-2001 “finishings” Values

The IPP “finishings” attribute values extension [PWG5100.1-2001] defines the following “finishings” enum values:

'fold' (10): Fold the hardcopy output. The exact number and orientations of the folds is implementation and/or site-defined.

'trim' (11): Trim the hardcopy output on one or more edges. The exact number of edges and the amount to be trimmed is implementation and/or site-defined.

'bale' (12): Bale the Set(s). The type of baling is implementation and/or site-defined.

'booklet-maker' (13): Deliver the Set(s) to the signature booklet maker. This value is a short cut for specifying a job that is to be folded, trimmed and then saddle-stitched.

'jog-offset' (14): Shift each Set from the previous one by a small amount which is device dependent. This value has no effect on the “job-sheet”. This value SHOULD NOT have an effect if each Set of the Job consists of one sheet.

'bind-left' (50): Bind the Set(s) along the left edge; the type of the binding is implementation and/or site-defined.

'bind-top' (51): Bind the Set(s) along the top edge; the type of the binding is implementation and/or site-defined.

'bind-right' (52): Bind the Set(s) along the right edge; the type of the binding implementation and/or is site-defined.

'bind-bottom' (53): Bind the Set(s) along the bottom edge; the type of the binding is implementation and/or site-defined.

5.1.3 PWG 5100.1-2014 “finishings” Values

This specification defines the following “finishings” enum values:

'coat' (15): Apply a protective liquid or powdered coating to each sheet in an implementation and/or site-defined manner.

'laminate' (16): Apply a protective (solid) material to each sheet in an implementation and/or site-defined manner.

'staple-triple-left' (32): Bind the Set(s) with three staples (wire stitches) along the left edge assuming a portrait document (see section 0).

'staple-triple-top' (33): Bind the Set(s) with three staples (wire stitches) along the top edge assuming a portrait document (see section 0).

'staple-triple-right' (34): Bind the Set(s) with three staples (wire stitches) along the right edge assuming a portrait document (see section 0).

'staple-triple-bottom' (35): Bind the Set(s) with three staples (wire stitches) along the top edge assuming a portrait document (see section 0).

'punch-top-left' (70): Punch a single hole in the top left of the hardcopy output.

'punch-bottom-left' (71): Punch a single hole in the bottom left of the hardcopy output.

'punch-top-right' (72): Punch a single hole in the top right of the hardcopy output.

'punch-bottom-right' (73): Punch a single hole in the bottom right of the hardcopy output.

'punch-dual-left' (74): Punch two holes on the left side of the hardcopy output.

'punch-dual-top' (75): Punch two holes at the top of the hardcopy output.

'punch-dual-right' (76): Punch two holes on the right side of the hardcopy output.

'punch-dual-bottom' (77): Punch two holes at the bottom of the hardcopy output.

'punch-triple-left' (78): Punch three holes on the left side of the hardcopy output.

'punch-triple-top' (79): Punch three holes at the top of the hardcopy output.

'punch-triple-right' (80): Punch three holes on the right side of the hardcopy output.

'punch-triple-bottom' (81): Punch three holes at the bottom of the hardcopy output.

'punch-quad-left' (82): Punch four holes on the left side of the hardcopy output.

'punch-quad-top' (83): Punch four holes at the top of the hardcopy output.

'punch-quad-right' (84): Punch four holes on the right side of the hardcopy output.

'punch-quad-bottom' (85): Punch four holes at the bottom of the hardcopy output.

'fold-accordion' (90): Accordion-fold the hardcopy output vertically into four sections.

'fold-double-gate' (91): Fold the top and bottom quarters of the hardcopy output towards the midline, then fold in half vertically.

'fold-gate' (92): Fold the top and bottom quarters of the hardcopy output towards the midline.

'fold-half' (93): Fold the hardcopy output in half vertically.

'fold-half-z' (94): Fold the hardcopy output in half horizontally, then Z-fold the paper vertically into three sections.

'fold-left-gate' (95): Fold the top quarter of the hardcopy output towards the midline.

'fold-letter' (96): Fold the hardcopy output into three sections vertically; sometimes also known as a C fold.

'fold-parallel' (97): Fold the hardcopy output in half vertically two times, yielding four sections.

'fold-poster' (98): Fold the hardcopy output in half horizontally and vertically; sometimes also called a cross fold.

'fold-right-gate' (99): Fold the bottom quarter of the hardcopy output towards the midline.

'fold-z' (100): Fold the hardcopy output vertically into three sections, forming a Z.

5.1.4 PWG 5100.13 “finishings” Values

The IPP Job and Printer Extensions - Set 3 (JPS3) [PWG5100.13] defines the following standard enum values:

'trim-after-pages' (60): Trim output after each page.

'trim-after-documents' (61): Trim output after each Document.

'trim-after-copies' (62): Trim output after each Set.

'trim-after-job' (63): Trim output after Job.

5.2 finishings-col (no-value | 1setOf collection)

The "finishings-col" Job Template attribute (originally defined in section 3.2 of [PWG5100.3]) augments the "finishings" Job Template attribute (section 5.1) and allows the Client to specify detailed finishing instructions that cannot be specified using the simple enumerated values of the "finishings" attribute. Printers that support any of the finishing processes listed in section 4 SHOULD support this attribute and MUST support the "finishings" attribute.

Clients MUST NOT specify both the "finishings" and "finishings-col" attributes in a Job Creation request. Printers MUST reject Job Creation requests containing both the "finishings" and "finishings-col" attributes with the 'client-error-conflicting-attributes' status code.

Table 1 lists the "finishings-col" member attributes. The order of values supplied in the "finishings-col" attribute is not significant. Supported values are provided in the "xxx-supported" attributes defined in section 6. Printers MUST NOT require Clients to supply values in a particular order. If the Client does not want any finishings applied it sends the 'no-value' out-of-band value.

Table 1 - "finishings-col" Member Attributes

Member Attribute	Client Support	Printer Support
finishing-template (type2 keyword name(MAX))	MUST	MUST
baling (collection)	MAY	MUST (note 1)
binding (collection)	MAY	MUST (note 1)
coating (collection)	MAY	MUST (note 1)
covering (collection)	MAY	MUST (note 1)
folding (1setOf collection)	MAY	MUST (note 1)
imposition-template (type2 keyword name(MAX))	MAY	MAY (note 2)
laminating (collection)	MAY	MUST (note 1)
media-size (collection)	MAY	MAY (note 2)
media-size-name (type2 keyword)	MAY	MAY (note 2)
punching (collection)	MAY	MUST (note 1)
stitching (collection)	MAY	MUST (note 1)
trimming (1setOf collection)	MAY	MUST (note 1)

Note 1: MUST be supported when the corresponding finishing option is supported.

Note 2: Only returned in the "finishings-col-database" and "finishings-col-ready" attributes.

The "xxx-reference-edge" member attributes are single valued, e.g., top-left is not allowed.

The standard keyword values are:

'bottom': The bottom edge coincides with the x-axis of the coordinate system.

'top': The top edge is opposite and parallel to the bottom edge.

'left': The left edge coincides with the y-axis of the coordinate system.

'right': The right edge is opposite and parallel to the left edge.

5.2.1 finishing-template (type2 keyword | name(MAX))

The REQUIRED "finishing-template" member attribute (originally defined in section 3.2.1 of [PWG5100.3]) specifies the particular finishing process using either one of the standard IANA-registered "finishings" keywords or an implementation or site defined name. Specifying only the "finishing-template" member attribute with no other member attributes results in the default values for those member attributes.

In addition to the registered "finishings" value keywords, this specification also defines keywords for each JDF @FoldCatalog [JDF1.5] value of the form 'jdf-fN-N'. For example, the JDF @FoldCatalog value 'F8-6' (a three fold instruction similar to 'fold-parallel') would be specified using a "finishing-template" value of 'jdf-f8-6'.

Vendor extensions, as expressed using the vendor-unique enum values for the "finishings" Job Template attribute, SHOULD use unique keyword values to allow Clients to localize them using the language-specific strings file referenced by the "printer-strings-uri" Printer attribute [PWG5100.13]. Vendor unique keywords SHOULD begin with a reverse-DNS identifier prefix, for example a vendor whose domain is "example.com" uses keyword values starting with "com.example-".

5.2.2 baling (collection)

The "baling" member attribute specifies which baling to apply to the hardcopy output. Printers with a baling finisher **MUST** support this member attribute and all "baling-xxx" member attributes if they support the "finishings-col" attribute.

5.2.2.1 baling-type (type2 keyword | name(MAX))

The "baling-type" member attribute specifies the type of baling to apply. The following values are defined by this specification:

'band': each Set is baled with a paper or plastic band.

'shrink-wrap': each Set is shrink-wrapped in plastic.

'wrap': each Set is wrapped in paper.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA].

5.2.2.2 baling-when (type2 keyword)

The "baling-when" member attribute specified when baling is performed. The default value may be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value. The following values are defined by this specification:

'after-sets': Baling occurs after each Set (the typical default).

'after-job': Baling occurs only after the entire Job is printed.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA].

5.2.3 binding (collection)

The "binding" member attribute specifies the location and type of binding to apply to the hardcopy output. Printers with a binding finisher **MUST** support this member attribute and all "binding-xxx" member attributes if they support the "finishings-col" attribute.

5.2.3.1 binding-reference-edge (type1 keyword)

The "binding-reference-edge" member attribute specifies which edge ('bottom', 'left', 'right', or 'top') is bound. If not specified, the default value is either derived from the "finishing-template" keyword value ('bind-bottom', 'bind-left', 'bind-right', 'bind-top') or, if no edge is specified, is an implementation or site defined value.

5.2.3.2 binding-type (type2 keyword | name(MAX))

The "binding-type" member attribute specifies the type of binding to apply. If not specified, an implementation or site defined value is used. The following keyword values are defined by this specification:

'adhesive': sheets are bound using glue or adhesive.

'comb': sheets are bound by placing small rectangular holes along the binding edge and using a tube-shaped plastic binding strip with comb like fingers that fit through the holes.

'flat': sheets are bound so that they can lay flat when the hardcopy output is opened. The specific method of producing such a binding is implementation defined.

'padding': sheets are bound by applying a non-penetrating adhesive to the edge of the stack of sheets so that the sheets can be easily peeled off one at a time.

'perfect': sheets are bound by roughing the binding edge and applying an adhesive.

'spiral': sheets are bound by placing small round holes along the binding edge and winding plastic or metal wire through the holes in a spiral pattern.

'tape': sheets are bound by placing tape along the binding edge, overlapping the top and bottom sheets of the stack.

'velo': sheets are bound by placing small holes along the binding edge and joining the sheets using plastic strips with pins that extend through those holes.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA].

5.2.4 coating (collection)

The "coating" member attribute specifies which coating to apply to the hardcopy output. Typically the coating is applied to the entire page, although some Printers MAY only coat those areas that have been marked on. Printers with a coating finisher MUST support this member attribute and all "coating-xxx" member attributes if they support the "finishings-col" attribute.

5.2.4.1 coating-sides (type1 keyword)

The "coating-sides" member attribute specifies which sides of the sheets are coated: 'front', 'back', or 'both', If not specified, an implementation or site defined default value is used.

5.2.4.2 coating-type (type2 keyword | name(MAX))

The "coating-type" member attribute specifies the type of coating to apply. The following values are defined by this specification:

'archival': each sheet is coated to preserve the output for an extended period of time, e.g., a UV protectant.

'archival-glossy': each sheet is coated to produce a glossy surface that preserves the output for an extended period of time, e.g., a UV protectant.

'archival-matte': each sheet is coated to produce a matte surface that preserves the output for an extended period of time, e.g., a UV protectant.

'archival-semi-gloss': each sheet is coated to produce a semi-gloss surface that preserves the output for an extended period of time, e.g., a UV protectant.

'glossy': each sheet is coated to produce a glossy surface.

'high-gloss': each sheet is coated to produce a high-gloss surface.

'matte': each sheet is coated to produce a matte surface.

'semi-gloss': each sheet is coated to produce a semi-gloss surface.

'silicone': each sheet is coated to produce a water resistant surface.

'translucent': each sheet is coated to produce a translucent surface.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA].

5.2.5 covering (collection)

The "covering" member attribute specifies which cover to apply over the hardcopy output. Printers with a cover finisher **MUST** support this member attribute and all "covering-xxx" member attributes if they support the "finishings-col" attribute.

Note: Unlike the "cover-back" and "cover-front" Job Template attributes [PWG5100.3], finishing covers are applied over any binding, edge stitching, or staples and do not contain print-stream pages.

5.2.5.1 covering-name (type2 keyword | name(MAX))

The "covering-name" member attribute specifies which cover to apply. The default is implementation or site defined. The name typically represents a pre-printed, pre-cut, or generic cover that is available to the Printer. Clients **MUST** query the value of the "covering-name-supported" (section 6.7) Printer attribute for the list of supported values. The following values are defined by this specification:

'plain': a plain (blank) cover is applied.

'pre-cut': a pre-cut cover is applied.

'pre-printed': a pre-printed cover is applied.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA].

5.2.6 folding (1setOf collection)

The "folding" member attribute specifies the location and direction of folds to apply to the hardcopy output. Printers with a folding finisher **MUST** support this member attribute and all "folding-xxx" member attributes if they support the "finishings-col" attribute.

Note: The order of "folding" values is significant and is part of the fold intent. Printers **MAY** re-order "folding" values so long as the final result matches the specified intent.

Note: This specification only defines folds parallel to the reference edge. Diagonal folds are explicitly not supported.

5.2.6.1 folding-direction (type1 keyword)

The "folding-direction" member attribute specifies whether the sheets are pushed outward ('outward') or pulled inward ('inward') for the current fold. The default value may be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value.

5.2.6.2 folding-offset (integer(0:MAX))

The "folding-offset" member attribute specifies where the fold is made. The value is the distance from the reference edge specified by the "folding-reference-edge" member attribute toward the center of the medium in hundredths of millimeters (1/2540th of an inch). The default value is generally derived from the "finishing-template" value and output media.

5.2.6.3 folding-reference-edge (type1 keyword)

The "folding-reference-edge" member attribute specifies which edge is used as the basis of the fold instructions: 'bottom', 'left', 'right', or 'top'. Folds are placed parallel to the reference edge at the offset specified by the "folding-location" member attribute. The default value is generally derived from the "finishing-template" value and output media.

5.2.6.4 "folding" Examples

The following examples show "folding" values for the standard folds in Figure 1 applied to A4 media sheets.

```
`fold-accordion`  
folding = { folding-direction='inward' folding-location=7425  
           folding-reference-edge='top' },  
          { folding-direction='inward' folding-location=22275  
           folding-reference-edge='top' },  
          { folding-direction='outward' folding-location=14850  
           folding-reference-edge='top' }
```

```
`fold-double-gate'
folding = { folding-direction='inward' folding-offset=7425
            folding-reference-edge='top' },
            { folding-direction='inward' folding-offset=22275
              folding-reference-edge='top' },
            { folding-direction='inward' folding-offset=14850
              folding-reference-edge='top' }

`fold-gate'
folding = { folding-direction='inward' folding-offset=7425
            folding-reference-edge='top' },
            { folding-direction='inward' folding-offset=22275
              folding-reference-edge='top' }

`fold-half'
folding = { folding-direction='inward' folding-offset=14850
            folding-reference-edge='top' }

`fold-half-z'
folding = { folding-direction='inward' folding-offset=10500
            folding-reference-edge='left' },
            { folding-direction='inward' folding-offset=9900
              folding-reference-edge='top' },
            { folding-direction='outward' folding-offset=19800
              folding-reference-edge='top' }

`fold-left-gate'
folding = { folding-direction='inward' folding-offset=7425
            folding-reference-edge='top' }

`fold-letter'
folding = { folding-direction='inward' folding-offset=9900
            folding-reference-edge='top' },
            { folding-direction='inward' folding-offset=19800
              folding-reference-edge='top' }

`fold-parallel'
folding = { folding-direction='inward' folding-offset=14850
            folding-reference-edge='top' },
            { folding-direction='inward' folding-offset=7425
              folding-reference-edge='top' }

`fold-poster'
folding = { folding-direction='inward' folding-offset=10500
            folding-reference-edge='left' },
            { folding-direction='outward' folding-offset=14850
              folding-reference-edge='top' }

`fold-right-gate'
folding = { folding-direction='inward' folding-offset=22275
            folding-reference-edge='top' }

`fold-z'
folding = { folding-direction='inward' folding-offset=9900
            folding-reference-edge='top' },
            { folding-direction='outward' folding-offset=19800
              folding-reference-edge='top' }
```


5.2.7 imposition-template (type2 keyword | name(MAX))

The "imposition-template" member attribute specifies the default imposition template used for the specified finishing process and is only provided in "finishings-col-database" (section 6.9) and "finishings-col-ready" (section 6.11) Printer attribute values. For example, when applying a 'booklet-maker' finishing process a Printer could automatically apply a 'signature' imposition template when processing input pages.

5.2.8 laminating (collection)

The "laminating" member attribute specifies which material to apply to the hardcopy output. Printers with a laminating finisher MUST support this member attribute and all "laminating-xxx" member attributes if they support the "finishings-col" attribute.

5.2.8.1 laminating-sides (type2 keyword)

The "laminating-sides" member attribute specifies which sides of the sheets are laminated: 'front', 'back', or 'both', If not specified, an implementation or site defined default value is used.

5.2.8.2 laminating-type (type2 keyword | name(MAX))

The "laminating-type" member attribute specifies the type of material to laminate with. The following values are defined by this specification:

'archival': each sheet is laminated to preserve the output for an extended period of time, e.g., a UV protectant.

'glossy': each sheet is laminated to produce a glossy surface.

'high-gloss': each sheet is laminated to produce a high-gloss surface.

'matte': each sheet is laminated to produce a matte surface.

'semi-gloss': each sheet is laminated to produce a semi-gloss surface.

'translucent': each sheet is laminated to produce a translucent surface.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA].

5.2.9 media-size (collection)

The "media-size" member attribute specifies the applicable media size dimensions for the specified finishing values and is only provided in "finishings-col-database" (section 6.9) and "finishings-col-ready" (section 6.11) Printer attribute values. For example, a Printer can list the supported "punching-locations" values for ISO A4 and US Letter media sizes.

The "x-dimension (integer(0:MAX))" and "y-dimension (integer(0:MAX))" member attributes provide the dimensions of the media.

5.2.10 media-size-name (type2 keyword)

The "media-size-name" member attribute specifies the applicable media size for the specified finishing values and is only provided in "finishings-col-database" (section 6.9) and "finishings-col-ready" (section 6.11) Printer attribute values. For example, a Printer can list the supported "punching-locations" values for ISO A4 and US Letter media sizes.

The values are PWG media size names [PWG5101.1].

5.2.11 punching (collection)

The "punching" member attribute specifies the locations of holes to make in the hardcopy output. Printers with a hole punching/drilling finisher **MUST** support this member attribute and all "punching-xxx" member attributes if they support the "finishings-col" attribute.

5.2.11.1 punching-locations (1setOf integer(0:MAX))

The "punching-locations" member attribute specifies the locations to be punched or drilled along the reference edge. Each value in the 1setOf **MUST** be in order of increasing distance.

If the "punching-reference-edge" is either 'top' or 'bottom', then each value in the "punching-locations" represents an offset in hundredths of millimeters (1/2540th of an inch) from the left edge toward the center of the medium. If the "punching-reference-edge" is either 'left' or 'right', then each value in the "punching-locations" represents an offset in hundredths of millimeters (1/2540th of an inch) from the bottom edge toward the center of the medium.

The default value may be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value.

5.2.11.2 punching-offset (integer(0:MAX))

The "punching-offset" member attribute specifies the distance of the holes from the reference edge specified by the "punching-reference-edge" member attribute in hundredths of millimeters (1/2540th of an inch). The default value may be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value.

5.2.11.3 punching-reference-edge (type1 keyword)

The "punching-reference-edge" member attribute specifies which edge of the sheets will be punched or drilled: 'bottom', 'left', 'right', or 'top'. The default value may be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value.

5.2.12 stitching (collection)

The "stitching" member attribute (originally defined in section 3.2.2 of [PWG5100.3]) specifies the locations of stitches or staples that are used to bind the hardcopy output. Printers with a stapler and/or stitching finisher MUST support this member attribute and all "stitching-xxx" member attributes if they support the "finishings-col" attribute.

A Client that chooses to request custom stitching using the "stitching" collection attribute MUST specify the "stitching-reference-edge", the "stitching-offset", and the "stitching-locations" member attributes. If the Client supplies a malformed request by not supplying all three member attributes, the Printer MUST (depending on implementation) either reject the request and return the 'client-error-bad-request' (see [RFC2911] section 13.1.4.1) or default the omitted member attributes, independent of the value of the "ipp-attribute-fidelity" attribute supplied by the Client.

5.2.12.1 stitching-locations (1setOf integer(0:MAX))

Each value of "stitching-locations" specifies an absolute offset along the Finishing Reference Edge at which a stitch MUST occur. Each value in the 1setOf MUST be in order of increasing distance.

If the "stitching-reference-edge" is either 'top' or 'bottom', then each value in the "stitching-locations" represents an offset in hundredths of millimeters from the left edge along the Finishing Reference Edge toward the center of the medium. If the "stitching-reference-edge" is either 'left' or 'right', then each value in the "stitching-locations" represents an offset in hundredths of millimeters from the bottom edge along the Finishing Reference Edge toward the center of the medium.

The unit of measure for the "stitching-locations" member attribute is one hundredth of a millimeter. This unit is equivalent to 1/2540th of an inch resolution.

5.2.12.2 stitching-offset (integer (0:MAX))

The "stitching-offset" member attribute specifies the perpendicular distance of the staples from the Finishing Reference Edge. Since the "stitching-offset" member attribute is positive or zero, the offset is always in the direction that is both away from the Finishing Reference Edge and toward the center of the media sheet.

The unit of measure for the "stitching-offset" member attribute is one hundredth of a millimeter. This unit is equivalent to 1/2540th of an inch resolution.

If the Client specifies a "stitching-offset" then the Printer MUST produce a stitch (or stitches) along a line that is the specified number of hundredths of millimeters specified by the "stitching-offset" attribute away from the "stitching-reference-edge".

5.2.12.3 stitching-reference-edge (type1 keyword)

The "stitching-reference-edge" member attribute specifies the Finishing Reference Edge of the output media relative to which the stapling or stitching MUST be applied. The individual staples or stitches are situated along a line or axis parallel to the Finishing Reference Edge.

A Printer MUST support this member attribute and at least the 'left' value.

Note: The 'left' value works with 'portrait' and 'landscape' Documents since 'landscape' Documents are rotated anti-clock-wise 90 degrees, i.e., plus 90 degrees, with respect to 'portrait' Documents. The left edge becomes the top edge when the human reader orients the landscape Document for reading.

5.2.13 trimming (1setOf collection)

The "trimming" member attribute specifies the locations of cuts to make in the hardcopy output. Printers with a trimming/cutting/perforation/scoring finisher MUST support this member attribute and all "trimming-xxx" member attributes if they support the "finishings-col" attribute.

5.2.13.1 trimming-offset (1setOf integer(0:MAX))

The "trimming-offset" member attribute specifies where the cut, perforation, or score is made. The value is the distance from the Finishing Reference Edge specified by the "trimming-reference-edge" member attribute toward the center of the medium in hundredths of millimeters (1/2540th of an inch). The default value is generally derived from the "finishing-template" value and output media.

5.2.13.2 trimming-reference-edge (type1 keyword)

The "trimming-reference-edge" member attribute specifies which edge is used as the basis of the cut, perforation, or score: 'bottom', 'left', 'right', or 'top'. Cuts, perforations, and scores are placed parallel to the reference edge at the offset specified by the "trimming-offset" member attribute. The default value is generally derived from the "finishing-template" value and output media.

5.2.13.3 trimming-type (type2 keyword | name(MAX))

The "trimming-type" member attribute specifies the type of trim that is to be performed. The default value is implementation and/or site defined. The following values are defined by this specification:

'full': Cuts the hardcopy output the full length parallel to the reference edge.

'partial': Partially cuts the hardcopy output along the length parallel to the reference edge.

'perforate': Perforates the hardcopy output the full length parallel to the reference edge.

'score': Scores the hardcopy output the full length parallel to the reference edge.

'tab': Cuts the hardcopy output along the length parallel to the reference edge leaving a hanging tab.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA].

5.2.13.4 trimming-when (type2 keyword)

The "trimming-when" member attribute specified when trimming is performed. The default value may be derived from the "finishing-template" value or, if a default value cannot be

determined from that value, using an implementation or site defined value. The following values are defined by this specification:

'after-documents': Trimming occurs after each Document.

'after-job': Trimming occurs only after the entire Job is printed.

'after-sets': Trimming occurs after each Set (the typical default).

'after-sheets': Trimming occurs after each sheet.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA].

5.3 job-pages-per-set (integer(1:MAX))

The RECOMMENDED "job-pages-per-set" Job Template attribute specifies the number of input pages that constitute a set for finishing processes. For example, if a Client submits a 14 page PWG Raster Format Document for printing that actually contains two copies of four duplex pages each, the Client could specify a "job-pages-per-set" Job Template attribute with a value of 7, a "sides" attribute with a value of 'two-sided-long-edge', and a "finishings" attribute with a value of 4 (staple) to have the Printer staple two Sets of four sheets. Figure 3 shows a graphical representation of this example.

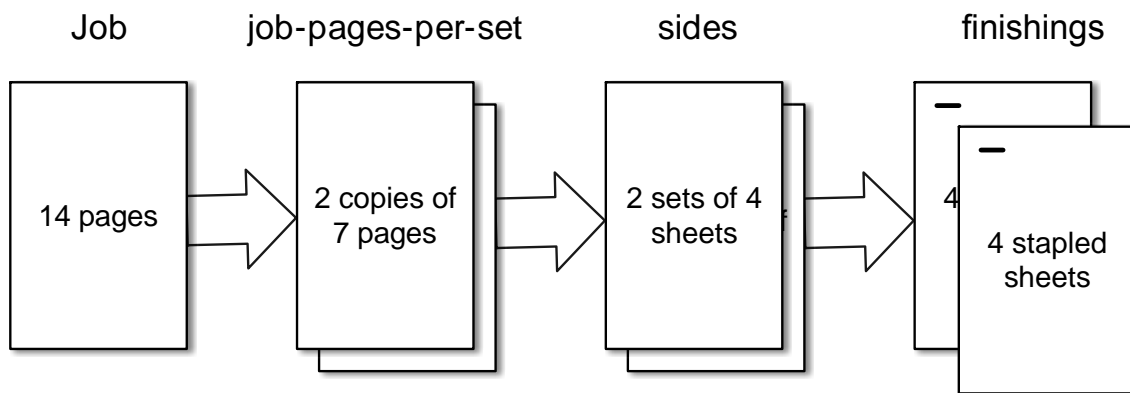


Figure 3 - Handling of "job-pages-per-set" Job Template Attribute

6. Printer Description Attributes

6.1 **baling-type-supported (1setOf (type2 keyword | name(MAX)))**

The "baling-type-supported" Printer attribute lists the supported values for the "baling-type" (section 5.2.2.1) member attribute.

6.2 **baling-when-supported (1setOf type2 keyword)**

The "baling-when-supported" Printer attribute lists the supported values for the "baling-when" (section 5.2.2.2) member attribute.

6.3 **binding-reference-edge-supported (1setOf type1 keyword)**

The "binding-reference-edge-supported" Printer attribute lists the supported values for the "binding-reference-edge" (section 5.2.3.1) member attribute.

6.4 **binding-type-supported (1setOf type2 keyword)**

The "binding-type-supported" Printer attribute lists the supported values for the "binding-type" (section 5.2.3.2) member attribute.

6.5 **coating-sides-supported (1setOf type1 keyword)**

The "coating-sides-supported" Printer attribute lists the supported values for the "coating-sides" (section 5.2.4.1) member attribute.

6.6 **coating-type-supported (1setOf (type2 keyword | name(MAX)))**

The "coating-type-supported" Printer attribute lists the supported values for the "coating-type" (section 5.2.4.2) member attribute.

6.7 **covering-name-supported (1setOf (type2 keyword | name(MAX)))**

The "covering-name-supported" Printer attribute lists the supported values for the "covering-name" (section 5.2.5.1) member attribute.

6.8 **finishing-template-supported (1setOf (name(MAX) | type2 keyword))**

The "finishing-template-supported" Printer attribute lists the supported values for the "finishing-template" (section 5.2.1) member. Except for 'none', Printers MUST list all "finishings-supported" keyword value equivalents in the list of "finishing-template-supported" values.

6.9 finishings-col-database (1setOf collection)

The RECOMMENDED "finishings-col-database" Printer attribute lists the "finishings-col" member attributes corresponding to each "finishings-supported" value. Unlike the "media-col-database" Printer attribute [PWG5100.11], the "finishings-col-database" attribute does not provide a definitive list of the valid combinations of valid finishing processes. Instead, it lists the basic finishing processes separately as well as vendor or site defined preset combinations, each identified by a corresponding "finishing-template" name or keyword. For example, a Printer that supports the 'booklet-maker' and 'staple' values might report:

```
finishings-col-database={
  finishing-template='booklet-maker'
  imposition-template='signature'
  media-size-name='na_tabloid_11x17in'
  folding={
    folding-direction='inward'
    folding-offset=21590
    folding-reference-edge='top'
  }
  stitching={
    stitching-locations=9313,18626
    stitching-offset=21590
    stitching-reference-edge='top'
  }
},{
  finishing-template='booklet-maker'
  imposition-template='signature'
  media-size={
    x-dimension=29700
    y-dimension=42000
  }
  folding={
    folding-direction='inward'
    folding-offset=21000
    folding-reference-edge='top'
  }
  stitching={
    stitching-locations=9900,19800
    stitching-offset=21000
    stitching-reference-edge='top'
  }
},{
  finishing-template='staple'
  stitching={
    stitching-locations=635
    stitching-offset=635
    stitching-reference-edge='left'
  }
}
```

Printers SHOULD report "finishings-col-database" values for each "finishings-supported" value other than 'none' (which is equivalent to a no-value for "finishings-col"), and MAY report multiple instances with the same "finishing-template" value but different "media-size"

or "media-size-name" values. This allows a Client to easily discovery which finishing processes are supported for a given media size, and to preview the results of each finishing process for the User. This attribute can also provide Printer and site-defined "presets" for compound finishing processes.

The same values SHOULD be returned in the "finishings-col-ready" Printer attribute (section 6.11) for each finisher Subunit that is available.

6.10 finishings-col-default (1setOf collection | no-value)

The "finishings-col-default" Printer attribute provides the default "finishings-col" (section 5.2) Job Template attribute value. Each collection value MUST contain the "finishing-template" member attribute and SHOULD contain all finishing process member attributes that are not affected by media size. For example, if the default is to staple output in the top left corner then the collection value SHOULD contain the "stitching" member attribute because the location of the staple does not depend on the media size. However, if the default is to punch three holes along the left edge of the media, the collection value SHOULD contain the "punching-reference-edge" and "punching-offset" member attributes but SHOULD NOT contain the "punching-locations" member attribute since the value of that member attribute depends upon the media size.

The "finishings-col-default" Printer attribute MUST report the same finishing processes as the "finishings-default" [RFC2911] Printer attribute. If "finishings-default" has the value 'none', then "finishings-col-default" MUST have the 'no-value' out-of-band value.

6.11 finishings-col-ready (1setOf collection)

The RECOMMENDED "finishings-col-ready" Printer attribute lists the "finishings-col" member attributes corresponding to each "finishing-template" value for Subunits that are available and media that is loaded. The values are always the same as or a subset of the "finishings-col-database" Printer attribute (section 6.9).

6.12 folding-direction-supported (1setOf type1 keyword)

The "folding-direction-supported" Printer attribute lists the supported values for the "folding-direction" (section 5.2.6.1) member attribute.

6.13 folding-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "folding-offset-supported" Printer attribute lists the supported values for the "folding-offset" (section 5.2.6.2) member attribute.

6.14 folding-reference-edge-supported (1setOf type1 keyword)

The "folding-reference-edge-supported" Printer attribute lists the supported values for the "folding-reference-edge" (section 5.2.6.3) member attribute.

6.15 laminating-sides-supported (1setOf type1 keyword)

The "laminating-sides-supported" Printer attribute lists the supported values for the "laminating-sides" (section 5.2.8.1) member attribute.

6.16 laminating-type-supported (1setOf (type2 keyword | name(MAX)))

The "laminating-type-supported" Printer attribute lists the supported values for the "laminating-type" (section 5.2.8.2) member attribute.

6.17 job-pages-per-set-supported (boolean)

The "job-pages-per-set-supported" Printer Attribute specifies whether the "job-pages-per-set" Job Template attribute (section 5.3) is supported. This attribute **MUST** be supported if the "job-pages-per-set" attribute is supported.

6.18 printer-finisher (1setOf octetString(MAX))

The **REQUIRED** "printer-finisher" Printer attribute provides current finisher details mapped from the SNMP finDeviceTable defined in IETF Finishing MIB [RFC3806].

This attribute **MUST** be supported if the "printer-finisher-description" (section 0) Printer attribute is supported. If supported, this attribute **MUST** have the same cardinality (contain the same number of values) as the "printer-finisher-description" attribute. The i^{th} value in the "printer-finisher" attribute corresponds to the i^{th} value in the "printer-finisher-description" attribute.

6.18.1 Keywords for printer-finisher

Table 2 defines the IPP datatypes and keywords for encoding "printer-finisher" from all of the machine-readable (non-localized) columnar objects in finDeviceTable [RFC3806].

6.18.2 Encoding of printer-finisher

Values of "printer-finisher" **MUST** be encoded using a visible subset of the [US-ASCII] charset. Control codes (0x00 to 0x1F and 0x7F) **MUST NOT** be used. The ABNF [STD68] [FIN-ABNF] in Figure 4 defines the standard encoding in "printer-finisher" for all the machine-readable (non-localized) columnar objects in finDeviceTable [RFC3806].

6.18.3 Examples of printer-finisher

The following example shows two rows of the machine-readable (non-localized) columnar objects from finDeviceTable encoded into corresponding values of "printer-finisher".

Note: Line breaks are shown below for readability of this example. Line breaks MUST NOT be encoded into actual values of "printer-finisher".

```
printer-finisher[1] =
    type=stitcher;unit=sheets;maxcapacity=500;capacity=100;
printer-finisher[2] =
    type=puncher;unit=sheets;maxcapacity=100;capacity=20;
```

Table 2 - Keywords for "printer-finisher"

Finishing MIB Object	IPP Data-type	IPP Keyword	PWG SM Keyword	Conformance
finDevice...				
Index (note 1)	Integer	index	Id	OPTIONAL
Type	String	type	FinisherType	REQUIRED
CapacityUnit	String	unit	FinisherCapacity Unit	REQUIRED
MaxCapacity	Integer	maxcapacity	FinisherMax Capacity	REQUIRED
CurrentCapacity	Integer	capacity	FinisherCurrent Capacity	REQUIRED
PresentOnOff	String	presentonoff	FinisherPresent OnOff	OPTIONAL
AssociatedMediaPaths	---	---	FinisherAssociat edMediaPaths	---
AssociatedOutputs	---	---	FinisherAssociat edOutputs	---
Status	Integer	status	SubunitStates	OPTIONAL

Notes:

1. finDeviceIndex is OPTIONAL in "printer-finisher", because correlation with the original MIB order is considered unimportant.

Figure 4 - ABNF for "printer-finisher" Values

```

printer-finisher = *finisher-required *[finisher-optional]
    ; set of finisher elements encoded into one value

finisher-required = finisher-req ";"
finisher-req = finisher-type / finisher-unit /
    finisher-max-capacity /
    finisher-capacity
finisher-optional = finisher-opt ";"
finisher-opt = finisher-index / finisher-presentonoff /
    finisher-status / finisher-ext

finisher-type = "type" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g.,
    ; 'stitcher') of finDeviceType in [RFC3806] mapped
    ; indirectly from the *label* in FinDeviceTypeTC

finisher-unit = "unit" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g., 'other') of
    ; finDeviceCapacityUnit in [RFC3806] mapped indirectly from
    ; the *label* in PrtCapacityUnitTC in [RFC3805]

finisher-max-capacity = "maxcapacity" "=" 1*[DIGIT / "-"]
    ; integer value as a numeric string mapped directly from
    ; finDeviceMaxCapacity in [RFC3806]

finisher-capacity = "capacity" "=" 1*[DIGIT / "-"]
    ; integer value as a numeric string mapped directly from
    ; finDeviceCurrentCapacity in [RFC3806]

finisher-index = "index" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly from
    ; finDeviceIndex in [RFC3806]

finisher-presentonoff = "presentonoff" "=" 1*ALPHA
    ; string value as an alpha string mapped directly from
    ; PresentOnOff in [RFC3805]

finisher-status = "status" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly from
    ; finDeviceStatus in [RFC3806]

finisher-ext      = finisher-extname "=" finisher-extvalue
finisher-extname  = 1*[ALPHA / DIGIT / "-"]
finisher-extvalue = 1*[ALPHA / DIGIT / "-" / "." / ","]
    ; extension point for other MIB values not mapped

```

6.19 printer-finisher-description (1setOf text(MAX))

The REQUIRED "printer-finisher-description" READ-ONLY Printer attribute provides current supply descriptions mapped from the SNMP finDeviceDescription object in the finDeviceTable defined in IETF Finishing MIB [RFC3806].

This attribute MUST be supported if the "printer-finisher" (section 6.18) Printer attribute is supported. If supported, this attribute MUST have the same cardinality (contain the same number of values) as the "printer-finisher" attribute. The i^{th} value in the "printer-finisher-description" attribute corresponds to the i^{th} value in the "printer-finisher" attribute.

6.19.1 Encoding of printer-finisher-description

Values of the "printer-finisher-description" attribute MUST be mapped from the corresponding human-readable (localized) values of finDeviceDescription, exactly as follows:

1. Each value of finDeviceDescription MUST be converted from the character set [RFC3808] specified by prtGeneralCurrentLocalization and prtLocalizationCharacterSet into the charset specified by "charset-configured" and then copied into a text value of "printer-finisher-description"; and
2. Each value of "printer-finisher-description" MUST be tagged with the natural language [RFC5646] specified by prtGeneralCurrentLocalization, prtLocalizationLanguage, and prtLocalizationCountry unless the natural language matches the default language used in the response.

6.19.2 Example of printer-finisher-description

The following example shows two instances of the human-readable (localized) columnar object finDeviceDescription in the finDeviceTable encoded into corresponding values of "printer-finisher-description":

```
printer-finisher-description[1] = "Stapler S/N:EXAMPLE-12345"  
printer-finisher-description[2] = "Hole Punch S/N:EXAMPLE-67890"
```

6.20 punching-locations-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "punching-locations-supported" Printer attribute lists the supported values for the "punching-locations" (section 5.2.11.1) member attribute.

6.21 punching-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "punching-offset-supported" Printer attribute lists the supported values for the "punching-offset" (section 5.2.11.2) member attribute.

6.22 punching-reference-edge-supported (1setOf type1 keyword)

The "punching-reference-edge-supported" Printer attribute lists the supported values for the "punching-reference-edge" (section 5.2.11.3) member attribute.

6.23 stitching-locations-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "stitching-locations-supported" Printer attribute lists the supported values for the "stitching-locations" (section 5.2.12.1) member attribute.

6.24 stitching-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "stitching-offset-supported" Printer attribute lists the supported values for the "stitching-offset" (section 5.2.12.2) member attribute.

6.25 stitching-reference-edge-supported (1setOf type1 keyword)

The "stitching-reference-edge-supported" Printer attribute lists the supported values for the "stitching-reference-edge" (section 5.2.12.3) member attribute.

6.26 trimming-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "trimming-offset-supported" Printer attribute lists the supported values for the "trimming-offset" (section 5.2.13.1) member attribute.

6.27 trimming-reference-edge-supported (1setOf type1 keyword)

The "trimming-reference-edge-supported" Printer attribute lists the supported values for the "trimming-reference-edge" (section 5.2.13.2) member attribute.

6.28 trimming-type-supported (1setOf type2 keyword)

The "trimming-type-supported" Printer attribute lists the supported values for the "trimming-type" (section 5.2.13.3) member attribute.

6.29 trimming-when-supported (1setOf type2 keyword)

The "trimming-when-supported" Printer attribute lists the supported values for the "trimming-when" (section 5.2.13.4) member attribute.

7. Conformance Requirements

This section summarizes the Conformance Requirements detailed in the definitions in this document for Clients and Printers.

7.1 Conformance Requirements for Clients

In order for a Client to claim conformance to this specification, a Client **MUST** support:

1. The IPP Printer attributes defined in section 6;
2. The IPP Job Template attributes defined in section 5;
3. The internationalization considerations in section 8; and
4. The security considerations in section 9.

7.2 Conformance Requirements for Printers

In order for a Printer to claim conformance to this specification, a Printer **MUST** support:

1. The IPP Printer attributes for any supported finishings defined in section 6;
2. The IPP Job Template attributes for any supported finishings defined in section 5;
3. The internationalization considerations in section 8; and
4. The security considerations in section 9.

8. Internationalization Considerations

For interoperability and basic support for multiple languages, conforming implementations **MUST** support:

1. The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8) [STD63] encoding of Unicode [UNICODE] [ISO10646]; and
2. The Unicode Format for Network Interchange [RFC5198] which requires transmission of well-formed UTF-8 strings and recommends transmission of normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

Unicode NFC is defined as the result of performing Canonical Decomposition (into base characters and combining marks) followed by Canonical Composition (into canonical composed characters wherever Unicode has assigned them).

WARNING – Performing normalization on UTF-8 strings received from IPP Clients and subsequently storing the results (e.g., in IPP Job objects) could cause false negatives in IPP Client searches and failed access (e.g., to IPP Printers with percent-encoded UTF-8 URIs now 'hidden').

9. Security Considerations

In addition to the security considerations described in the IPP/1.1: Model and Semantics [RFC2911], implementations MAY support different access control to various finishing features, depending on the identity of the job submitting user.

10. IANA and PWG Considerations

10.1 Attribute Registrations

The attributes defined in this document will be published by IANA according to the procedures in IPP Model and Semantics [RFC2911] section 6.2 in the following file:

<http://www.iana.org/assignments/ipp-registrations>

The registry entries will contain the following information:

Job Template attributes: -----	Reference -----
finishings-col (no-value 1setOf collection)	[PWG5100.1]
baling (collection)	[PWG5100.1]
baling-type (type2 keyword name(MAX))	[PWG5100.1]
baling-when (type2 keyword)	[PWG5100.1]
binding (collection)	[PWG5100.1]
binding-reference-edge (type1 keyword)	[PWG5100.1]
binding-type (type2 keyword name(MAX))	[PWG5100.1]
coating (collection)	[PWG5100.1]
coating-sides (type1 keyword)	[PWG5100.1]
coating-type (type2 keyword name(MAX))	[PWG5100.1]
covering (collection)	[PWG5100.1]
covering-name (type2 keyword name(MAX))	[PWG5100.1]
finishing-template (name(MAX) type2 keyword)	[PWG5100.1]
folding (1setOf collection)	[PWG5100.1]
folding-direction (type1 keyword)	[PWG5100.1]
folding-offset (integer(0:MAX))	[PWG5100.1]
folding-reference-edge (type1 keyword)	[PWG5100.1]
laminating (collection)	[PWG5100.1]
laminating-sides (type1 keyword)	[PWG5100.1]
laminating-type (type2 keyword name(MAX))	[PWG5100.1]
punching (collection)	[PWG5100.1]
punching-locations (1setOf integer(0:MAX))	[PWG5100.1]
punching-offset (integer(0:MAX))	[PWG5100.1]
punching-reference-edge (type1 keyword)	[PWG5100.1]
trimming (1setOf collection)	[PWG5100.1]
trimming-offset (integer(0:MAX))	[PWG5100.1]
trimming-reference-edge (type1 keyword)	[PWG5100.1]
trimming-type (type2 keyword name(MAX))	[PWG5100.1]
trimming-when (type2 keyword)	[PWG5100.1]
job-pages-per-set (integer(1:MAX))	[PWG5100.1]
 Printer Description attributes:	 Reference

```

-----
baling-type-supported (1setOf (type2 keyword | name(MAX))) [PWG5100.1]
baling-when-supported (1setOf type2 keyword) [PWG5100.1]
binding-reference-edge-supported (1setOf type1 keyword) [PWG5100.1]
binding-type-supported (1setOf type2 keyword) [PWG5100.1]
coating-sides-supported (1setOf type1 keyword) [PWG5100.1]
coating-type-supported (1setOf (type2 keyword | name(MAX))) [PWG5100.1]
covering-name-supported (1setOf (type2 keyword | name(MAX)))
[PWG5100.1]
finishing-template-supported (1setOf (name(MAX) | type2 keyword))
[PWG5100.1]
finishings-col-database (1setOf collection) [PWG5100.1]
< member attributes are the same as finishings-col > [PWG5100.1]
folding-direction-supported (1setOf type1 keyword) [PWG5100.1]
folding-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))
[PWG5100.1]
folding-reference-edge-supported (1setOf type1 keyword) [PWG5100.1]
laminating-sides-supported (1setOf type1 keyword) [PWG5100.1]
laminating-type-supported (1setOf (type2 keyword | name(MAX)))
[PWG5100.1]
job-pages-per-set-supported (boolean) [PWG5100.1]
printer-finisher (1setOf octetString(MAX)) [PWG5100.1]
printer-finisher-description (1setOf text(MAX)) [PWG5100.1]
punching-locations-supported (1setOf (integer(0:MAX) |
rangeOfInteger(0:MAX))) [PWG5100.1]
punching-offset-supported (1setOf (integer(0:MAX) |
rangeOfInteger(0:MAX))) [PWG5100.1]
punching-reference-edge-supported (1setOf type1 keyword) [PWG5100.1]
trimming-offset-supported (1setOf (integer(0:MAX) |
rangeOfInteger(0:MAX))) [PWG5100.1]
trimming-reference-edge-supported (1setOf type1 keyword) [PWG5100.1]
trimming-type-supported (1setOf type2 keyword) [PWG5100.1]
trimming-when-supported (1setOf type2 keyword) [PWG5100.1]

```

10.2 Attribute Value Registrations

The keyword attribute values defined in this document will be published by IANA according to the procedures in the IPP Model and Semantics [RFC2911] section 6.1 in the following file:

<http://www.iana.org/assignments/ipp-registrations>

The registry entries will contain the following information:

Attributes (attribute syntax)	Reference
Keyword Attribute Value	-----
-----	-----
baling-type (type2 keyword name(MAX))	[PWG5100.1]
band	[PWG5100.1]
shrink-wrap	[PWG5100.1]
wrap	[PWG5100.1]
baling-type-supported (1setOf (type2 keyword name(MAX)))	[PWG5100.1]
< all baling-type values >	

balancing-when (type2 keyword)	[PWG5100.1]
after-sets	[PWG5100.1]
after-job	[PWG5100.1]
balancing-when-supported (1setOf type2 keyword)	[PWG5100.1]
< all balancing-when values >	[PWG5100.1]
binding-reference-edge (type1 keyword)	[PWG5100.1]
bottom	[PWG5100.1]
left	[PWG5100.1]
right	[PWG5100.1]
top	[PWG5100.1]
binding-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
< all binding-reference-edge values >	[PWG5100.1]
binding-type (type2 keyword name(MAX))	[PWG5100.1]
adhesive	[PWG5100.1]
comb	[PWG5100.1]
flat	[PWG5100.1]
padding	[PWG5100.1]
perfect	[PWG5100.1]
spiral	[PWG5100.1]
tape	[PWG5100.1]
velo	[PWG5100.1]
binding-type-supported ((1setOf type2 keyword name(MAX)))	[PWG5100.1]
< all binding-type values >	[PWG5100.1]
coating-sides (type1 keyword)	[PWG5100.1]
back	[PWG5100.1]
both	[PWG5100.1]
front	[PWG5100.1]
coating-sides-supported (1setOf type1 keyword)	[PWG5100.1]
< all coating-sides values >	[PWG5100.1]
coating-type (type2 keyword name(MAX))	[PWG5100.1]
archival	[PWG5100.1]
archival-glossy	[PWG5100.1]
archival-matte	[PWG5100.1]
archival-semi-gloss	[PWG5100.1]
glossy	[PWG5100.1]
high-gloss	[PWG5100.1]
matte	[PWG5100.1]
semi-gloss	[PWG5100.1]
silicone	[PWG5100.1]
translucent	[PWG5100.1]
coating-type-supported ((1setOf type2 keyword name(MAX)))	[PWG5100.1]
< all coating-type values >	[PWG5100.1]
covering-name (type2 keyword name(MAX))	[PWG5100.1]
plain	[PWG5100.1]
pre-cut	[PWG5100.1]
pre-printed	[PWG5100.1]
covering-name-supported (1setOf (type2 keyword name(MAX)))	[PWG5100.1]
< all covering-name values >	[PWG5100.1]
finishing-template (name(MAX) type2 keyword)	[PWG5100.1]

bale	[PWG5100.1]
bind	[PWG5100.1]
bind-bottom	[PWG5100.1]
bind-left	[PWG5100.1]
bind-right	[PWG5100.1]
bind-top	[PWG5100.1]
booklet-maker	[PWG5100.1]
coat	[PWG5100.1]
cover	[PWG5100.1]
edge-stitch	[PWG5100.1]
edge-stitch-bottom	[PWG5100.1]
edge-stitch-left	[PWG5100.1]
edge-stitch-right	[PWG5100.1]
edge-stitch-top	[PWG5100.1]
fold	[PWG5100.1]
fold-accordion	[PWG5100.1]
fold-double-gate	[PWG5100.1]
fold-gate	[PWG5100.1]
fold-half	[PWG5100.1]
fold-half-z	[PWG5100.1]
fold-left-gate	[PWG5100.1]
fold-letter	[PWG5100.1]
fold-parallel	[PWG5100.1]
fold-poster	[PWG5100.1]
fold-right-gate	[PWG5100.1]
fold-z	[PWG5100.1]
jdf-f2-1	[PWG5100.1]
jdf-f4-1	[PWG5100.1]
jdf-f4-2	[PWG5100.1]
jdf-f6-1	[PWG5100.1]
jdf-f6-2	[PWG5100.1]
jdf-f6-3	[PWG5100.1]
jdf-f6-4	[PWG5100.1]
jdf-f6-5	[PWG5100.1]
jdf-f6-6	[PWG5100.1]
jdf-f6-7	[PWG5100.1]
jdf-f6-8	[PWG5100.1]
jdf-f8-1	[PWG5100.1]
jdf-f8-2	[PWG5100.1]
jdf-f8-3	[PWG5100.1]
jdf-f8-4	[PWG5100.1]
jdf-f8-5	[PWG5100.1]
jdf-f8-6	[PWG5100.1]
jdf-f8-7	[PWG5100.1]
jdf-f10-1	[PWG5100.1]
jdf-f10-2	[PWG5100.1]
jdf-f10-3	[PWG5100.1]
jdf-f12-1	[PWG5100.1]
jdf-f12-2	[PWG5100.1]
jdf-f12-3	[PWG5100.1]
jdf-f12-4	[PWG5100.1]
jdf-f12-5	[PWG5100.1]
jdf-f12-6	[PWG5100.1]
jdf-f12-7	[PWG5100.1]
jdf-f12-8	[PWG5100.1]
jdf-f12-9	[PWG5100.1]

jdf-f12-10	[PWG5100.1]
jdf-f12-11	[PWG5100.1]
jdf-f12-12	[PWG5100.1]
jdf-f12-13	[PWG5100.1]
jdf-f12-14	[PWG5100.1]
jdf-f14-1	[PWG5100.1]
jdf-f16-1	[PWG5100.1]
jdf-f16-2	[PWG5100.1]
jdf-f16-3	[PWG5100.1]
jdf-f16-4	[PWG5100.1]
jdf-f16-5	[PWG5100.1]
jdf-f16-6	[PWG5100.1]
jdf-f16-7	[PWG5100.1]
jdf-f16-8	[PWG5100.1]
jdf-f16-9	[PWG5100.1]
jdf-f16-10	[PWG5100.1]
jdf-f16-11	[PWG5100.1]
jdf-f16-12	[PWG5100.1]
jdf-f16-13	[PWG5100.1]
jdf-f16-14	[PWG5100.1]
jdf-f18-1	[PWG5100.1]
jdf-f18-2	[PWG5100.1]
jdf-f18-3	[PWG5100.1]
jdf-f18-4	[PWG5100.1]
jdf-f18-5	[PWG5100.1]
jdf-f18-6	[PWG5100.1]
jdf-f18-7	[PWG5100.1]
jdf-f18-8	[PWG5100.1]
jdf-f18-9	[PWG5100.1]
jdf-f20-1	[PWG5100.1]
jdf-f20-2	[PWG5100.1]
jdf-f24-1	[PWG5100.1]
jdf-f24-2	[PWG5100.1]
jdf-f24-3	[PWG5100.1]
jdf-f24-4	[PWG5100.1]
jdf-f24-5	[PWG5100.1]
jdf-f24-6	[PWG5100.1]
jdf-f24-7	[PWG5100.1]
jdf-f24-8	[PWG5100.1]
jdf-f24-9	[PWG5100.1]
jdf-f24-10	[PWG5100.1]
jdf-f24-11	[PWG5100.1]
jdf-f28-1	[PWG5100.1]
jdf-f32-1	[PWG5100.1]
jdf-f32-2	[PWG5100.1]
jdf-f32-3	[PWG5100.1]
jdf-f32-4	[PWG5100.1]
jdf-f32-5	[PWG5100.1]
jdf-f32-6	[PWG5100.1]
jdf-f32-7	[PWG5100.1]
jdf-f32-8	[PWG5100.1]
jdf-f32-9	[PWG5100.1]
jdf-f36-1	[PWG5100.1]
jdf-f36-2	[PWG5100.1]
jdf-f40-1	[PWG5100.1]
jdf-f48-1	[PWG5100.1]

jdf-f48-2	[PWG5100.1]
jdf-f64-1	[PWG5100.1]
jdf-f64-2	[PWG5100.1]
jog-offset	[PWG5100.1]
laminates	[PWG5100.1]
punch	[PWG5100.1]
punch-bottom-left	[PWG5100.1]
punch-bottom-right	[PWG5100.1]
punch-dual-bottom	[PWG5100.1]
punch-dual-left	[PWG5100.1]
punch-dual-right	[PWG5100.1]
punch-dual-top	[PWG5100.1]
punch-quad-bottom	[PWG5100.1]
punch-quad-left	[PWG5100.1]
punch-quad-right	[PWG5100.1]
punch-quad-top	[PWG5100.1]
punch-top-left	[PWG5100.1]
punch-top-right	[PWG5100.1]
punch-triple-bottom	[PWG5100.1]
punch-triple-left	[PWG5100.1]
punch-triple-right	[PWG5100.1]
punch-triple-top	[PWG5100.1]
saddle-stitch	[PWG5100.1]
staple	[PWG5100.1]
staple-bottom-left	[PWG5100.1]
staple-bottom-right	[PWG5100.1]
staple-dual-bottom	[PWG5100.1]
staple-dual-left	[PWG5100.1]
staple-dual-right	[PWG5100.1]
staple-dual-top	[PWG5100.1]
staple-top-left	[PWG5100.1]
staple-top-right	[PWG5100.1]
staple-triple-bottom	[PWG5100.1]
staple-triple-left	[PWG5100.1]
staple-triple-right	[PWG5100.1]
staple-triple-top	[PWG5100.1]
trim	[PWG5100.1]
trim-after-copies	[PWG5100.1]
trim-after-documents	[PWG5100.1]
trim-after-job	[PWG5100.1]
trim-after-pages	[PWG5100.1]
finishing-template-supported (1setOf (type2 keyword name (MAX))	[PWG5200.FIN]
< any finishing-template value >	[PWG5100.1]
folding-direction (type1 keyword)	[PWG5100.1]
inward	[PWG5100.1]
outward	[PWG5100.1]
folding-direction-supported (1setOf type1 keyword)	[PWG5100.1]
< all folding-direction values >	[PWG5100.1]
folding-reference-edge (type1 keyword)	[PWG5100.1]
bottom	[PWG5100.1]
left	[PWG5100.1]
right	[PWG5100.1]
top	[PWG5100.1]

folding-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
< all folding-reference-edge values >	[PWG5100.1]
laminating-sides (type1 keyword)	[PWG5100.1]
back	[PWG5100.1]
both	[PWG5100.1]
front	[PWG5100.1]
laminating-sides-supported (1setOf type1 keyword)	[PWG5100.1]
< all laminating-sides values >	[PWG5100.1]
laminating-type (type2 keyword name(MAX))	[PWG5100.1]
archival	[PWG5100.1]
glossy	[PWG5100.1]
high-gloss	[PWG5100.1]
matte	[PWG5100.1]
semi-gloss	[PWG5100.1]
translucent	[PWG5100.1]
laminating-type-supported ((1setOf type2 keyword name(MAX)))	[PWG5100.1]
< all laminating-type values >	[PWG5100.1]
punching-reference-edge (type1 keyword)	[PWG5100.1]
bottom	[PWG5100.1]
left	[PWG5100.1]
right	[PWG5100.1]
top	[PWG5100.1]
punching-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
< all punching-reference-edge values >	[PWG5100.1]
trimming-reference-edge (type1 keyword)	[PWG5100.1]
bottom	[PWG5100.1]
left	[PWG5100.1]
right	[PWG5100.1]
top	[PWG5100.1]
trimming-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
< all trimming-reference-edge values >	[PWG5100.1]
trimming-type (type2 keyword name(MAX))	[PWG5100.1]
full	[PWG5100.1]
partial	[PWG5100.1]
perforate	[PWG5100.1]
score	[PWG5100.1]
tab	[PWG5100.1]
trimming-type-supported (1setOf type2 keyword)	[PWG5100.1]
< all trimming-type values >	[PWG5100.1]
trimming-when (type2 keyword)	[PWG5100.1]
after-documents	[PWG5100.1]
after-job	[PWG5100.1]
after-sheets	[PWG5100.1]
after-sets	[PWG5100.1]
trimming-when-supported (1setOf type2 keyword)	[PWG5100.1]
< all trimming-when values >	[PWG5100.1]

10.3 Type2 enum Attribute Value Registrations

The enumerations defined in this document will be published by IANA according to the procedures in the IPP Model and Semantics [RFC2911] section 6.2 in the following file:

<http://www.iana.org/assignments/ipp-registrations>

The registry entries will contain the following information:

Attributes (attribute syntax)		Reference
Enum Value	Enum Symbolic Name	
-----	-----	-----
finishings (1setOf type2 enum)		[RFC2911]
15	coat	[PWG5100.1]
16	laminate	[PWG5100.1]
32	staple-triple-left	[PWG5100.1]
33	staple-triple-top	[PWG5100.1]
34	staple-triple-right	[PWG5100.1]
35	staple-triple-bottom	[PWG5100.1]
70	punch-top-left	[PWG5100.1]
71	punch-bottom-left	[PWG5100.1]
72	punch-top-right	[PWG5100.1]
73	punch-bottom-right	[PWG5100.1]
74	punch-dual-left	[PWG5100.1]
75	punch-dual-top	[PWG5100.1]
76	punch-dual-right	[PWG5100.1]
77	punch-dual-bottom	[PWG5100.1]
78	punch-triple-left	[PWG5100.1]
79	punch-triple-top	[PWG5100.1]
80	punch-triple-right	[PWG5100.1]
81	punch-triple-bottom	[PWG5100.1]
82	punch-quad-left	[PWG5100.1]
83	punch-quad-top	[PWG5100.1]
84	punch-quad-right	[PWG5100.1]
85	punch-quad-bottom	[PWG5100.1]
90	fold-accordion	[PWG5100.1]
91	fold-double-gate	[PWG5100.1]
92	fold-gate	[PWG5100.1]
93	fold-half	[PWG5100.1]
94	fold-half-z	[PWG5100.1]
95	fold-left-gate	[PWG5100.1]
96	fold-letter	[PWG5100.1]
97	fold-parallel	[PWG5100.1]
98	fold-poster	[PWG5100.1]
99	fold-right-gate	[PWG5100.1]
100	fold-z	[PWG5100.1]

10.4 PWG Semantic Model Registrations

The IPP attributes and values defined in this specification and listed in the preceding sections will be added to the PWG Semantic Model XML schema using the method defined in section 21 of [PWG5108.07].

11. References

11.1 Normative References

- [ISO10646] "Information technology -- Universal Coded Character Set (UCS)", ISO/IEC 10646:2011
- [JDF1.5] CIP4 Organization, "JDF Specification, Release 1.5", December 2013, <http://www.cip4.org/>
- [PWG5100.3] K. Ocke, T. Hastings, "Internet Printing Protocol (IPP): Production Printing Attributes – Set1", PWG 5100.3-2001, February 2001, <http://ftp.pwg.org/pub/pwg/candidates/cs-ippprodprint10-20010212-5100.3.pdf>
- [PWG5100.13] M. Sweet, I. McDonald, P. Zehler, "IPP: Job and Printer Extensions - Set 3 (JPS3)", PWG 5100.13-2012, July 2012, <http://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext3v10-20120727-5100.13.pdf>
- [PWG5108.07] P. Zehler, "PWG Print Job Ticket and Associated Capabilities Version 1.0 (PJT)", PWG 5108.07-2012, August 2012, <http://ftp.pwg.org/pub/pwg/candidates/cs-sm20-pjt10-20120801-5108.07.pdf>
- [RFC2119] S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels", RFC 2119/BCP 14, March 1997, <http://www.ietf.org/rfc/rfc2119.txt>
- [RFC2910] R. Herriot, S. Butler, P. Moore, R. Turner, J. Wenn, "Internet Printing Protocol/1.1: Encoding and Transport", RFC 2910, September 2000, <http://www.ietf.org/rfc/rfc2910.txt>
- [RFC2911] T. Hastings, R. Herriot, R. deBry, S. Isaacson, P. Powell, "Internet Printing Protocol/1.1: Model and Semantics", RFC 2911, September 2000, <http://www.ietf.org/rfc/rfc2911.txt>
- [RFC3381] T. Hastings, H. Lewis, R. Bergman, "Internet Printing Protocol (IPP): Job Progress Attributes", RFC 3381, September 2002, <http://www.ietf.org/rfc/rfc3381.txt>
- [RFC3382] R. deBry, R. Herriot, T. Hastings, K. Ocke, P. Zehler, "Internet Printing Protocol (IPP): The 'collection' attribute syntax", RFC 3382, September 2002, <http://www.ietf.org/rfc/rfc3382.txt>
- [RFC3805] R. Bergman, H. Lewis, I. McDonald, "Printer MIB v2", RFC 3805, June 2004, <http://www.ietf.org/rfc/rfc3805.txt>

- [RFC3806] R. Bergman, H. Lewis, I. McDonald, "Printer Finishing MIB", RFC 3806, June 2004, <http://www.ietf.org/rfc/rfc3806.txt>
- [RFC3808] I. McDonald, "IANA Charset MIB", RFC 3808, June 2004, <http://www.ietf.org/rfc/rfc3808.txt>
- [RFC5198] J. Klensin, M. Padlipsky, "Unicode Format for Network Interchange", RFC 5198, March 2008, <http://www.ietf.org/rfc/rfc5198.txt>
- [RFC5646] A. Phillips, M. Davis, "Tags for Identifying Languages", September 2009, <http://www.ietf.org/rfc/rfc5646.txt>
- [RFC7230] R. Fielding, J. Reschke, "Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing", RFC 7230, June 2014, <http://www.ietf.org/rfc/rfc7230.txt>
- [STD63] F. Yergeau, "UTF-8, a transformation format of ISO 10646", RFC 3629/STD 63, November 2003, <http://www.ietf.org/rfc/rfc3629.txt>
- [STD68] D. Crocker, P Overell, "Augmented BNF for Syntax Specifications: ABNF", RFC 5234/STD 68, January 2008, <http://www.ietf.org/rfc/rfc5234.txt>
- [UAX15] M. Davis, M. Duerst, "Unicode Normalization Forms", Unicode Standard Annex 15, March 2008, <http://www.unicode.org/reports/tr15/>
- [UNICODE] The Unicode Consortium, "The Unicode Standard, Version 6.2.0", ISBN 978-1-936213-07-8, September 2012, <http://www.unicode.org/versions/Unicode6.2.0/>

11.2 Informative References

- [FIN-ABNF] Collected ABNF for PWG 5100.1-YYYY, <http://ftp.pwg.org/pub/pwg/informational/pwg5100.1-abnf.txt>
- [ISO10175] "Document Printing Application (DPA)", ISO/IEC 10175, June 1996
- [PUNCH] "Hole punch", http://en.wikipedia.org/wiki/Hole_punch
- [PWG5100.1-2001] T. Hastings, D. Fullman, "IPP: 'finishings' attribute values extension", PWG 5100.1-2001, February 2001, <ftp://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishing10-20010205-5100.1.pdf>

12. Author's Address

Michael Sweet
1 Infinite Loop
M/S 111-HOMC
Cupertino, CA 95014
msweet@apple.com

The author would also like to thank the following individuals for their contributions to this standard:

Richard Blanchard (Apple)
Don Fullman (original Author)
Tom Hastings (original Author)
Smith Kennedy (Hewlett Packard)
Ira McDonald (High North)