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IPP Finishings 3.0 (FIN)

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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.

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<https://ftp.pwg.org/pub/pwg/general/pwg-process30.pdf>

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<https://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:

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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.

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1. Introduction

The Internet Printing Protocol/1.1 [STD92] specification defines the basic attributes and values needed to support advanced finishing processes on printed output. This specification, which was originally titled 'IPP: "finishings" attribute values extension', defines more new 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 to provide a holistic view of the various finishing processes that some Printers support.

The "finishings" Job Template attribute [STD92] 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 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.

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 [BCP14]. Additionally, the term CONDITIONALLY REQUIRED is 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 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], and Internet Printing Protocol/1.1 [STD92].

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

Finishing Location: The distance from the 'left' edge of the Media Sheet toward the 'right' edge when the Finishing Reference Edge is either 'top' or 'bottom', or the distance from the 'bottom' edge of the Media Sheet toward the 'top' edge when the Finishing Reference Edge is either 'left' or 'right'.

Finishing Offset: The distance from the Finishing Reference Edge toward the center of the Media Sheet where finishing operations are performed. Some types of finishing operations, such as folding, only need an offset, while other types of finishing operations, such as punching or stitching, also need Finishing Location(s) to be specified.

Finishing Reference Edge: The Media Sheet edge ('top', 'left', 'right', 'bottom') used as a starting point to describe finishing operations.

Finishing Template: A named collection of finishing processes and values.

Impression: The Document content imposed upon one side of a Media Sheet by a marking engine, independent of the number of times that the sheet side passes any marker. An Impression contains one or more Input Pages that are imposed (scaled, translated, and/or rotated) during processing of the Document data. [STD92]

Input Page: A page according to the definition of "pages" in the language used to express the Document data. [STD92]

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.

Media Sheet: A single instance of a medium, whether printing on one or both sides of the medium. Media Sheets also include sections of roll media. [STD92]

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. Finishing processes operate on Sets. [STD92]

2.4 Acronyms and Organizations

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

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

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

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

PWG: IEEE ISTO Printer Working Group, <https://www.pwg.org/>

3. Requirements

3.1 Rationale for IPP Finishings

Based on the following existing specifications:

- Internet Printing Protocol/1.1 [STD92] defined the "finishings" Job Template attribute and basic values.

This IPP Finishings 3.0 (FIN) specification SHOULD:

- Define Job Template attributes and values needed to clearly express finishing intent; and
- Define 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 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.

3.2.9 Punch

Jane is printing invoices that will 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.

3.2.10 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.

3.2.11 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.

3.2.12 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.

3.2.13 Wrap

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

3.2.14 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 sheets, then staple the sheets along the midline, fold the sheets along the midline, and finally shrink-wrap each booklet. She then submits the print request.

3.2.15 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.

3.2.16 Finishing Supplies

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. She is notified that the number of staples in the Printer is low.

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 3.2.14), the Printer returns an error indicating that the requested finishing intent cannot be combined as requested.

3.3.3 Finishing with Finisher Fidelity Restrictions

Jane is printing an eight-page brochure booklet. Using software on her Client device, she specifies finishing intent to impose the pages from her Document onto sheets, fold and staple the sheets along the midline, and shrink-wrap each produced copy of the booklet. The Client looks up finisher restrictions for the Printer's media and orientation and presents an accurate print preview. Jane submits the print request, and the output accurately matches the preview and her expectations.

3.4 Out of Scope

The following are 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

3.5 Design Requirements

The design requirements for this specification are:

1. Follow the naming conventions defined in Internet Printing Protocol/1.1 [STD92], 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]. IPP finishing is any post-processing of the hardcopy output 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 [STD92] 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

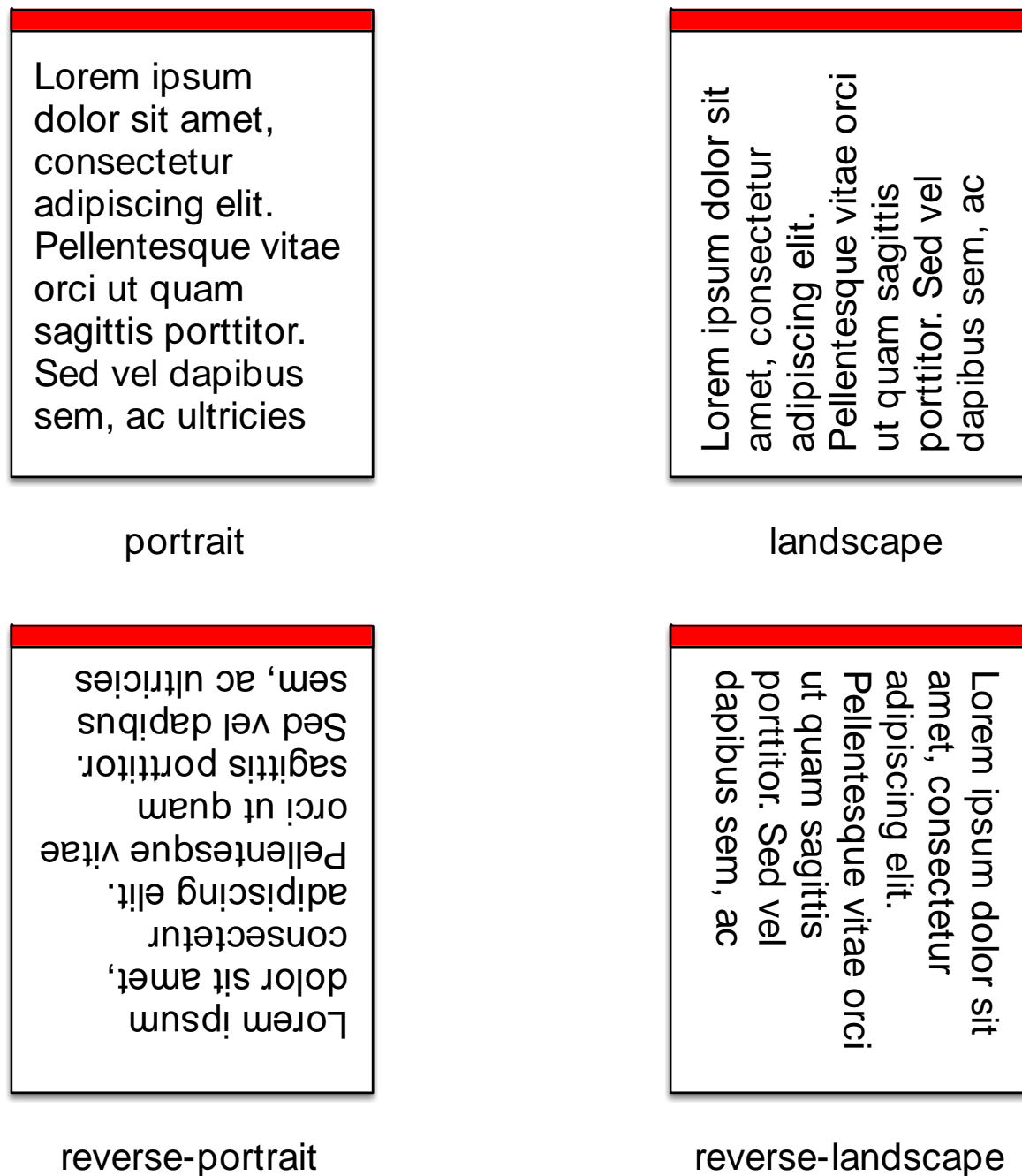
or bound and covered and get the intended output – the Printer is responsible for determining the correct processing order for a sequence of finishing values.

The original finishing support in Internet Printing Protocol/1.1 [STD92] 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 [PWG5100.3-2001] 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.

4.1 Coordinate System

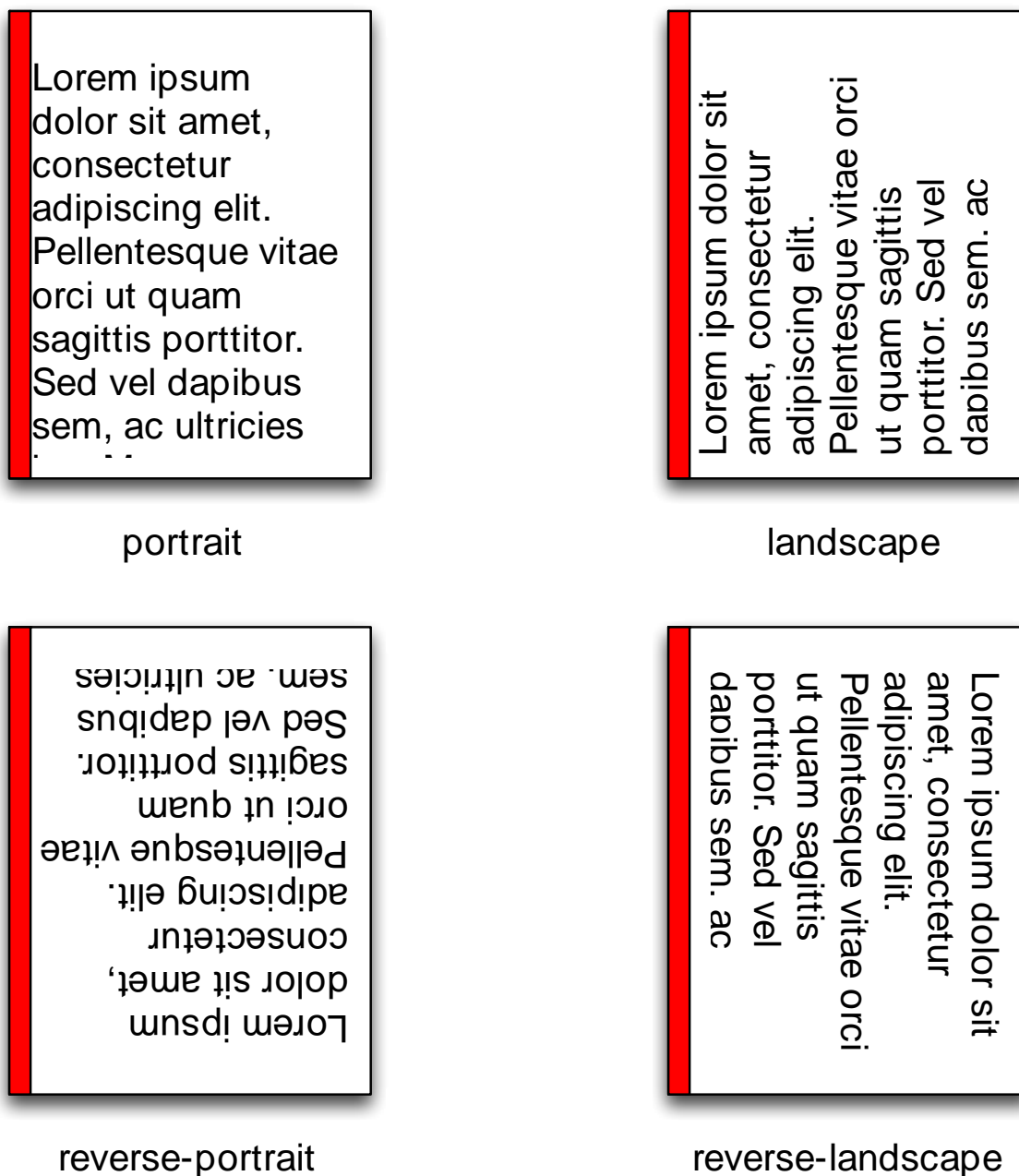
The positional values are specified with respect to the Document as if the Document was in portrait orientation. This coordinate system scheme agrees with the Finisher MIB [RFC3806], which in turn follows the ISO DPA [ISO10175] approach of using a coordinate system as if the document were portrait. The 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.

If the Document is in landscape or reverse-landscape orientation, the Client supplies the appropriate transformed value. For example, to position a staple in the upper left corner of a landscape Document when held for reading, the Client supplies the 'staple-bottom-left' value since landscape is defined as a counter-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 1 shows how content is placed on sheets for each "orientation-requested" value [STD92] when feeding short edge first. Figure 2 shows how content is placed on sheets for each "orientation-requested" value when feeding long edge first.



Leading Edge of Sheet

Figure 1 - Effect of "orientation-requested" on Output with Short Edge First Feed



Leading Edge of Sheet

Figure 2 - Effect of "orientation-requested" on Output with Long Edge First Feed

4.2 Finishing Processes

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

4.2.1 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.

4.2.2 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.

4.2.3 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.

4.2.4 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.

4.2.5 Cover

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

4.2.6 Fold

A fold finisher places folds in hardcopy output at certain positions and directions. Figure 3 shows common fold styles that are supported by this specification.

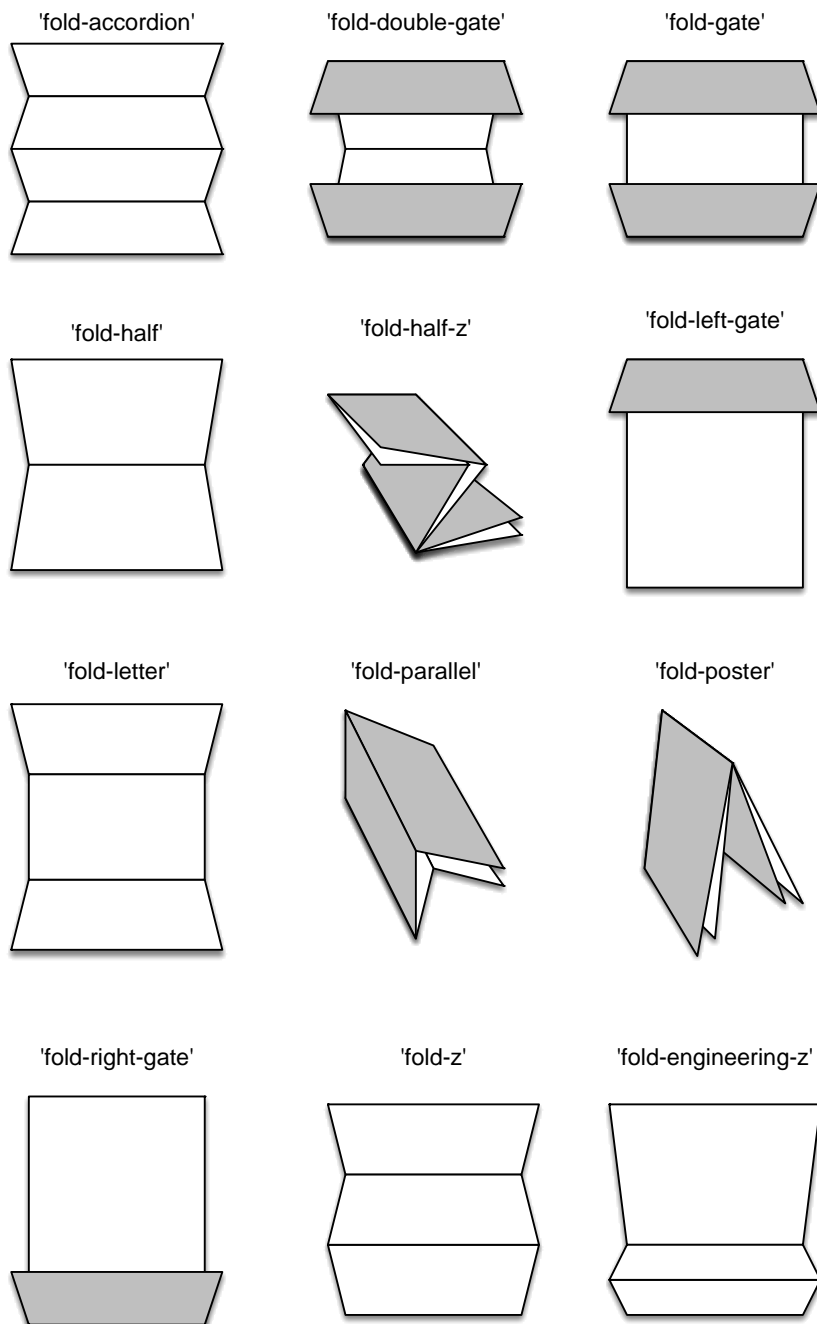


Figure 3 - Standard Folds

4.2.7 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].

4.2.8 Stitch (Staple, Crimp, Edge Stitch, or 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. Crimps can be used instead of staples in some cases. 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.

4.2.9 Trim (Cut, Perforate, or Score)

Trim finishers cut, perforate, or score hardcopy output along a straight line parallel or perpendicular to the feed direction.

5. Job Template Attributes

Table 1 lists the Job Template attributes defined in this specification and their associated Printer conformance requirements.

Table 1 - New Job Template Attributes

Attribute	Printer Conformance
finishings	REQUIRED
finishings-col	REQUIRED
job-pages-per-set	CONDITIONALLY REQUIRED

5.1 finishings (1setOf type2 enum)

This REQUIRED Job Template attribute [STD92] lists the finishing processes that the Printer uses for each copy of each printed Document in the Job. A Printer that supports 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. A Printer MUST NOT require Clients to supply values in a particular order. If a Client supplies a value of 3 ('none') with any additional values, the Printer MUST ignore the 3 ('none') value and process the Job as though 'none' was never supplied.

If the Printer supports the "media-col-ready" and / or "media-col-database" Printer Description attributes [PWG5100.7], the Client can discover the media feed orientation and direction by checking the values of the "media-source-feed-orientation" and "media-source-feed-direction" member attributes in each collection.

Note: The effect of the “finishings” attribute on Jobs with multiple copies and Documents is controlled by the “multiple-document-handling” Job Template attribute [STD92]. The relationship of this attribute and the other attributes that control Document processing is described in Internet Printing Protocol/1.1 [STD92].

5.1.1 STD 92 “finishings” Values

Internet Printing Protocol/1.1 [STD92] defines the following values for the “finishings” attribute:

- '3' (none): Perform no finishing
- '4' (staple): Bind the Set(s) with one or more staples. The exact number, placement, and orientation of the staples are implementation and/or site defined.
- '5' (punch): 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.
- '6' (cover): 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.
- '7' (bind): 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.
- '8' (saddle-stitch): 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.
- '9' (edge-stitch): 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.
- '20' (staple-top-left): Bind the Set(s) with one or more staples in the top left corner.
- '21' (staple-bottom-left): Bind the Set(s) with one or more staples in the bottom left corner.
- '22' (staple-top-right): Bind the Set(s) with one or more staples in the top right corner.
- '23' (staple-bottom-right): Bind the Set(s) with one or more staples in the bottom right corner.

- '24' (edge-stitch-left): 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.
- '25' (edge-stitch-top): 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.
- '26' (edge-stitch-right): 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.
- '27' (edge-stitch-bottom): 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.
- '28' (staple-dual-left): Bind the Set(s) with two staples (wire stitches) along the left edge assuming a portrait document (see section 5.1).
- '29' (staple-dual-top): Bind the Set(s) with two staples (wire stitches) along the top edge assuming a portrait document (see section 5.1).
- '30' (staple-dual-right): Bind the Set(s) with two staples (wire stitches) along the right edge assuming a portrait document (see section 5.1).
- '31' (staple-dual-bottom): Bind the Set(s) with two staples (wire stitches) along the bottom edge assuming a portrait document (see section 5.1).

5.1.2 PWG 5100.1-2001 “finishings” Values

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

- '10' (fold): Fold the hardcopy output. The exact number and orientations of the folds is implementation and/or site defined.
- '11' (trim): 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.
- '12' (bale): Bale the Set(s). The type of baling is implementation and/or site defined.
- '13' (booklet-maker): 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.

- '14' (jog-offset): (DEPRECATED) 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. The "output-bin" Job Template attribute can be used instead, specifying one of the 'stacker-NN' keywords (e.g. 'stacker-1').
- '50' (bind-left): Bind the Set(s) along the left edge; the type of the binding is implementation and/or site defined.
- '51' (bind-top): Bind the Set(s) along the top edge; the type of the binding is implementation and/or site defined.
- '52' (bind-right): Bind the Set(s) along the right edge; the type of binding is implementation and/or site defined.
- '53' (bind-bottom): 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

The IPP Finishings 2.0 specification [PWG5100.1-2014] defined the following values for the “finishings” attribute:

- '15' (coat): Apply a protective liquid or powdered coating to each sheet in an implementation and/or site defined manner.
- '16' (lamine): Apply a protective (solid) material to each sheet in an implementation and/or site defined manner.
- '32' (staple-triple-left): Bind the Set(s) with three staples (wire stitches) along the left edge assuming a portrait document (see section 5.1).
- '33' (staple-triple-top): Bind the Set(s) with three staples (wire stitches) along the top edge assuming a portrait document (see section 5.1).
- '34' (staple-triple-right): Bind the Set(s) with three staples (wire stitches) along the right edge assuming a portrait document (see section 5.1).
- '35' (staple-triple-bottom): Bind the Set(s) with three staples (wire stitches) along the top edge assuming a portrait document (see section 5.1).
- '70' (punch-top-left): Punch a single hole in the top left of the hardcopy output.
- '71' (punch-bottom-left): Punch a single hole in the bottom left of the hardcopy output.
- '72' (punch-top-right): Punch a single hole in the top right of the hardcopy output.

- '73' (punch-bottom-right): Punch a single hole in the bottom right of the hardcopy output.
- '74' (punch-dual-left): Punch two holes on the left side of the hardcopy output.
- '75' (punch-dual-top): Punch two holes at the top of the hardcopy output.
- '76' (punch-dual-right): Punch two holes on the right side of the hardcopy output.
- '77' (punch-dual-bottom): Punch two holes at the bottom of the hardcopy output.
- '78' (punch-triple-left): Punch three holes on the left side of the hardcopy output.
- '79' (punch-triple-top): Punch three holes at the top of the hardcopy output.
- '80' (punch-triple-right): Punch three holes on the right side of the hardcopy output.
- '81' (punch-triple-bottom): Punch three holes at the bottom of the hardcopy output.
- '82' (punch-quad-left): Punch four holes on the left side of the hardcopy output.
- '83' (punch-quad-top): Punch four holes at the top of the hardcopy output.
- '84' (punch-quad-right): Punch four holes on the right side of the hardcopy output.
- '85' (punch-quad-bottom): Punch four holes at the bottom of the hardcopy output.
- '90' (fold-accordion): Accordion-fold the hardcopy output vertically into four sections.
- '91' (fold-double-gate): Fold the top and bottom quarters of the hardcopy output towards the midline, then fold in half vertically.
- '92' (fold-gate): Fold the top and bottom quarters of the hardcopy output towards the midline.
- '93' (fold-half): Fold the hardcopy output in half vertically.
- '94' (fold-half-z): Fold the hardcopy output in half horizontally, then Z-fold the paper vertically into three sections.
- '95' (fold-left-gate): Fold the top quarter of the hardcopy output towards the midline.

- '96' (fold-letter): Fold the hardcopy output into three sections vertically; sometimes also known as a C fold.
- '97' (fold-parallel): Fold the hardcopy output in half vertically two times, yielding four sections.
- '98' (fold-poster): Fold the hardcopy output in half horizontally and vertically; sometimes also called a cross fold.
- '99' (fold-right-gate): Fold the bottom quarter of the hardcopy output towards the midline.
- '100' (fold-z): Fold the hardcopy output vertically into three sections, forming a Z.

5.1.4 PWG 5100.1-2017 “finishings” Values

The IPP Finishings 2.1 specification [PWG5100.1-2017] defined the following values for the “finishings” attribute:

- '86' (punch-multiple-left): Drill or punch more than four holes along the reference edge. For 1-4 holes, the individual explicit value ('punch-top-left', 'punch-dual-left', 'punch-triple-left' and 'punch-quad-left') SHOULD be used instead. A Printer supplies the number and location of holes in the "punching" member attribute in the collections listed by the "finishings-col-database" and "finishings-col-ready" Printer Description attributes.
- '87' (punch-multiple-top): Drill or punch more than four holes along the reference edge. For 1-4 holes, the individual explicit value ('punch-top-top', 'punch-dual-top', 'punch-triple-top' and 'punch-quad-top') SHOULD be used instead. A Printer supplies the number and location of holes in the "punching" member attribute in the collections listed by the "finishings-col-database" and "finishings-col-ready" Printer Description attributes.
- '88' (punch-multiple-right): Drill or punch more than four holes along the reference edge. For 1-4 holes, the individual explicit value ('punch-top-right', 'punch-dual-right', 'punch-triple-right' and 'punch-quad-right') SHOULD be used instead. A Printer supplies the number and location of holes in the "punching" member attribute in the collections listed by the "finishings-col-database" and "finishings-col-ready" Printer Description attributes.
- '89' (punch-multiple-bottom): Drill or punch more than four holes along the reference edge. For 1-4 holes, the individual explicit value ('punch-top-bottom', 'punch-dual-bottom', 'punch-triple-bottom' and 'punch-quad-bottom') SHOULD be used instead. A Printer supplies the number and location of holes in the "punching" member attribute in the collections listed by the "finishings-col-database" and "finishings-col-ready" Printer Description attributes.

- '101' (fold-engineering-z): Fold the hardcopy output vertically into three sections, forming a Z but leaving room for binding, punching, or stapling along the top edge

5.1.5 PWG 5100.1-2020 “finishings” Values

This IPP Finishings 3.0 (FIN) specification defines the following values, which were originally defined in [PWG5100.13-2012]:

- '60' (trim-after-pages): Trim output after each page.
- '61' (trim-after-documents): Trim output after each Document.
- '62' (trim-after-copies): Trim output after each Set.
- '63' (trim-after-job): Trim output after Job.

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

This REQUIRED Job Template attribute specifies detailed finishing instructions that cannot be expressed by the "finishings" Job Template attribute (section 5.1). A Client creates the "finishings-col" for a Job by supplying all the "finishings-col" collections that correspond to the user's selections among the finishing operations listed by the Printer's "finishings-col-database" Printer Description attribute (section 6.9) and/or "finishings-col-ready" Printer Description attribute (section 6.11).

A Printer that supports any of the finishing processes listed in section 4 MUST support both this attribute and the "finishings" attribute. A Client supplies either the "finishings" or "finishings-col" attribute in a Job Creation request, but not both. A Printer MUST reject a Job Creation request supplying both the "finishings" and "finishings-col" attributes and return the 'client-error-conflicting-attributes' status code.

Table 2 lists the "finishings-col" member attributes. The order of member attributes supplied in the "finishings-col" attribute is not significant except for the ordering of "folding" member attributes if present. A Printer MUST accept member attributes in any order. A Client supplies the 'no-value' out-of-band value to specify that no finishing processes are requested.

Table 2 - "finishings-col" Member attributes

Member attribute	Printer Conformance
finishing-template	REQUIRED
baling	CONDITIONALLY REQUIRED
binding	CONDITIONALLY REQUIRED

coating	CONDITIONALLY REQUIRED
covering	CONDITIONALLY REQUIRED
folding	CONDITIONALLY REQUIRED
laminating	CONDITIONALLY REQUIRED
punching	CONDITIONALLY REQUIRED
stitching	CONDITIONALLY REQUIRED
trimming	CONDITIONALLY REQUIRED

Supported values for each "xxx" member attribute and sub-member attribute are listed in a corresponding "xxx-supported" Printer Description attribute defined in section 6.

A Client supplies a complete set of member attributes to describe the desired finishing operation in cases where it does not supply the "finishing-template" member attribute (section 5.2.5). When a Client supplies a "finishing-template" member attribute, the Printer copies the other member attributes and their values from the matching collection in its "finishings-col-database" Printer Description attribute (section 6.9) to the Job. A Client supplies member attributes to override those from the matching collection. A Printer that receives a request that results in an incomplete "finishings-col" value MUST either reject the request and return the 'client-error-attributes-or-values-not-supported' status code or accept the request and return the 'successful-ok-ignored-or-substituted-attributes' status code [STD92].

This specification defines the following keywords for all "xxx-reference-edge" member attributes:

- **'bottom'**: The edge at the bottom of the Media Sheet. This edge coincides with the x-axis of the coordinate system.
- **'top'**: The edge at the top of the Media Sheet, parallel to the 'bottom' edge.
- **'left'**: The edge on the left of the Media Sheet. This edge coincides with the y-axis of the coordinate system.
- **'right'**: The edge on the right side of the Media Sheet, parallel to the 'left' edge.

These member attributes are all single valued, e.g., 'top','left' is not an allowed value, and hybrid values such as 'top-left' are intentionally left undefined.

5.2.1 baling (collection)

This CONDITIONALLY REQUIRED member attribute specifies the type of baling to apply to a collection of Media Sheets. A Printer with a baling finisher MUST support this member attribute and all its member attributes.

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

This REQUIRED member attribute specifies the baling to perform. This specification defines the following keywords:

- **'band'**: Media Sheets are baled with a paper or plastic band.
- **'shrink-wrap'**: Media Sheets are shrink-wrapped in plastic.
- **'wrap'**: Media Sheets are wrapped in paper.

5.2.1.2 baling-when (type2 keyword)

This REQUIRED member attribute specified when Media Sheets are baled. If a Client does not supply this member attribute and the template from the Printer's "finishings-col-database" doesn't include this member attribute, the Printer MUST use 'after-sets' as the default value.

This specification defines the following keywords:

- **'after-job'**: All Media Sheets produced by the Job are baled.
- **'after-sets'**: Each Set of Media Sheets are baled.

5.2.2 binding (collection)

This CONDITIONALLY REQUIRED member attribute specifies the location and type of binding to apply to the hardcopy output. A Printer with a binding finisher MUST support this member attribute and all its member attributes.

5.2.2.1 binding-reference-edge (type1 keyword)

This REQUIRED member attribute specifies the Finishing Reference Edge for the binding, using the common keywords defined in section 5.2.

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

This REQUIRED member attribute specifies the type of binding to apply. This specification defines the following keyword values:

- **'adhesive'**: Media Sheets are bound using glue or adhesive.
- **'comb'**: Media 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'**: Media Sheets are bound so that they can lie flat when the hardcopy output is opened. The specific method of producing such a binding is implementation defined.
- **'padding'**: Media 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'**: Media Sheets are bound by roughing the binding edge and applying an adhesive.
- **'spiral'**: Media 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'**: Media Sheets are bound by placing tape along the binding edge, overlapping the top and bottom sheets of the stack.
- **'velo'**: Media 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.

5.2.3 coating (collection)

This CONDITIONALLY REQUIRED member attribute specifies the coating to apply to the Media Sheets. A Printer with a coating finisher **MUST** support this member attribute and all its member attributes.

5.2.3.1 coating-sides (type1 keyword)

This REQUIRED member attribute specifies which sides of the Media Sheets to coat. This specification defines the following keywords:

- **'front'**: The forward or primary side of a Media Sheet.
- **'back'**: The rear or secondary side of a Media Sheet.
- **'both'**: Both sides of a Media Sheet.

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

This REQUIRED member attribute specifies the type of coating to apply. This specification defines the following keywords:

- **'archival'**: Coat each Media Sheet to preserve the output for an extended period of time, e.g., a UV protectant.

- **'archival-glossy'**: Coat each Media Sheet to produce a glossy surface that preserves the output for an extended period of time, e.g., a UV protectant.
- **'archival-matte'**: Coat each Media Sheet to produce a matte surface that preserves the output for an extended period of time, e.g., a UV protectant.
- **'archival-semi-gloss'**: Coat each Media Sheet to produce a semi-gloss surface that preserves the output for an extended period of time, e.g., a UV protectant.
- **'glossy'**: Coat each Media Sheet to produce a glossy surface.
- **'high-gloss'**: Coat each Media Sheet to produce a high-gloss surface.
- **'matte'**: Coat each Media Sheet to produce a matte surface.
- **'semi-gloss'**: Coat each Media Sheet to produce a semi-gloss surface.
- **'translucent'**: Coat each Media Sheet to produce a translucent surface.
- **'water-resistant'**: Coat each Media Sheet to produce a water-resistant surface.

5.2.4 covering (collection)

This CONDITIONALLY REQUIRED member attribute specifies which cover to apply over the hardcopy output. A Printer with a cover finisher MUST support this member attribute and all its member attributes.

Note: Unlike the "cover-back" and "cover-front" Job Template attributes [PWG5100.3-2001], finishing covers are applied over any binding, edge stitching, or staples and are not Media Sheets.

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

This REQUIRED member attribute specifies the cover to apply. The name typically represents a pre-printed, pre-cut, or generic cover that is available to the Printer. This specification defines the following keywords:

- **'plain'**: Apply a plain (blank) cover.
- **'pre-cut'**: Apply a pre-cut cover.
- **'pre-printed'**: Apply a pre-printed cover.

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

This REQUIRED member attribute specifies the unique name for the Finishing Template. This specification defines keywords matching the names for all registered "finishings" enums. 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 triple fold instruction similar to 'fold-parallel') would be specified using a "finishing-template" value of 'jdf-f8-6'.

A keyword can be extended by appending a qualifying label to the base registered keyword, separated by an underscore, when a Printer supports multiple variants of a particular finishing operation. For example, 'punch-quad-left_trio-binder', where 'punch-quad-left' is the IANA registered type2 keyword, and 'trio-binder' is the qualifying label. This also enables unique localized label strings for variants to be listed in the Printer's Message Catalog [PWG5100.13].

A Client can also supply an implementation or site defined name. Vendor-unique finishing processes SHOULD be identified using keywords with a suitable distinguishing prefix such as 'smiNNN-' where NNN is an SMI Private Enterprise Number (PEN) [IANA-PEN]. For example, if the company Example Corp. had obtained the SMI PEN 32473, then a vendor attribute 'foo' would be 'smi32473-foo'. The Printer SHOULD provide localized strings for all vendor unique "finishing-template" keyword values in its Message Catalog [PWG5100.13].

Note: Prior versions of this document recommended using a reversed domain name (e.g., 'com.example-foo'). Domain names have proven problematic due to the length of some domain names, parallel use of country-specific domain names (e.g., 'example.co.jp-foo'), and changes in ownership of domain names.

5.2.6 folding (1setOf collection)

This CONDITIONALLY REQUIRED member attribute lists the location and direction of each fold to be made to the Set, in order of execution. A Printer with a folding finisher MUST support this member attribute and all its member attributes. A Printer MAY re-order "folding" values so long as the result matches the specified intent.

This specification only defines folds parallel to its Finishing Reference Edge. Perpendicular folds are achieved by choosing a perpendicular reference edge. Diagonal folds are intentionally not supported.

A Client requests custom folding by supplying the "folding" member attribute with the "folding-direction", "folding-location" and "folding-reference-edge" member attributes for each collection. A Printer receiving an incomplete set of collections MUST either accept the request, use implementation-defined defaults, and return 'successful-ok-ignored-or-substituted-attributes' status code [STD92], or reject the request and return the 'client-error-attributes-or-values-not-supported' status code [STD92].

The following example shows a "finishings-col-database" providing one collection describing the 'fold-accordion' fold style from Figure 3 applied to A4 media sheets. If the folding finisher or the fold style described has limits on the number of sheets that can be folded together, that will be indicated in the collection by the "media-sheets-supported" member attribute (section 6.9.2).


```

finishings-col-database=
{
    finishing-template='fold-accordion'
    media-size-name="iso_a4_210x297mm"
    media-sheets-supported=1-8
    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'
    }
}

```

5.2.6.1 folding-direction (type1 keyword)

This REQUIRED member attribute specifies whether the sheets are pushed outward ('outward') or pulled inward ('inward') for the fold.

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

This REQUIRED member attribute specifies the Finishing Offset where the Printer folds the Media Sheet, measured in hundredths of millimeters (1/2540th of an inch).

5.2.6.3 folding-reference-edge (type1 keyword)

This REQUIRED member attribute specifies the Finishing Reference Edge for the folding, using the common keywords defined in section 5.2.

5.2.7 laminating (collection)

This CONDITIONALLY REQUIRED member attribute specifies which material to apply to the hardcopy output. A Printer with a laminating finisher MUST support this member attribute and all its member attributes.

5.2.7.1 laminating-sides (type2 keyword)

This REQUIRED member attribute specifies which sides of the Media Sheets to laminate. This specification defines the following keywords:

- **'front'**: The forward or primary side of a Media Sheet.

- **'back'**: The rear or secondary side of a Media Sheet.
- **'both'**: Both sides of a Media Sheet.

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

This REQUIRED member attribute specifies the type of material used to laminate the Media Sheets. This specification defines the following keywords:

- **'archival'**: Laminate each Media Sheet to preserve the output for an extended period of time, e.g., a UV protectant.
- **'archival-glossy'**: Laminate each Media Sheet to produce a glossy surface that preserves the output for an extended period of time, e.g., a UV protectant.
- **'archival-matte'**: Laminate each Media Sheet to produce a matte surface that preserves the output for an extended period of time, e.g., a UV protectant.
- **'archival-semi-gloss'**: Laminate each Media Sheet to produce a semi-gloss surface that preserves the output for an extended period of time, e.g., a UV protectant.
- **'glossy'**: Laminate each Media Sheet to produce a glossy surface.
- **'high-gloss'**: Laminate each Media Sheet to produce a high-gloss surface.
- **'matte'**: Laminate each Media Sheet to produce a matte surface.
- **'semi-gloss'**: Laminate each Media Sheet to produce a semi-gloss surface.
- **'translucent'**: Laminate each Media Sheet to produce a translucent surface.
- **'water-resistant'**: Laminate each Media Sheet to produce a water-resistant surface.

5.2.8 punching (collection)

This CONDITIONALLY REQUIRED member attribute specifies the locations of holes to make in the hardcopy output. A Printer with a hole punching/drilling finisher MUST support this member attribute and all its member attributes.

The diameter of the hole made by the punch is indicated by the "punching-hole-diameter-configured" Printer Description attribute (section 6.19).

A Client requests custom punching by supplying the "punching-locations", "punching-offset", and "punching-reference-edge" member attributes. If a Printer receives an incomplete collection, then it MUST either accept the request and return the 'successful-ok-ignored-or-

substituted-attributes' status code [STD92], or reject the request and return the 'client-error-attributes-or-values-not-supported' status code [STD92].

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

This REQUIRED member attribute specifies the Finishing Locations where the Printer punches or drills holes on the Set, measured in hundredths of millimeters (1/2540th of an inch) to the center of each hole.

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

This REQUIRED member attribute specifies the Finishing Offset where the Printer punches or drills holes on the Set, measured in hundredths of millimeters (1/2540th of an inch) from the Finishing Reference Edge to the center of each hole.

5.2.8.3 punching-reference-edge (type1 keyword)

This REQUIRED member attribute specifies the Finishing Reference Edge for the punching, using the common keywords defined in section 5.2.

5.2.9 stitching (collection)

This CONDITIONALLY REQUIRED member attribute specifies the locations of stitches, staples or crimps used to fasten Sets of Media Sheets. A Printer with a stapling / crimping / stitching finisher MUST support this member attribute and all its member attributes.

A Client supplies the "stitching-locations", "stitching-offset", and "stitching-reference-edge" member attributes to request custom stitching. A Printer receiving an incomplete collection MUST either accept the request and return the 'successful-ok-ignored-or-substituted-attributes' status code [STD92], or reject the request and return the 'client-error-attributes-or-values-not-supported' status code [STD92].

5.2.9.1 stitching-angle (integer(0:359))

This REQUIRED member attribute specifies the staple or stitch's angle of counterclockwise rotation around the center of the staple, measured in degrees. A value of 0 (zero degrees) is parallel to the top edge of the Media Sheet in portrait orientation.

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

This REQUIRED member attribute specifies the Finishing Locations where the Printer places stitches on the Set, measured in hundredths of millimeters (1/2540th of an inch) to the center of each stitch.

5.2.9.3 stitching-method (type2 keyword)

This REQUIRED member attribute specifies the type of stitching to use. This specification defines the following keywords:

- **'auto'**: Automatically choose a stitching type.
- **'crimp'**: Crimp the Set together.
- **'wire'**: Use wire staples.

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

This REQUIRED member attribute specifies the Finishing Offset where the Printer places stitches on the Set, measured in hundredths of millimeters (1/2540th of an inch) from the Finishing Reference Edge to the center of each stitch.

5.2.9.5 stitching-reference-edge (type1 keyword)

This REQUIRED member attribute specifies the Finishing Reference Edge for the stitching, using the common keywords defined in section 5.2.

5.2.10 trimming (1setOf collection)

This CONDITIONALLY REQUIRED member attribute specifies where to cut, perforate, or score the Media Sheets. A Printer with a trimming / cutting / perforation / scoring finisher MUST support this member attribute and all its member attributes.

A Client supplies the "trimming-offset", "trimming-reference-edge", and "trimming-type" member attributes to request custom trimming. A Printer that receives an incomplete collection MUST either accept the request and return the 'successful-ok-ignored-or-substituted-attributes' status code [STD92], or reject the request and return the 'client-error-attributes-or-values-not-supported' status code [STD92].

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

This REQUIRED member attribute specifies the Finishing Offset where the Printer cuts, perforates, or scores the Media Sheet(s), measured in hundredths of millimeters (1/2540th of an inch) from the Finishing Reference Edge.

5.2.10.2 trimming-reference-edge (type1 keyword)

This REQUIRED member attribute specifies the Finishing Reference Edge for the trimming, using the common keywords defined in section 5.2.

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

This REQUIRED member attribute specifies the type of trimming to use. This specification defines the following keywords:

- **'draw-line'**: Marks a cut line on the Media Sheet.
- **'full'**: Cuts the Media Sheet.

- **'partial'**: Partially cuts the Media Sheet.
- **'perforate'**: Pierces the Media Sheet.
- **'score'**: Scores the Media Sheet.
- **'tab'**: Cuts the Media Sheet, leaving a hanging tab.

5.2.10.4 trimming-when (type2 keyword)

This REQUIRED member attribute specifies when to perform the trimming operation. This specification defines the following keywords:

- **'after-documents'**: Trim after each Document.
- **'after-job'**: Trim after the Job.
- **'after-sets'**: Trim after each Set.
- **'after-sheets'**: Trim after each Media Sheet.

If a Client does not supply this member attribute, and the finishing template from the Printer's "finishings-col-database" does not include this member attribute, the Printer MUST use 'after-sets' as the default value.

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

This CONDITIONALLY REQUIRED Job Template attribute specifies the number of Input Pages that constitute a Set for finishing processes. A Printer MUST support this attribute when it does not support the "copies" Job Template attribute [STD92] for the specified Document format.

A Client supplies this attribute only when the Printer does not support the "copies" attribute for the selected Document format. If the Client supplies both this attribute and the "copies" attribute, the Printer MUST either accept the request and return the 'successful-ok-ignored-or-substituted-attributes' status code [STD92] to indicate which value it used, or reject the request and return the 'client-error-attributes-or-values-not-supported' status code [STD92].

A Client supplies a value for this attribute that is evenly divisible by the number of Input Pages, since it is being used to demarcate the length of a single Set (see the sections on the "multiple-document-handling" Job Template attribute [STD92] for more information on using this attribute with multiple Document Jobs). If the Printer receives a Document with a number of pages that is not evenly divisible by the value supplied for "job-pages-per-set", the Printer MUST accept the request, treat any remaining pages as a separate Set for finishing, return the 'successful-ok' status code [STD92], and include the 'job-completed-with-warnings' keyword in the "job-state-reasons" Job Status attribute [STD92] to report the issue.

For example, to produce two copies of a source containing seven Input Pages with each copy stapled, using a Printer that supports PWG Raster [PWG5102.4] but does not support "copies", a Client encodes that intent by rendering the source to produce a Document in PWG Raster format containing 14 pages, and submits that in a Create-Job / Send-Document operation sequence that includes the following IPP Job Template attributes:

- "job-pages-per-set" = 7
- "finishings" = '4' (staple)

Figure 4 shows a graphical representation of this example. Without "job-pages-per-set" to indicate the Set boundary and the Document lacked the blank pages, the Printer would create 14 impressions on 7 Media Sheets and staple them all together.

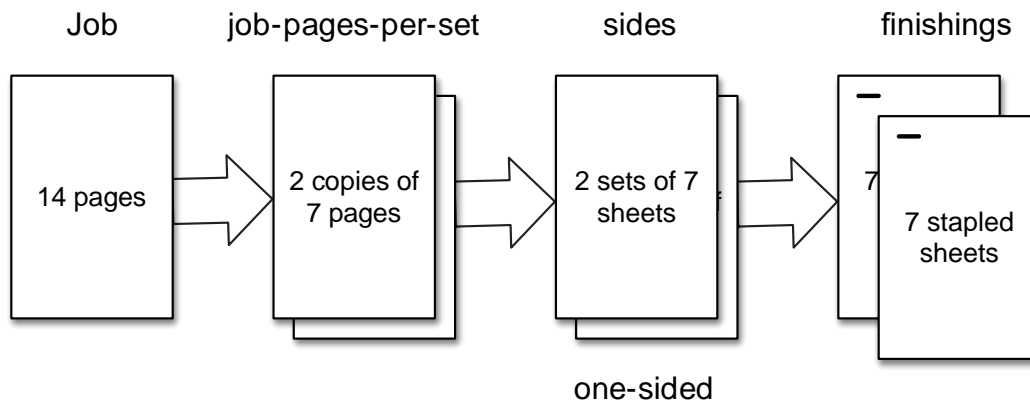


Figure 4 - Handling of "job-pages-per-set" with One-Sided Printing

To produce the same output but with two-sided printing enabled, the Client creates a Document in PWG Raster format containing 16 pages (seven pages from source, one blank page, seven pages from source, one blank page, to ensure two-sided printing works properly), and submits that in a Create-Job / Send-Document operation sequence that includes the following IPP Job Template attributes:

- "job-pages-per-set" = 8
- "sides" = 'two-sided-long-edge'
- "finishings" = '4' (staple)

Figure 5 shows a graphical representation of this example. If the Client does not insert blank pages and update the value of "job-pages-per-set" to include the blank pages to make the number of pages be an even number, the Printer's behavior is undefined.

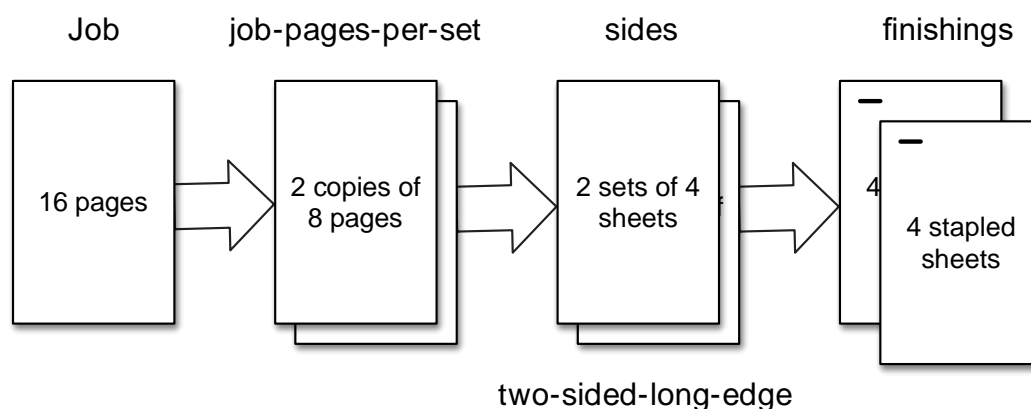


Figure 5 - Handling of "job-pages-per-set" with Two-Sided Printing

6. Printer Description Attributes

Table 3 lists the Printer Description attributes defined in this specification and their associated Printer conformance requirements.

Table 3 - New Printer Description Attributes

Attribute	Printer Conformance
baling-type-supported	CONDITIONALLY REQUIRED
baling-when-supported	CONDITIONALLY REQUIRED
binding-reference-edge-supported	CONDITIONALLY REQUIRED
binding-reference-edge-supported	CONDITIONALLY REQUIRED
coating-sides-supported	CONDITIONALLY REQUIRED
coating-type-supported	CONDITIONALLY REQUIRED
covering-name-supported	CONDITIONALLY REQUIRED
finishing-template-supported	REQUIRED
finishings-col-database	REQUIRED
finishings-col-default	REQUIRED
finishings-col-ready	REQUIRED
folding-direction-supported	CONDITIONALLY REQUIRED
folding-offset-supported	CONDITIONALLY REQUIRED
folding-reference-edge-supported	CONDITIONALLY REQUIRED
folding-direction-supported	CONDITIONALLY REQUIRED
folding-offset-supported	CONDITIONALLY REQUIRED
folding-reference-edge-supported	CONDITIONALLY REQUIRED
laminating-sides-supported	CONDITIONALLY REQUIRED
laminating-type-supported	CONDITIONALLY REQUIRED
job-pages-per-set-supported	CONDITIONALLY REQUIRED
punching-hole-diameter-configured	CONDITIONALLY REQUIRED
punching-locations-supported	CONDITIONALLY REQUIRED
punching-offset-supported	CONDITIONALLY REQUIRED
punching-reference-edge-supported	CONDITIONALLY REQUIRED

Attribute	Printer Conformance
stitching-angle-supported	CONDITIONALLY REQUIRED
stitching-locations-supported	CONDITIONALLY REQUIRED
stitching-method-supported	CONDITIONALLY REQUIRED
stitching-offset-supported	CONDITIONALLY REQUIRED
stitching-reference-edge-supported	CONDITIONALLY REQUIRED
trimming-offset-supported	CONDITIONALLY REQUIRED
trimming-reference-edge-supported	CONDITIONALLY REQUIRED
trimming-type-supported	CONDITIONALLY REQUIRED
trimming-when-supported	CONDITIONALLY REQUIRED

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "baling-type" member attribute (section 5.2.1.1). A Printer MUST support this attribute if it supports the "baling-type" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "baling-when" member attribute (section 5.2.1.2). A Printer MUST support this attribute if it supports the "baling-when" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "binding-reference-edge" member attribute (section 5.2.2.1). A Printer MUST support this attribute if it supports the "binding-reference-edge" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "binding-type" member attribute (section 5.2.2.2). A Printer MUST support this attribute if it supports the "binding-type" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "coating-sides" member attribute (section 5.2.3.1). A Printer MUST support this attribute if it supports the "coating-sides" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "coating-type" member attribute (section 5.2.3.2). A Printer MUST support this attribute if it supports the "coating-type" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "covering-name" member attribute (section 5.2.4.1). A Printer MUST support this attribute if it supports the "covering-name" member attribute.

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

This REQUIRED Printer Description attribute lists the supported values of the "finishing-template" member attribute (section 5.2.5). A Printer MUST list keyword value equivalents for all enum values listed by its "finishings-supported" Printer Description attribute [STD92] other than 'none'.

6.9 finishings-col-database (1setOf collection | no-value)

This REQUIRED Printer Description attribute lists the Printer's supported Finishing Templates. If the Printer's "finishings-supported" attribute only lists 'none', then the Printer MAY either support this attribute with the 'no-value' out-of-band value or omit this attribute. Each collection describes a single finishing process named by "finishing-template-supported". A Client can combine these using the "finishings-col" attribute. The Printer does not need to provide collections describing all possible combinations.

This attribute includes all member attributes defined for the "finishings-col" Job Template attribute (section 5.2) and adds the member attributes listed in Table 4. If a Printer receives a Job Creation request supplying a "finishings-col" Job Template attribute containing any of the member attributes listed in Table 4, then the Printer MUST reject the request and return the 'client-error-bad-request' status code [STD92].

Table 4 - Additions to "finishings-col-database" and "finishings-col-ready"

Member attribute	Printer Conformance
imposition-template	RECOMMENDED
media-sheets-supported	RECOMMENDED
media-size	RECOMMENDED
media-size-name	RECOMMENDED

A Printer SHOULD list multiple collections supplying common "finishing-template" values but different "media-size" (section 6.9.3) or "media-size-name" (section 6.9.4) values to allow a Client to discover which finishing processes are supported for a given media size. A Printer

MAY exclude the "media-size" and "media-size-name" member attributes from collection values when the Printer supports all values of the corresponding member attribute when combined with the other member attributes and values. A Printer MAY supply either the "media-size" or the "media-size-name" member attribute but MUST NOT supply both in a single collection.

Because the number and size of values of this attribute can be very large, the Printer MUST NOT return this attribute in the response to a Get-Printer-Attributes operation [STD92] unless the Client explicitly requests it by including the 'finishings-col-database' value in the "requested-attributes" [STD92] operation attribute supplied in the Get-Printer-Attributes request.

For example, a Printer that supports the 'booklet-maker', 'punch-triple-left' and 'staple-top-left' values for "finishings-template-supported" and "finishings-supported" might report the following for "finishings-col-database" [PAPI]:

```
finishings-col-database=
{
  finishing-template='booklet-maker'
  imposition-template='signature'
  media-size-name='na_tabloid_11x17in'
  media-sheets-supported=1-5
  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-sheets-supported=1-8
  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='punch-triple-left'
        media-sheets-supported=1-100
        media-size-name='na_letter_8.5x11in'
        punching=
        {
            punching-locations=5715,16510,27305
            punching-offset=1300
            punching-reference-edge='left'
        }
    },
    {
        finishing-template='staple-top-left'
        media-sheets-supported=1-150
        stitching=
        {
            stitching-locations=635
            stitching-offset=635
            stitching-reference-edge='left'
        }
    }
}

```

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

This RECOMMENDED member attribute specifies the default "imposition-template" Job Template attribute [PWG5100.3-2001] used for the finishing process defined by the collection. For example, when processing Input Pages and applying a 'booklet-maker' finishing process, a Printer could automatically apply a 'signature' imposition template.

6.9.2 media-sheets-supported (rangeOfInteger(1:MAX))

This RECOMMENDED member attribute specifies the minimum and maximum number of Media sheets supported for the finishing operation described by the collection. For example, a Printer implementing the 'fold-half' Finishing Template that has a minimum of 1 sheet and a maximum of 5 sheets indicates this limit with a value of '1-5'. A Printer MUST report a value for this attribute that is within the range reported by the Printer's "job-media-sheets-supported" Printer Description attribute [STD92].

6.9.3 media-size (collection)

This RECOMMENDED member attribute specifies the applicable media size for the finishing process described by the collection, represented by "x-dimension (integer(0:MAX))" and "y-dimension (integer(0:MAX))" member attributes semantically equivalent to those defined by the "media-size" member attribute of "media-col" [PWG5100.7].

A Printer MUST report a value for this attribute listed by its "media-size-supported" Printer Description attribute [PWG5100.7]. A Printer MUST NOT include both this member attribute and the "media-size-name" member attribute (section 6.9.4) in the same collection.

6.9.4 media-size-name (type2 keyword | name(MAX))

This RECOMMENDED member attribute specifies the applicable media size for the finishing process described by the collection, represented as a keyword or name.

A Printer MUST report a value for this attribute listed by its "media-supported" Printer Description attribute [STD92]. A Printer MUST NOT include both this member attribute and the "media-size" member attribute (section 6.9.3) in the same collection.

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

This REQUIRED Printer Description attribute contains the default value for the "finishings-col" Job Template attribute (section 5.2). This attribute MUST report the same finishing processes as the "finishings-default" Printer Description attribute [STD92]. If "finishings-default" has the value '3' (none), then the value of this attribute MUST be the 'no-value' out-of-band value [STD92]. A Printer SHOULD omit all media-specific member attributes from the collection values.

6.11 finishings-col-ready (1setOf collection)

This REQUIRED Printer Description attribute lists collections from the "finishings-col-database" Printer Description attribute (section 6.9) that are ready for use.

6.12 finishings-col-supported (1setOf keyword)

This REQUIRED attribute lists the supported member attributes of the "finishings-col" Job/Document Template attribute (section 5.2).

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "folding-direction" member attribute (section 5.2.6.1). A Printer MUST support this attribute if it supports the "folding-direction" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "folding-offset" member attribute (section 5.2.6.2). A Printer MUST support this attribute if it supports the "folding-offset" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "folding-reference-edge" member attribute (section 5.2.6.3). A Printer MUST support this attribute if it supports the "folding-reference-edge" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "laminating-sides" member attribute (section 5.2.7.1). A Printer MUST support this attribute if it supports the "laminating-sides" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "laminating-type" member attribute (section 5.2.7.2). A Printer MUST support this attribute if it supports the "laminating-type" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute indicates whether the "job-pages-per-set" Job Template attribute (section 5.3) is supported. A Printer MUST support this attribute if it supports the "job-pages-per-set" Job Template attribute. A Printer MUST report a value of 'true' for each Document format listed by its "document-format-supported" Printer Description attribute [STD92] that does not support the "copies" attribute.

6.19 punching-hole-diameter-configured (integer(0:MAX))

This CONDITIONALLY REQUIRED Printer Description attribute supplies the diameter of the hole produced by the Printer's hole punch, measured in hundredths of millimeters (1/2540th of an inch). A Printer MUST support this attribute if it supports the "punching" member attribute (section 5.2.8).

Note: Prior versions of this specification did not require the "punching-hole-diameter-configured" Printer Description attribute. If a Printer does not support this attribute, a Client SHOULD use the value 790 (7.9mm or 5/16in.) for media sizes with dimensions measured in inches and 650 (6.5mm) for media sizes with dimensions measured in millimeters.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "punching-locations" member attribute (section 5.2.8.1). A Printer MUST support this attribute if it supports the "punching-locations" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "punching-offset" member attribute (section 5.2.8.2). A Printer MUST support this attribute if it supports the "punching-offset" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "punching-reference-edge" member attribute (section 5.2.8.3). A Printer MUST support this attribute if it supports the "punching-reference-edge" member attribute.

6.23 stitching-angle-supported (1setOf (integer(0:359) | rangeOfInteger(0:359)))

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "stitching-angle" member attribute (section 5.2.9.1). A Printer MUST support this attribute if it supports the "stitching-angle" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "stitching-locations" member attribute (section 5.2.9.2). A Printer MUST support this attribute if it supports the "stitching-locations" member attribute.

6.25 stitching-method-supported (1setOf type2 keyword)

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "stitching-method" member attribute (section 5.2.9.3). A Printer MUST support this attribute if it supports the "stitching-method" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "stitching-offset" member attribute (section 5.2.9.4). A Printer MUST support this attribute if it supports the "stitching-offset" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "stitching-reference-edge" member attribute (section 5.2.9.5). A Printer MUST support this attribute if it supports the "stitching-reference-edge" member attribute. A Printer MUST support the 'left' value.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "trimming-offset" member attribute (section 5.2.10.1). A Printer MUST support this attribute if it supports the "trimming-offset" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "trimming-reference-edge" member attribute (section 5.2.10.2). A Printer MUST support this attribute if it supports the "trimming-reference-edge" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "trimming-type" member attribute (section 5.2.10.3). A Printer MUST support this attribute if it supports the "trimming-type" member attribute.

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

This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values of the "trimming-when" member attribute (section 5.2.10.4). A Printer MUST support this attribute if it supports the "trimming-when" member attribute.

7. Printer Status Attributes

Table 3 lists the Printer Status attributes defined in this specification and their associated Printer conformance requirements.

Table 5 - New Printer Status Attributes

Attribute	Printer Conformance
printer-finisher	REQUIRED
printer-finisher-description	REQUIRED
printer-finisher-supplies	CONDITIONALLY REQUIRED
printer-finisher-supplies-description	CONDITIONALLY REQUIRED

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

This REQUIRED Printer Status attribute lists strings describing each of the Printer's installed (although perhaps not currently attached) finisher subunits. A Printer MUST list all installed finisher subunits. This attribute MUST have the same cardinality (supply the same number of strings) as the "printer-finisher-description" attribute (section 7.2). The i^{th} string in this attribute corresponds to the i^{th} string in the "printer-finisher-description" attribute. A Printer MUST support this attribute if it implements the IETF Finishing MIB [RFC3806] and the values MUST be mapped from the IETF Finishing MIB elements listed in Table 6.

Table 6 - Keywords for "printer-finisher"

Key	IPP Data Type	Finishing MIB Element	Printer Conformance
type	String	finDeviceType	REQUIRED
unit	String	finDeviceCapacityUnit	REQUIRED
maxcapacity	Integer	finDeviceMaxCapacity	REQUIRED
index	Integer	finDeviceIndex	REQUIRED
presentonoff	String	finDevicePresentOnOff	REQUIRED
status	Integer	finDeviceStatus	REQUIRED
capacity	Integer	finDeviceCurrentCapacity	DEPRECATED

Each string consists of an unordered sequence of key/value pairs, structured according to the ABNF [STD68] [FIN-ABNF] defined in Figure 6.

A Printer MUST encode the strings listed by this attribute using only printable characters from the Net-ASCII subset of the US-ASCII character set [RFC5198].

Figure 6 - ABNF for "printer-finisher" Values

```
printer-finisher = 1*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-index /
              finisher-presentonoff / finisher-status
finisher-optional = finisher-opt ";"
```



```

finisher-opt = finisher-capacity

finisher-type = "type" "=" 1*ALPHA
; enumerated value as an alpha string (e.g.,
; 'stitcher') of finDeviceType [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 [RFC3805]

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

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

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

finisher-presentonoff = "presentonoff" "=" "other"/ "on" /
;                                     "off" / "notPresent"
; string value as an alpha string of
; finDevicePresentOnOff [RFC3806] mapped indirectly
; from the *label* in PresentOnOff [RFC3805]

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

```

7.1.1 Example of printer-finisher

Figure 7 describes an example "printer-finisher" attribute listing two strings describing staple and punch finisher subunits, presented using PAPI textual encoding [PAPI] with line breaks added for readability.

Figure 7 - PAPI Example of "printer-finisher"

```

printer-finisher[1] = "index=8;
                      type=stitcher;
                      unit=sheets;
                      maxcapacity=500;"

printer-finisher[2] = "index=3;
                      type=puncher;
                      unit=sheets;"

```

```
maxcapacity=100;"
```

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

This REQUIRED Printer Status attribute lists localized descriptions for each currently installed finisher subunit listed by the "printer-finisher" Printer Status attribute (section 7.1).

This attribute MUST have the same cardinality (supply 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.

If a Printer implements the IETF Finishing MIB [RFC3806], then the Printer MUST support this attribute and MUST map each human-readable (localized) value from finDeviceDescription to one of the strings supplied by this attribute using the following process:

1. The value of finDeviceDescription is converted from the character set specified by prtGeneralCurrentLocalization and prtLocalizationCharacterSet to the character set specified by the "charset-configured" Printer Description attribute [STD92]; and
2. The new "printer-finisher-description" value is tagged with the natural language specified by prtGeneralCurrentLocalization, prtLocalizationLanguage, and prtLocalizationCountry unless the natural language matches the language to be used in the response as indicated by the "attributes-natural-language" operation attribute [STD92].

7.2.1 Example of printer-finisher-description

Figure 8 describes an example "printer-finisher-description" attribute listing two values corresponding to the values in Figure 7, each tagged with the natural language identifier for "de" (German), presented using PAPI textual encoding [PAPI] with line breaks added for readability.

Figure 8 - PAPI Example of "printer-finisher-description"

```
printer-finisher-description[1] = "Hefter SN:BEISPIEL-12345" (de)
printer-finisher-description[2] = "Lochstanze S/N:BEISPIEL-67890" (de)
```

7.3 printer-finisher-supplies (1setOf octetString(MAX))

This CONDITIONALLY REQUIRED Printer Status attribute lists a string for each supply used by the Printer's installed finishing subunits. A Printer MUST support this attribute if it implements the IETF Finishing MIB [RFC3806] finSupplyTable. A Printer that supports this attribute MUST support the "printer-finisher-supplies-description" attribute (section 7.4).

Each value consists of an unordered sequence of key/value pairs, structured according to the ABNF [STD68] [FIN-ABNF] defined in Figure 9. Table 7 lists the keys defined in this

specification and their derivation from the corresponding elements in the `finSupplyTable` defined in the IETF Finishing MIB [RFC3806].

Table 7 - Keywords for "printer-finisher-supplies"

Key	IPP Data Type	Finishing MIB Element	Printer Conformance
<code>deviceIndex</code>	Integer	<code>finSupplyDeviceIndex</code>	REQUIRED (note 1)
<code>class</code>	String	<code>finSupplyClass</code>	REQUIRED
<code>type</code>	String	<code>finSupplyType</code>	REQUIRED
<code>unit</code>	String	<code>finSupplyUnit</code>	REQUIRED
<code>max</code>	Integer	<code>finSupplyMaxCapacity</code>	REQUIRED
<code>level</code>	Integer	<code>finSupplyCurrentLevel</code>	REQUIRED
<code>color</code>	String	<code>finSupplyColorName</code>	REQUIRED
<code>index</code>	Integer	<code>finSupplyIndex</code>	OPTIONAL (note 2)

Notes:

1. REQUIRED to associate the supply to the finisher subunit using that supply.
2. OPTIONAL because correlation with the original MIB order is not needed.

This attribute MUST have the same cardinality (supply the same number of values) as the "printer-finisher-supplies-description" attribute. The i^{th} value in the "printer-finisher-supplies" attribute corresponds to the i^{th} value in the "printer-finisher-supplies-description" attribute.

A Printer MUST encode the values of "printer-finisher-supplies" using printable characters from the Net-ASCII subset of the US-ASCII character set [RFC5198].

Figure 9 - ABNF for "printer-finisher-supplies" Values

```

finisher-supply = 1*supply-required *supply-optional
; set of finisher supply elements encoded into one value
supply-required = supply-req ";"
supply-req = supply-class / supply-type / supply-description /
            supply-unit / supply-max / supply-current-level /
            supply-color

supply-optional = supply-opt ";"
supply-opt = supply-index / supply-device-index / supply-ext

supply-class = "class" "=" 1*ALPHA
; enumerated value as an alpha string (e.g., 'supplyThatIsConsumed')
; of prtMarkerSuppliesClass in [RFC3805] mapped indirectly from
; the *label* in PrtMarkerSuppliesClassTC in [RFC3805]

supply-type = "type" "=" 1*ALPHA
; enumerated value as an alpha string (e.g., 'staples') of
; prtMarkerSuppliesType in [RFC3805] mapped indirectly from
; the *label* in PrtMarkerSuppliesTypeTC in [RFC3805]

supply-unit = "unit" "=" 1*ALPHA
; enumerated value as an alpha string (e.g., 'items' or 'percent')
; of finSupplyUnit in [RFC3806] mapped indirectly from the *label*

```

```

; in PrtMarkerSuppliesSupplyUnitTC in [RFC3805]

supply-max = "max" "=" 1*[DIGIT / "-"]
; integer value as a numeric string mapped directly from
; finSupplyMaxCapacity in [RFC3806]

supply-current-level = "level" "=" 1*[DIGIT / "-"]
; integer value as a numeric string mapped directly from
; finSupplyCurrentLevel in [RFC3806]

supply-color = "color" "=" 1*ALPHA
; enumerated value as an alpha string (e.g., 'silver') of
; finSupplyColorName in [RFC3806] mapped indirectly from the color
; names from PWG Media Standardized Names 2.0 [PWG5101.1]

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

supply-device-index = "deviceIndex" "=" 1*ALPHA
; string value as an alpha string mapped directly from
; finSupplyDeviceIndex in [RFC3806]

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

```

7.3.1 Example of printer-finisher-supplies

Figure 10 shows an example "printer-finisher-supplies" listing one finisher supply, referencing the stitcher finisher device subunit listed in Figure 7, presented using a PAPI [PAPI] encoding (line breaks added for readability).

Figure 10 - PAPI Example of "printer-finisher-supplies"

```

printer-finisher-supplies = "class=supplyThatIsConsumed;
                             type=staples;
                             unit=items;
                             max=500;
                             level=100;
                             color=silver;
                             index=8;"

```

7.4 printer-finisher-supplies-description (1setOf text(MAX))

This CONDITIONALLY REQUIRED Printer Status attribute lists localized descriptions of finisher supplies listed by the "printer-finisher-supplies" Printer Status attribute (section 7.3). A Printer MUST support this attribute if it supports the "printer-finisher-supplies" attribute. A Printer MUST support this attribute if the Printer implements the IETF Finishing MIB [RFC3806] finSupplyTable.

The values of this attribute are consistent with the `finSupplyDescription` element [RFC3806].

If the Printer implements the IETF Finishing MIB `finSupplyTable`, it MUST map each human-readable (localized) `finSupplyDescription` value to one of the strings supplied by this attribute using the following process:

1. The value of `finSupplyDescription` is converted from the character set specified by `prtGeneralCurrentLocalization` and `prtLocalizationCharacterSet` to the character set specified by the "charset-configured" Printer Description attribute [STD92]; and
2. The new "printer-finisher-supplies-description" value is tagged with the natural language specified by `prtGeneralCurrentLocalization`, `prtLocalizationLanguage`, and `prtLocalizationCountry` unless the natural language matches the language to be used in the response as indicated by the "attributes-natural-language" operation attribute [STD92].

This attribute MUST have the same cardinality (supply the same number of values) as the "printer-finisher-supplies" attribute. The i^{th} value in the "printer-finisher-supplies-description" attribute corresponds to the i^{th} value in the "printer-finisher-supplies" attribute.

7.4.1 Example of printer-finisher-supplies-description

Figure 11 shows an example of "printer-finisher-supplies-description" listing a description for the supply listed in Figure 10, tagged with the "de" (German) natural language identifier, presented using a PAPI [PAPI] encoding.

Figure 11 - PAPI Example of "printer-finisher-supplies-description"

```
printer-finisher-supplies-description = "Heftklammern"(de)
```

8. Conformance Requirements

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

8.1 Conformance Requirements for Clients

For a Client to claim conformance to this specification, the Client MUST support:

- The REQUIRED IPP Job Template attributes defined in section 5;
- The REQUIRED IPP Printer Description attributes defined in section 6;
- The REQUIRED IPP Printer Status attributes defined in section 7;
- The internationalization considerations in section 9; and

- The security considerations in section 10.

8.2 Conformance Requirements for Printers

For a Printer to claim conformance to this specification, the Printer **MUST** support:

- The REQUIRED IPP Job Template attributes defined in section 5;
- The REQUIRED IPP Printer Description attributes defined in section 6;
- The CONDITIONALLY REQUIRED IPP Printer Description attributes defined section 6 for all the finishing features the Printer supports;
- The REQUIRED IPP Printer Status attributes defined in section 7;
- The CONDITIONALLY REQUIRED IPP Printer Status attributes defined in section 7 for all the finishing features the Printer supports;
- The internationalization considerations in section 9; and
- The security considerations in section 10.

9. Internationalization Considerations

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

- The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8) [STD63] encoding of Unicode [UNICODE] [ISO10646]; and
- 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').

Implementations of this specification **SHOULD** conform to the following standards on processing of human-readable Unicode text strings, see:

- Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical
- Unicode Line Breaking Algorithm [UAX14]– character classes and wrapping
- Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]
- Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences
- Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization
- Unicode Character Encoding Model [UTR17] – multi-layer character model
- Unicode Character Property Model [UTR23] – character properties
- Unicode Conformance Model [UTR33] – Unicode conformance basis+
- Unicode Collation Algorithm [UTS10] – sorting
- Unicode Locale Data Markup Language [UTS35] – locale databases

10. Security Considerations

In addition to the security considerations described in Internet Printing Protocol /1.1 [STD92], implementations MAY support different access control to various finishing features, depending on the identity of the User submitting the Job.

Implementations of this specification SHOULD conform to the following standards on processing of human-readable Unicode text strings, see:

- Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks
- Unicode Security FAQ [UNISECFAQ]– common Unicode security issues

11. IANA and PWG Considerations

11.1 Attribute Registrations

The attributes defined in this document will be published by IANA according to the procedures in Internet Printing Protocol/1.1 [STD92] in the following location:

<https://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 (type2 keyword name(MAX))	[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]
imposition-template (type2 keyword name(MAX))	[PWG5100.1]
laminating (collection)	[PWG5100.1]
laminating-sides (type1 keyword)	[PWG5100.1]
laminating-type (type2 keyword name(MAX))	[PWG5100.1]
media-sheets-supported (rangeOfInteger(1:MAX))	[PWG5100.1]
media-size (collection)	[PWG5100.1]
media-size-name (type2 keyword)	[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]
stitching (collection)	[PWG5100.3]
stitching-angle (integer(0:359))	[PWG5100.1]
stitching-method (type2 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 (type2 keyword name(MAX)))	[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]
printer-finisher-supplies (1setOf octetString(MAX)) [PWG5100.1]
printer-finisher-supplies-description (1setOf text(MAX)) [PWG5100.1]
punching-hole-diameter-configured (integer(0: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]
stitching-angle-supported (1setOf (integer(0:359) | rangeOfInteger(0:359))) [PWG5100.1]
stitching-method-supported (1setOf (type2 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]

```

11.2 Type2 keyword Registrations

The keyword attribute values defined in this document will be published by IANA according to the procedures in Internet Printing Protocol/1.1 [STD92] in the following location:

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

The registry entries will contain the following information:

Attributes (attribute syntax) Keyword Attribute Value -----	Reference -----
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 >	
baling-when (type2 keyword)	[PWG5100.1]
after-sets	[PWG5100.1]
after-job	[PWG5100.1]
baling-when-supported (1setOf type2 keyword)	[PWG5100.1]
< all baling-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]
translucent	[PWG5100.1]
water-resistant	[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 (type2 keyword name(MAX))	[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-engineering-z	[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]
laminate	[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-multiple-bottom	[PWG5100.1]

punch-multiple-left	[PWG5100.1]
punch-multiple-right	[PWG5100.1]
punch-multiple-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)))	[PWG5100.1]
< 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]
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]
translucent	[PWG5100.1]
water-resistant	[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]
stitching-method (type2 keyword)	[PWG5100.1]
auto	[PWG5100.1]
crimp	[PWG5100.1]
wire	[PWG5100.1]
stitching-method-supported (1setOf type2 keyword)	[PWG5100.1]
< all stitching-method 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]
draw-line	[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]

11.3 Type2 enum Attribute Value Registrations

The enumerations defined in this document will be published by IANA according to the procedures in Internet Printing Protocol/1.1 [STD92] in the following location:

<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)		[STD92]
10	fold	[PWG5100.1]
11	trim	[PWG5100.1]
12	bale	[PWG5100.1]
13	booklet-maker	[PWG5100.1]
14	jog-offset	[PWG5100.1]
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]
50	bind-left	[PWG5100.1]
51	bind-top	[PWG5100.1]
52	bind-right	[PWG5100.1]
53	bind-bottom	[PWG5100.1]
60	trim-after-pages	[PWG5100.1]
61	trim-after-documents	[PWG5100.1]
62	trim-after-copies	[PWG5100.1]
63	trim-after-job	[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]
86	punch-multiple-left	[PWG5100.1]
87	punch-multiple-top	[PWG5100.1]
88	punch-multiple-right	[PWG5100.1]
89	punch-multiple-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]
101	fold-engineering-z	[PWG5100.1]

12. Overview of Changes

12.1 Changes in IPP Finishings v3.0

IPP Finishings v3.0 included the following changes over the preceding revision:

- Changed conformance requirements on "finishings" and "finishings-col" and related attributes to be stricter, requiring a new major version.
- Finishings v2.1 Errata resolutions
 - [Issue #56](#) - Section 11.1 lacks mention of attributes and language clarifying shape / size / rotation of staples and punch
 - [Issue #87](#) - Section 5.1: uses of "feed-orientation" and "orientation-requested" lack source reference citations
 - [Issue #88](#) - Section 5.1.1 says 'RFC 2911 "finishings" Values'
- Moved the definition of the 'trim-after-pages', 'trim-after-documents', 'trim-after-copies' and 'trim-after-job' enum value here since the originating document was being updated at the time the errata issues were being resolved.
- Created a new Printer Status Attributes section to match similar editorial changes in IPP Enterprise Printing Extensions v2.0 and IPP Driverless Printing Extensions v2.0.
- Added tables to the start of sections to list the conformance requirements for the attribute definitions within the sections.
- Rewrote the sections for "printer-finisher", "printer-finisher-description", "printer-finisher-supplies", and "printer-finisher-supplies-description" with Mike Sweet and Steven Young
- Fixed passive voice and modernized the editorial style in the "xxx-supported" definitions in section 6.

12.2 Changes in IPP Finishings v2.1

IPP Finishings v2.1 included the following changes over the preceding revision:

- Added finishing enums and templates for multiple hole punching and an engineering Z fold.
- Defined an extension naming convention for the "finishing-template" member attribute.
- Added the "media-sheets-supported" member attribute for the "finishings-col-database" and "finishings-col-ready" attributes.
- Added the "stitching-method" member attribute for the "finishings-col", "finishings-col-database", and "finishings-col-ready" attributes.
- Added the "printer-finisher-supplies" and "printer-finisher-supplies-description" attributes.
- Added the "punching-hole-diameter-configured" and "stitching-angle" attributes, clarified that punched holes are round and of a particular size, and defined staples' axis of rotation to be around their midpoint, to more specifically define the coordinates of the space occupied by the punched holes and staples.

12.3 Changes in IPP Finishings v2.0

IPP Finishings v2.0 included the following changes over the preceding revision:

- Moved definition of PWG 5100.3 "finishings-col" attribute to this document and added new member attributes for all finishings processes.
- Added finishing enums and templates for coating, lamination, triple stapling, various kinds of punching, and common folds.
- Added the "finishings-col-database" and "job-pages-per-set" attributes.
- Added the "media-size" and "media-size-name" member attributes for the "finishings-col-database" and "finishings-col-ready" attributes.

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14. Authors' Addresses

Smith Kennedy
HP Inc.

Michael Sweet
Lakeside Robotics Corporation

Send comments to the PWG IPP Mailing List:

ipp@pwg.org (subscribers only)

To subscribe, see the PWG IPP workgroup web page:

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

Implementers of this specification document are encouraged to join the IPP Mailing List to participate in any discussions of clarification issues and review of registration proposals for additional attributes and values.

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