



The Printer Working Group

February 7, 2022
Working Draft

IPP Finishings 3.0

Status: ~~Prototype~~Stable

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

This document is a PWG Candidate Standard. For a definition of a "PWG Candidate Standard", see:

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

This document is available electronically at:

<https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippfinishings30-20220207.docx>

<https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippfinishings30-20220207.pdf>

<https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippfinishings30-20220207-rev.docx>

<https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippfinishings30-20220207-rev.pdf>

Copyright © 2001-2022⁴² The Printer Working Group. All rights reserved.

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

Title: IPP Finishings 3.0

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

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

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

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

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

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

About the IEEE-ISTO

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

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

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

About the IEEE-ISTO PWG

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

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

For additional information regarding the Printer Working Group visit:

<http://www.pwg.org>

Contact information:

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

68 About the Internet Printing Protocol Workgroup

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

74 For additional information regarding IPP visit:

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

76 Implementers of this specification are encouraged to join the IPP mailing list in order to
77 participate in any discussions of the specification. Suggested additions, changes, or
78 clarification to this specification, should be sent to the IPP mailing list for consideration.
79

Table of Contents

80		
81	1. Introduction	10
82	2. Terminology	10
83	2.1 Conformance Terminology	10
84	2.2 Protocol Role Terminology	10
85	2.3 Printing Terminology	11
86	2.4 Acronyms and Organizations	12
87	3. Requirements.....	13
88	3.1 Rationale for IPP Finishings	13
89	3.2 Use Cases.....	13
90	3.2.1 Band	13
91	3.2.2 Bind.....	13
92	3.2.3 Booklet Maker.....	14
93	3.2.4 Coat	14
94	3.2.5 Cover	14
95	3.2.6 Edge Stitch	14
96	3.2.7 Fold.....	14
97	3.2.8 Laminate	14
98	3.2.9 Punch.....	14
99	3.2.10 Saddle Stitch.....	14
100	3.2.11 Staple.....	15
101	3.2.12 Trim.....	15
102	3.2.13 Wrap	15
103	3.2.14 Multiple Finishing Options.....	15
104	3.2.15 Finishing of Multiple Copies.....	15
105	3.2.16 Finishing Supplies.....	15
106	3.3 Exceptions.....	15
107	3.3.1 Unsupported Media	15
108	3.3.2 Unsupported Combinations of Finishing Options	16
109	3.3.3 Finishing with Finisher Fidelity Restrictions	16
110	3.4 Out of Scope	16
111	3.5 Design Requirements.....	16
112	4. Overview of Finishing.....	17
113	4.1 Coordinate System.....	17
114	4.2 Finishing Processes	21
115	4.2.1 Bale (or Band) and Wrap	21
116	4.2.2 Bind.....	21
117	4.2.3 Booklet Making	21
118	4.2.4 Coat and Laminate	21
119	4.2.5 Cover	21
120	4.2.6 Fold.....	21
121	4.2.7 Punch.....	23
122	4.2.8 Stitch (Staple, Crimp, Edge Stitch, or Saddle Stitch).....	23
123	4.2.9 Trim (Cut, Perforate, or Score)	23
124	5. Job Template Attributes	23
125	5.1 finishings (1setOf type2 enum).....	23

126	5.1.1 STD 92 “finishings” Values	24
127	5.1.2 PWG 5100.1-2001 “finishings” Values.....	25
128	5.1.3 PWG 5100.1-2014 “finishings” Values.....	26
129	5.1.4 PWG 5100.1-2017 “finishings” Values.....	28
130	5.1.5 PWG 5100.1-2020 “finishings” Values.....	29
131	5.2 finishings-col (no-value 1setOf collection).....	29
132	5.2.1 baling (collection).....	31
133	5.2.2 binding (collection).....	31
134	5.2.3 coating (collection).....	32
135	5.2.4 covering (collection).....	33
136	5.2.5 finishing-template (type2 keyword name(MAX)).....	33
137	5.2.6 folding (1setOf collection)	34
138	5.2.7 laminating (collection).....	35
139	5.2.8 punching (collection).....	36
140	5.2.9 stitching (collection)	37
141	5.2.10 trimming (1setOf collection)	38
142	5.3 job-pages-per-set (integer(1:MAX)).....	39
143	6. Printer Description Attributes	41
144	6.1 baling-type-supported (1setOf (type2 keyword name(MAX))).....	42
145	6.2 baling-when-supported (1setOf type2 keyword).....	42
146	6.3 binding-reference-edge-supported (1setOf type1 keyword).....	42
147	6.4 binding-type-supported (1setOf type2 keyword)	42
148	6.5 coating-sides-supported (1setOf type1 keyword).....	42
149	6.6 coating-type-supported (1setOf (type2 keyword name(MAX))).....	43
150	6.7 covering-name-supported (1setOf (type2 keyword name(MAX))).....	43
151	6.8 finishing-template-supported (1setOf (name(MAX) type2 keyword))	43
152	6.9 finishings-col-database (1setOf collection no-value).....	43
153	6.9.1 imposition-template (type2 keyword name(MAX)).....	45
154	6.9.2 media-sheets-supported (rangeOfInteger(1:MAX))	45
155	6.9.3 media-size (collection)	45
156	6.9.4 media-size-name (type2 keyword name(MAX))	46
157	6.10 finishings-col-default (1setOf collection no-value).....	46
158	6.11 finishings-col-ready (1setOf collection)	46
159	6.12 finishings-col-supported (1setOf keyword).....	46
160	6.13 folding-direction-supported (1setOf type1 keyword).....	46
161	6.14 folding-offset-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX))).....	46
162	6.15 folding-reference-edge-supported (1setOf type1 keyword).....	47
163	6.16 laminating-sides-supported (1setOf type1 keyword).....	47
164	6.17 laminating-type-supported (1setOf (type2 keyword name(MAX)))	47
165	6.18 job-pages-per-set-supported (boolean).....	47
166	6.19 punching-hole-diameter-configured (integer(0:MAX)).....	47
167	6.20 punching-locations-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX))).....	47
168	6.21 punching-offset-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX))).....	48
169	6.22 punching-reference-edge-supported (1setOf type1 keyword).....	48
170	6.23 stitching-angle-supported (1setOf (integer(0:359) rangeOfInteger(0:359))).....	48
171	6.24 stitching-locations-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX))).....	48

172	6.25 stitching-method-supported (1setOf type2 keyword).....	48
173	6.26 stitching-offset-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX)))	48
174	6.27 stitching-reference-edge-supported (1setOf type1 keyword)	49
175	6.28 trimming-offset-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX)))	49
176	6.29 trimming-reference-edge-supported (1setOf type1 keyword).....	49
177	6.30 trimming-type-supported (1setOf type2 keyword)	49
178	6.31 trimming-when-supported (1setOf type2 keyword)	49
179	7. Printer Status Attributes	50
180	7.1 printer-finisher (1setOf octetString(MAX))	50
181	7.1.1 Example of printer-finisher	51
182	7.2 printer-finisher-description (1setOf text(MAX))	52
183	7.2.1 Example of printer-finisher-description	52
184	7.3 printer-finisher-supplies (1setOf octetString(MAX)).....	52
185	7.3.1 Example of printer-finisher-supplies	54
186	7.4 printer-finisher-supplies-description (1setOf text(MAX))	54
187	7.4.1 Example of printer-finisher-supplies-description	55
188	8. Conformance Requirements	55
189	8.1 Conformance Requirements for Clients	55
190	8.2 Conformance Requirements for Printers	56
191	9. Internationalization Considerations	56
192	10. Security Considerations	57
193	11. IANA and PWG Considerations	57
194	11.1 Attribute Registrations	57
195	11.2 Type2 keyword Registrations	59
196	11.3 Type2 enum Attribute Value Registrations	65
197	12. Overview of Changes.....	66
198	12.1 Changes in IPP Finishings v3.0	66
199	12.2 Changes in IPP Finishings v2.1	67
200	12.3 Changes in IPP Finishings v2.0	67
201	13. References.....	67
202	13.1 Normative References.....	67
203	13.2 Informative References	69
204	14. Authors' Addresses	71
205	15. Change History	71
206	15.1 February 7, 2022	71
207	15.2 November 19, 2021	72
208	15.3 October 7, 2021	72
209	15.4 October 6, 2021	72
210	15.5 September 2, 2021	72
211	15.6 April 12, 2021	73
212	15.7 March 11, 2021	73
213	15.8 February 23, 2021	73
214	15.9 January 8, 2021	73
215	15.10 October 22, 2020.....	74
216		
217		

218

List of Figures

Figure 1 - Effect of "orientation-requested" on Output with Short Edge First Feed	19
Figure 2 - Effect of "orientation-requested" on Output with Long Edge First Feed	20
Figure 3 - Standard Folds	22
Figure 4 - Handling of "job-pages-per-set" with One-Sided Printing	40
Figure 5 - Handling of "job-pages-per-set" with Two-Sided Printing	41
Figure 6 - ABNF for "printer-finisher" Values	50
Figure 7 - PAPI Example of "printer-finisher"	51
Figure 8 - PAPI Example of "printer-finisher-description"	52
Figure 9 - ABNF for "printer-finisher-supplies" Values	53
Figure 10 - PAPI Example of "printer-finisher-supplies"	54
Figure 11 - PAPI Example of "printer-finisher-supplies-description"	55

List of Tables

Table 1 - New Job Template Attributes	23
Table 2 - "finishings-col" Member attributes	30
Table 3 - Reference Edge Keywords	30
Table 4 - New Printer Description Attributes	41
Table 5 - Additions to "finishings-col-database" and "finishings-col-ready"	43
Table 6 - New Printer Status Attributes	50
Table 7 - Keywords for "printer-finisher"	50
Table 8 - Keywords for "printer-finisher-supplies"	53

1. Introduction

The Internet Printing Protocol/1.1: Model and Semantics [STD92] and Internet Printing Protocol (IPP): Production Printing Attributes - Set 1 [PWG5100.3] specifications define the basic attributes and values needed to support advanced finishing processes on printed output. This specification, which was originally titled 'IPP: "finishings" attribute values extension', defines additional values and member attributes needed to support the full breadth of finishing options available in modern Printers. It also revisits the original definitions of the "finishings" and "finishings-col" attributes 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 [PWG5100.3-2001] 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 [RFC2119]. The term CONDITIONALLY REQUIRED is additionally defined for a conformance requirement that applies to a particular capability or feature.

2.2 Protocol Role Terminology

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

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

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

2.3 Printing Terminology

Normative definitions and semantics of printing terms are imported from the Printer MIB v2 [RFC3805], Printer Finishings MIB [RFC3806], and Internet Printing Protocol/1.1: Model and Semantics [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 to be specified, 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]

312 **2.4 Acronyms and Organizations**

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

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

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

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

318 *PWG*: IEEE ISTO Printer Working Group, <http://www.pwg.org/>

3. Requirements

3.1 Rationale for IPP Finishings

Based on the following existing specifications:

- "Internet Printing Protocol/1.1: Model and Semantics" [STD92] defined the "finishings" Job Template attribute and basic values.
- "Internet Printing Protocol (IPP): Production Printing Attributes - Set 1" [PWG5100.3-2001] defined the "finishings-col" Job Template attribute for stapling.
- IPP Finishings 2.0 [PWG5100.1-2014] defined additional Printer Description attributes that allow a Client to determine the type and extent of finishing options supported by the printer, allowing the User to select choices with higher fidelity and allowing the Client to accurately present a preview to the User of the selected finishing processes. It also defines Job Template attributes and values that allow the Client to express finishing intent clearly.

To allow Clients to use and clearly specify finishing intent, this IPP Finishings 3.0 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.

349 3.2.3 Booklet Maker

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

353 3.2.4 Coat

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

357 3.2.5 Cover

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

361 3.2.6 Edge Stitch

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

365 3.2.7 Fold

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

369 3.2.8 Laminate

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

373 3.2.9 Punch

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

377 3.2.10 Saddle Stitch

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

381 3.2.11 Staple

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

385 3.2.12 Trim

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

389 3.2.13 Wrap

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

392 3.2.14 Multiple Finishing Options

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

397 3.2.15 Finishing of Multiple Copies

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

402 3.2.16 Finishing Supplies

403 Jane is printing an accounts-receivable report. Using software on her Client device, she
404 specifies a finishing intent that will place a single staple at the top left corner of each Set.
405 She is notified that the number of staples in the Printer is low.

406 3.3 Exceptions**407 3.3.1 Unsupported Media**

408 After submitting the orientation guide for printing (section 3.2.3), the Printer returns an error
409 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
4. Support for cuts that do not extend the full width or length of the media

3.5 Design Requirements

The design requirements for this specification are:

1. Follow the naming conventions defined in the IPP/1.1 Model and Semantics [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.

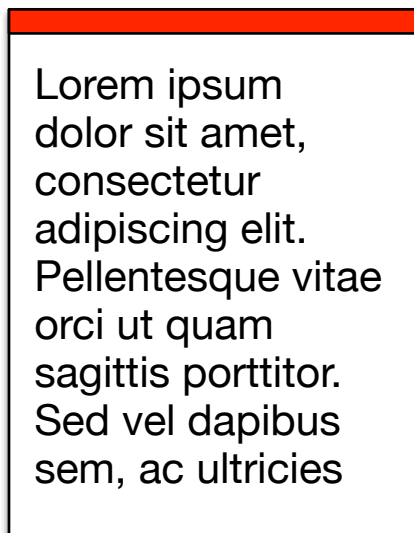
The original finishing support in IPP/1.1: Model and Semantics [STD92] only allows a Printer to list and a Client to specify simple finishing intent using the "finishings" attribute - staple, fold, punch, and so forth. The IPP Production Printing Extensions, Set 1 [PWG5100.3-2001] provided the first 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

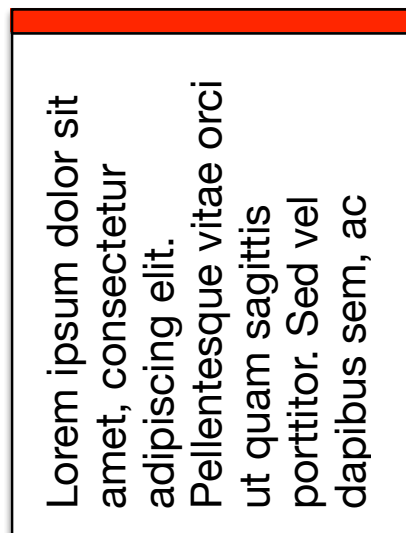
The positional values are specified with respect to the Document as if the Document was in portrait orientation. This coordinate system scheme agrees with the Finisher MIB [RFC3806], which in turn follows the ISO DPA [ISO10175] approach of using a coordinate system as if the document were portrait. The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

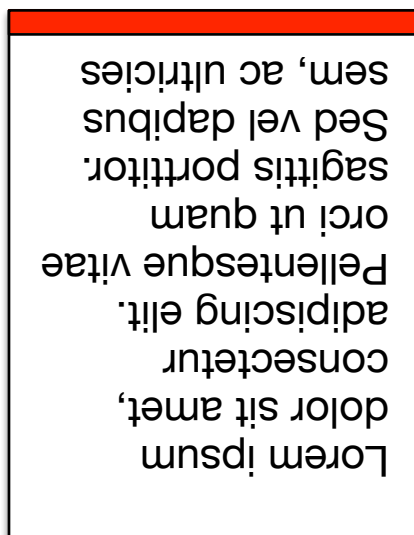
479 when held for reading, the Client supplies the 'staple-top-right' value since reverse-
480 landscape is defined as a clockwise rotation from portrait. Figure 1 shows how content is
481 placed on sheets for each "orientation-requested" value [STD92] when feeding short edge
482 first. Figure 2 shows how content is placed on sheets for each "orientation-requested" value
483 when feeding long edge first.



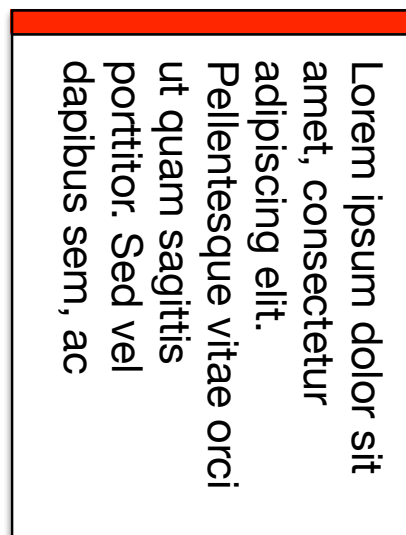
portrait



landscape



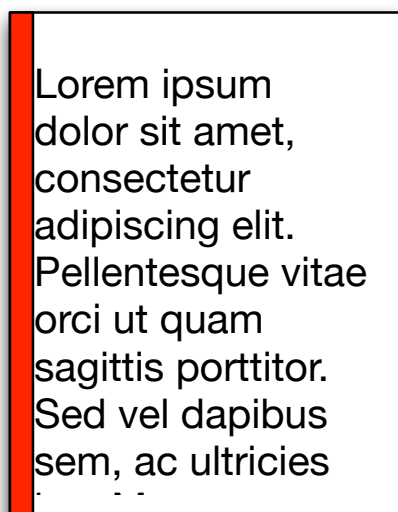
reverse-portrait



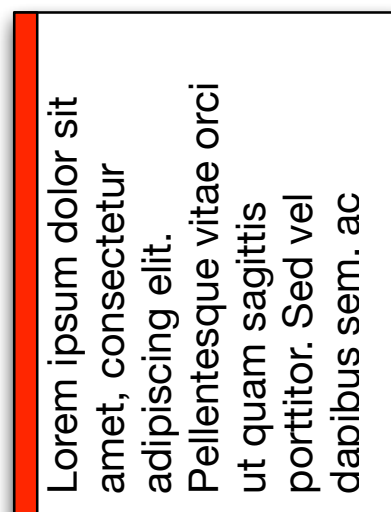
reverse-landscape

Leading Edge of Sheet

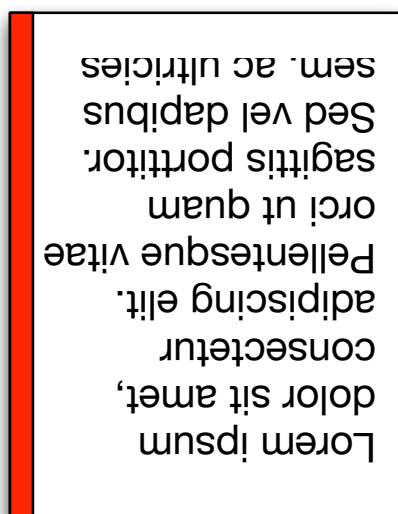
Figure 1 - Effect of "orientation-requested" on Output with Short Edge First Feed



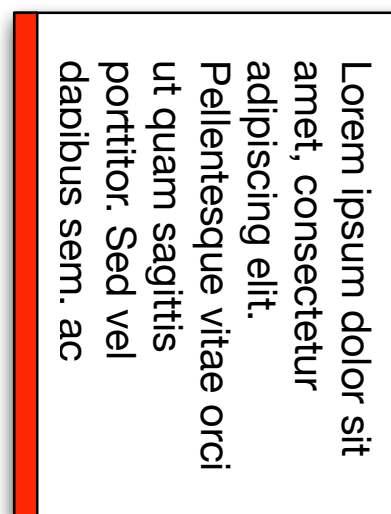
portrait



landscape



reverse-portrait



reverse-landscape

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

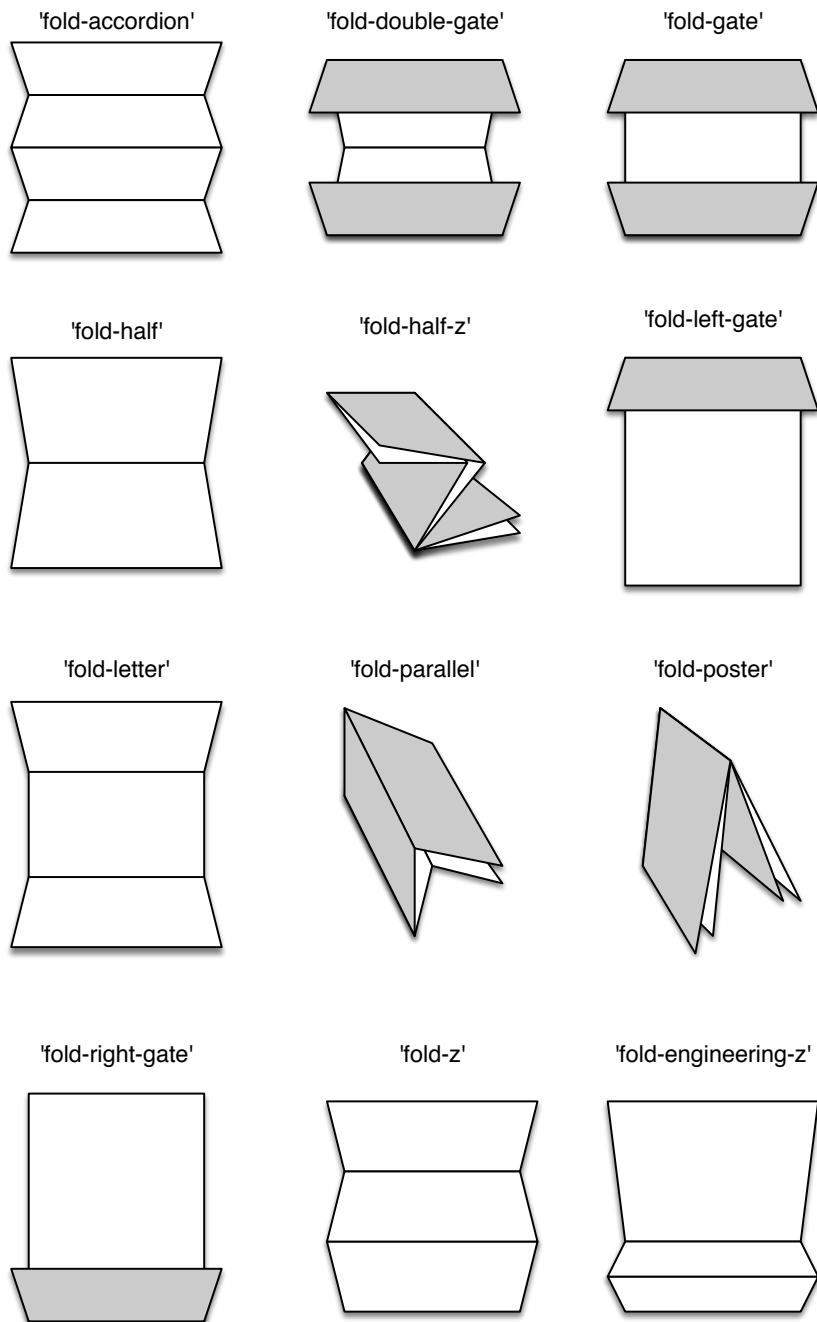
Coating finishers apply a liquid or powdered material to the surface of the hardcopy output, e.g., a clear UV light and weather resistant paint over a sign, while laminator finishers combine a solid material with the hardcopy output using heat and/or adhesives.

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**

513

514 **4.2.7 Punch**

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

517 **4.2.8 Stitch (Staple, Crimp, Edge Stitch, or Saddle Stitch)**

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

523 **4.2.9 Trim (Cut, Perforate, or Score)**

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

526 **5. Job Template Attributes**

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

529

Table 1 - New Job Template Attributes

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

530 **5.1 finishings (1setOf type2 enum)**

531 This REQUIRED Job Template attribute [STD92] lists the finishing processes that the Printer
 532 uses for each copy of each printed Document in the Job. A Printer that supports any of the
 533 finishing processes listed in section 4 MUST support this attribute.

534 The order of values supplied in the "finishings" attribute is not significant. A Printer MUST
 535 NOT require Clients to supply values in a particular order. If a Client supplies a value of 3
 536 ('none') with any additional values, the Printer MUST ignore the 3 ('none') value and process
 537 the Job as though 'none' was never supplied.

538 If the Printer supports the "media-col-ready" and / or "media-col-database" Printer
 539 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 the Internet Printing Protocol/1.1 [STD92].

5.1.1 STD 92 "finishings" Values

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

- **'none' (3):** Perform no finishing
- **'staple' (4):** Bind the Set(s) with one or more staples. The exact number, placement, and orientation of the staples are implementation and/or site defined.
- **'punch' (5):** This value indicates that holes are required in the finished hardcopy output. The exact number and placement of the holes are implementation and/or site defined. The punch specification MAY be satisfied (in a site- and implementation-specific manner) either by drilling/punching, or by substituting pre-drilled media.
- **'cover' (6):** This value is specified when it is desired to select a non-printed (or pre-printed) cover for each Set. This does not supplant the specification of a printed cover (on cover stock medium) by the Document itself.
- **'bind' (7):** This value indicates that a binding is to be applied to the Set; the type and placement of the binding are implementation and/or site defined.
- **'saddle-stitch' (8):** Bind the Set(s) with two or more staples (wire stitches) along the middle fold. The exact number and placement of the staples and the middle fold are implementation and/or site defined.
- **'edge-stitch' (9):** Bind the Set(s) with two or more staples (wire stitches) along one edge. The exact number and placement of the staples are implementation and/or site defined.
- **'staple-top-left' (20):** Bind the Set(s) with one or more staples in the top left corner.
- **'staple-bottom-left' (21):** Bind the Set(s) with one or more staples in the bottom left corner.
- **'staple-top-right' (22):** Bind the Set(s) with one or more staples in the top right corner.

- 574 • **‘staple-bottom-right’ (23):** Bind the Set(s) with one or more staples in the
575 bottom right corner.
- 576 • **‘edge-stitch-left’ (24):** Bind the Set(s) with two or more staples (wire stitches)
577 along the left edge. The exact number and placement of the staples are
578 implementation and/or site defined.
- 579 • **‘edge-stitch-top’ (25):** Bind the Set(s) with two or more staples (wire stitches)
580 along the top edge. The exact number and placement of the staples are
581 implementation and/or site defined.
- 582 • **‘edge-stitch-right’ (26):** Bind the Set(s) with two or more staples (wire stitches)
583 along the right edge. The exact number and placement of the staples are
584 implementation and/or site defined.
- 585 • **‘edge-stitch-bottom’ (27):** Bind the Set(s) with two or more staples (wire
586 stitches) along the bottom edge. The exact number and placement of the staples
587 are implementation and/or site defined.
- 588 • **‘staple-dual-left’ (28):** Bind the Set(s) with two staples (wire stitches) along the
589 left edge assuming a portrait document (see section 5.1).
- 590 • **‘staple-dual-top’ (29):** Bind the Set(s) with two staples (wire stitches) along the
591 top edge assuming a portrait document (see section 5.1).
- 592 • **‘staple-dual-right’ (30):** Bind the Set(s) with two staples (wire stitches) along
593 the right edge assuming a portrait document (see section 5.1).
- 594 • **‘staple-dual-bottom’ (31):** Bind the Set(s) with two staples (wire stitches) along
595 the bottom edge assuming a portrait document (see section 5.1).

596 **5.1.2 PWG 5100.1-2001 “finishings” Values**

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

- 599 • **‘fold’ (10):** Fold the hardcopy output. The exact number and orientations of the
600 folds is implementation and/or site defined.
- 601 • **‘trim’ (11):** Trim the hardcopy output on one or more edges. The exact number
602 of edges and the amount to be trimmed is implementation and/or site defined.
- 603 • **‘bale’ (12):** Bale the Set(s). The type of baling is implementation and/or site
604 defined.

- 605 • **'booklet-maker' (13):** Deliver the Set(s) to the signature booklet maker. This
606 value is a short cut for specifying a Job that is to be folded, trimmed and then
607 saddle-stitched.
- 608 • **'jog-offset' (14): (DEPRECATED)** Shift each Set from the previous one by a
609 small amount which is device dependent. This value has no effect on the "job-
610 sheet". This value SHOULD NOT have an effect if each Set of the Job consists
611 of one sheet. The "output-bin" Job Template attribute can be used instead,
612 specifying one of the 'stacker-NN' keywords (e.g. 'stacker-1').
- 613 • **'bind-left' (50):** Bind the Set(s) along the left edge; the type of the binding is
614 implementation and/or site defined.
- 615 • **'bind-top' (51):** Bind the Set(s) along the top edge; the type of the binding is
616 implementation and/or site defined.
- 617 • **'bind-right' (52):** Bind the Set(s) along the right edge; the type of binding is
618 implementation and/or site defined.
- 619 • **'bind-bottom' (53):** Bind the Set(s) along the bottom edge; the type of the
620 binding is implementation and/or site defined.

621 5.1.3 PWG 5100.1-2014 "finishings" Values

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

- 624 • **'coat' (15):** Apply a protective liquid or powdered coating to each sheet in an
625 implementation and/or site defined manner.
- 626 • **'laminate' (16):** Apply a protective (solid) material to each sheet in an
627 implementation and/or site defined manner.
- 628 • **'staple-triple-left' (32):** Bind the Set(s) with three staples (wire stitches) along
629 the left edge assuming a portrait document (see section 5.1).
- 630 • **'staple-triple-top' (33):** Bind the Set(s) with three staples (wire stitches) along
631 the top edge assuming a portrait document (see section 5.1).
- 632 • **'staple-triple-right' (34):** Bind the Set(s) with three staples (wire stitches) along
633 the right edge assuming a portrait document (see section 5.1).
- 634 • **'staple-triple-bottom' (35):** Bind the Set(s) with three staples (wire stitches)
635 along the top edge assuming a portrait document (see section 5.1).
- 636 • **'punch-top-left' (70):** Punch a single hole in the top left of the hardcopy output.

- 637 • **'punch-bottom-left' (71):** Punch a single hole in the bottom left of the hardcopy
638 output.
- 639 • **'punch-top-right' (72):** Punch a single hole in the top right of the hardcopy
640 output.
- 641 • **'punch-bottom-right' (73):** Punch a single hole in the bottom right of the
642 hardcopy output.
- 643 • **'punch-dual-left' (74):** Punch two holes on the left side of the hardcopy output.
- 644 • **'punch-dual-top' (75):** Punch two holes at the top of the hardcopy output.
- 645 • **'punch-dual-right' (76):** Punch two holes on the right side of the hardcopy
646 output.
- 647 • **'punch-dual-bottom' (77):** Punch two holes at the bottom of the hardcopy
648 output.
- 649 • **'punch-triple-left' (78):** Punch three holes on the left side of the hardcopy
650 output.
- 651 • **'punch-triple-top' (79):** Punch three holes at the top of the hardcopy output.
- 652 • **'punch-triple-right' (80):** Punch three holes on the right side of the hardcopy
653 output.
- 654 • **'punch-triple-bottom' (81):** Punch three holes at the bottom of the hardcopy
655 output.
- 656 • **'punch-quad-left' (82):** Punch four holes on the left side of the hardcopy output.
- 657 • **'punch-quad-top' (83):** Punch four holes at the top of the hardcopy output.
- 658 • **'punch-quad-right' (84):** Punch four holes on the right side of the hardcopy
659 output.
- 660 • **'punch-quad-bottom' (85):** Punch four holes at the bottom of the hardcopy
661 output.
- 662 • **'fold-accordion' (90):** Accordion-fold the hardcopy output vertically into four
663 sections.
- 664 • **'fold-double-gate' (91):** Fold the top and bottom quarters of the hardcopy output
665 towards the midline, then fold in half vertically.

- 666 • **'fold-gate' (92):** Fold the top and bottom quarters of the hardcopy output
667 towards the midline.
- 668 • **'fold-half' (93):** Fold the hardcopy output in half vertically.
- 669 • **'fold-half-z' (94):** Fold the hardcopy output in half horizontally, then Z-fold the
670 paper vertically into three sections.
- 671 • **'fold-left-gate' (95):** Fold the top quarter of the hardcopy output towards the
672 midline.
- 673 • **'fold-letter' (96):** Fold the hardcopy output into three sections vertically;
674 sometimes also known as a C fold.
- 675 • **'fold-parallel' (97):** Fold the hardcopy output in half vertically two times, yielding
676 four sections.
- 677 • **'fold-poster' (98):** Fold the hardcopy output in half horizontally and vertically;
678 sometimes also called a cross fold.
- 679 • **'fold-right-gate' (99):** Fold the bottom quarter of the hardcopy output towards
680 the midline.
- 681 • **'fold-z' (100):** Fold the hardcopy output vertically into three sections, forming a
682 Z.

683 **5.1.4 PWG 5100.1-2017 “finishings” Values**

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

- 686 • **'fold-engineering-z' (101):** Fold the hardcopy output vertically into three
687 sections, forming a Z but leaving room for binding, punching, or stapling along
688 the top edge
- 689 • **'punch-multiple-left' (86):** Drill or punch more than four holes along the
690 reference edge. For 1-4 holes, the individual explicit value ('punch-top-left',
691 'punch-dual-left', 'punch-triple-left' and 'punch-quad-left') SHOULD be used
692 instead. A Printer supplies the number and location of holes in the "punching"
693 member attribute in the collections listed by the "finishings-col-database" and
694 "finishings-col-ready" Printer Description attributes.
- 695 • **'punch-multiple-top' (87):** Drill or punch more than four holes along the
696 reference edge. For 1-4 holes, the individual explicit value ('punch-top-top',
697 'punch-dual-top', 'punch-triple-top' and 'punch-quad-top') SHOULD be used
698 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.

- **'punch-multiple-right' (88):** 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.
- **'punch-multiple-bottom' (89):** 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.

5.1.5 PWG 5100.1-2020 “finishings” Values

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

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

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

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

734 attributes if present. A Printer MUST accept member attributes in any order. A Client supplies
 735 the 'no-value' out-of-band value to specify that no finishing processes are requested.

736 **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

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

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

749 The "xxx-reference-edge" member attributes all share a common set of keyword values
 750 defined in Table 3. These member attributes are all single valued, e.g., 'top-left' is not
 751 allowed.

752 **Table 3 - Reference Edge Keywords**

Keyword	Description
'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.

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 to be bound, using the keywords defined in Table 3.

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:

- 781 • **'adhesive'**: Media Sheets are bound using glue or adhesive.
- 782 • **'comb'**: Media Sheets are bound by placing small rectangular holes along the
- 783 binding edge and using a tube-shaped plastic binding strip with comb like fingers
- 784 that fit through the holes.
- 785 • **'flat'**: Media Sheets are bound so that they can lay flat when the hardcopy output
- 786 is opened. The specific method of producing such a binding is implementation
- 787 defined.
- 788 • **'padding'**: Media Sheets are bound by applying a non-penetrating adhesive to
- 789 the edge of the stack of sheets so that the sheets can be easily peeled off one at
- 790 a time.
- 791 • **'perfect'**: Media Sheets are bound by roughing the binding edge and applying
- 792 an adhesive.
- 793 • **'spiral'**: Media Sheets are bound by placing small round holes along the binding
- 794 edge and winding plastic or metal wire through the holes in a spiral pattern.
- 795 • **'tape'**: Media Sheets are bound by placing tape along the binding edge,
- 796 overlapping the top and bottom sheets of the stack.
- 797 • **'velo'**: Media Sheets are bound by placing small holes along the binding edge
- 798 and joining the sheets using plastic strips with pins that extend through those
- 799 holes.

800 **5.2.3 coating (collection)**

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

804 **5.2.3.1 coating-sides (type1 keyword)**

805 This REQUIRED member attribute specifies the sides of the Media Sheets to be coated:
806 'front', 'back', or 'both'.

807 **5.2.3.2 coating-type (type2 keyword | name(MAX))**

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

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

- 812 • **'archival-glossy'**: Coat each Media Sheet to produce a glossy surface that
813 preserves the output for an extended period of time, e.g., a UV protectant.
- 814 • **'archival-matte'**: Coat each Media Sheet to produce a matte surface that
815 preserves the output for an extended period of time, e.g., a UV protectant.
- 816 • **'archival-semi-gloss'**: Coat each Media Sheet to produce a semi-gloss surface
817 that preserves the output for an extended period of time, e.g., a UV protectant.
- 818 • **'glossy'**: Coat each Media Sheet to produce a glossy surface.
- 819 • **'high-gloss'**: Coat each Media Sheet to produce a high-gloss surface.
- 820 • **'matte'**: Coat each Media Sheet to produce a matte surface.
- 821 • **'semi-gloss'**: Coat each Media Sheet to produce a semi-gloss surface.
- 822 • **'silicone'**: Coat each Media Sheet to produce a water-resistant surface.
- 823 • **'translucent'**: Coat each Media Sheet to produce a translucent surface.

824 **5.2.4 covering (collection)**

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

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

831 **5.2.4.1 covering-name (type2 keyword | name(MAX))**

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

- 835 • **'plain'**: Apply a plain (blank) cover.
- 836 • **'pre-cut'**: Apply a pre-cut cover.
- 837 • **'pre-printed'**: Apply a pre-printed cover.

838 **5.2.5 finishing-template (type2 keyword | name(MAX))**

839 This REQUIRED member attribute specifies the unique name for the Finishing Template.
840 This specification defines keywords matching the names for all registered "finishings"
841 enums. This specification also defines keywords for each JDF @FoldCatalog [JDF1.5] value

842 of the form 'jdf-fN-N'. For example, the JDF @FoldCatalog value 'F8-6' (a triple fold
843 instruction similar to 'fold-parallel') would be specified using a "finishing-template" value of
844 'jdf-f8-6'.

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

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

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

861 **5.2.6 folding (1setOf collection)**

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

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

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

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

```

880     finishings-col-database=
881     {
882         finishing-template='fold-accordion'
883         media-size-name="iso_a4_210x297mm"
884         media-sheets-supported=1-8
885         folding=
886         {
887             folding-direction='inward'
888             folding-location=7425
889             folding-reference-edge='top'
890         },
891         {
892             folding-direction='inward'
893             folding-location=22275
894             folding-reference-edge='top'
895         },
896         {
897             folding-direction='outward'
898             folding-location=14850
899             folding-reference-edge='top'
900         }
901     }
902

```

903 5.2.6.1 folding-direction (type1 keyword)

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

906 5.2.6.2 folding-offset (integer(0:MAX))

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

909 5.2.6.3 folding-reference-edge (type1 keyword)

910 This REQUIRED member attribute specifies the Finishing Reference Edge ('bottom', 'left',
 911 'right', or 'top') used for the folding operation.

912 5.2.7 laminating (collection)

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

916 5.2.7.1 laminating-sides (type2 keyword)

917 This REQUIRED member attribute specifies which sides of the Media Sheets are laminated.
 918 This specification defines the following keywords:

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

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

922 5.2.7.2 laminating-type (type2 keyword | name(MAX))

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

- 925 • **'archival'**: Laminate each Media Sheet to preserve the output for an extended
926 period of time, e.g., a UV protectant.
- 927 • **'archival-glossy'**: Laminate each Media Sheet to produce a glossy surface that
928 preserves the output for an extended period of time, e.g., a UV protectant.
- 929 • **'archival-matte'**: Laminate each Media Sheet to produce a matte surface that
930 preserves the output for an extended period of time, e.g., a UV protectant.
- 931 • **'archival-semi-gloss'**: Laminate each Media Sheet to produce a semi-gloss
932 surface that preserves the output for an extended period of time, e.g., a UV
933 protectant.
- 934 • **'glossy'**: Laminate each Media Sheet to produce a glossy surface.
- 935 • **'high-gloss'**: Laminate each Media Sheet to produce a high-gloss surface.
- 936 • **'matte'**: Laminate each Media Sheet to produce a matte surface.
- 937 • **'semi-gloss'**: Laminate each Media Sheet to produce a semi-gloss surface.
- 938 • **'silicone'**: Laminate each Media Sheet to produce a water-resistant surface.
- 939 • **'translucent'**: Laminate each Media Sheet to produce a translucent surface.

940 5.2.8 punching (collection)

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

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

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

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

951 **5.2.8.1 punching-locations (1setOf integer(0:MAX))**

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

955 **5.2.8.2 punching-offset (integer(0:MAX))**

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

959 **5.2.8.3 punching-reference-edge (type1 keyword)**

960 This REQUIRED member attribute specifies the Finishing Reference Edge ('bottom', 'left',
961 'right', or 'top') for the punching operation.

962 **5.2.9 stitching (collection)**

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

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

971 **5.2.9.1 stitching-angle (integer(0:359))**

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

975 **5.2.9.2 stitching-locations (1setOf integer(0:MAX))**

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

979 **5.2.9.3 stitching-method (type2 keyword)**

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

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

985 **5.2.9.4 stitching-offset (integer(0:MAX))**

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

989 **5.2.9.5 stitching-reference-edge (type1 keyword)**

990 This REQUIRED member attribute specifies the Finishing Reference Edge ('bottom', 'left',
991 'right', or 'top') for the stitching operation.

992 **5.2.10 trimming (1setOf collection)**

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

996 A Client supplies the "trimming-offset", "trimming-reference-edge", and "trimming-type"
997 member attributes to request custom trimming. A Printer that receives an incomplete
998 collection MUST either accept the request and return the 'successful-ok-ignored-or-
999 substituted-attributes' status code [STD92], or reject the request and return the 'client-error-
1000 attributes-or-values-not-supported' status code [STD92].

1001 **5.2.10.1 trimming-offset (1setOf integer(0:MAX))**

1002 This REQUIRED member attribute specifies the Finishing Offset where the Printer cuts,
1003 perforates, or scores the Media Sheet(s), measured in hundredths of millimeters (1/2540th
1004 of an inch) from the Finishing Reference Edge.

1005 **5.2.10.2 trimming-reference-edge (type1 keyword)**

1006 This REQUIRED member attribute specifies the Finishing Reference Edge ('bottom', 'left',
1007 'right', or 'top') for the trimming operation.

1008 **5.2.10.3 trimming-type (type2 keyword | name(MAX))**

1009 This REQUIRED member attribute specifies the type of trimming to use. This specification
1010 defines the following keywords:

- 1011 • **'draw-line'**: Marks a cut line on the Media Sheet
- 1012 • **'full'**: Cuts the Media Sheet

- 1013 • **'partial'**: Partially cuts the Media Sheet
- 1014 • **'perforate'**: Pierces the Media Sheet
- 1015 • **'score'**: Scores the Media Sheet
- 1016 • **'tab'**: Cuts the Media Sheet, leaving a hanging tab.

1017 **5.2.10.4 trimming-when (type2 keyword)**

1018 This REQUIRED member attribute specifies when to perform the trimming operation. This
1019 specification defines the following keywords:

- 1020 • **'after-documents'**: Trim after each Document.
- 1021 • **'after-job'**: Trim after the Job.
- 1022 • **'after-sets'**: Trim after each Set.
- 1023 • **'after-sheets'**: Trim after each Media Sheet.

1024 If a Client does not supply this member attribute, and the finishing template from the Printer's
1025 "finishings-col-database" does not include this member attribute, the Printer MUST use
1026 'after-sets' as the default value.

1027 **5.3 job-pages-per-set (integer(1:MAX))**

1028 This CONDITIONALLY REQUIRED Job Template attribute specifies the number of Input
1029 Pages that constitute a Set for finishing processes. A Printer MUST support this attribute
1030 when it does not support the "copies" Job Template attribute [STD92] for the specified
1031 Document format.

1032 A Client supplies this attribute only when the Printer does not support the "copies" attribute
1033 for the selected Document format. If the Client supplies both this attribute and the "copies"
1034 attribute, the Printer MUST either accept the request and return the 'successful-ok-ignored-
1035 or-substituted-attributes' status code [STD92] to indicate which value it used, or reject the
1036 request and return the 'client-error-attributes-or-values-not-supported' status code [STD92].

1037 A Client supplies a value for this attribute that is evenly divisible by the number of Input
1038 Pages, since it is being used to demarcate the length of a single Set (see the sections on
1039 the "multiple-document-handling" Job Template attribute [STD92] for more information on
1040 using this attribute with multiple Document Jobs). If the Printer receives a Document with a
1041 number of pages that is not evenly divisible by the value supplied for "job-pages-per-set",
1042 the Printer MUST accept the request, treat any remaining pages as a separate Set for
1043 finishing, return the 'successful-ok' status code [STD92], and include the 'job-completed-
1044 with-warnings' keyword in the "job-state-reasons" Job Status attribute [STD92] to report the
1045 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.

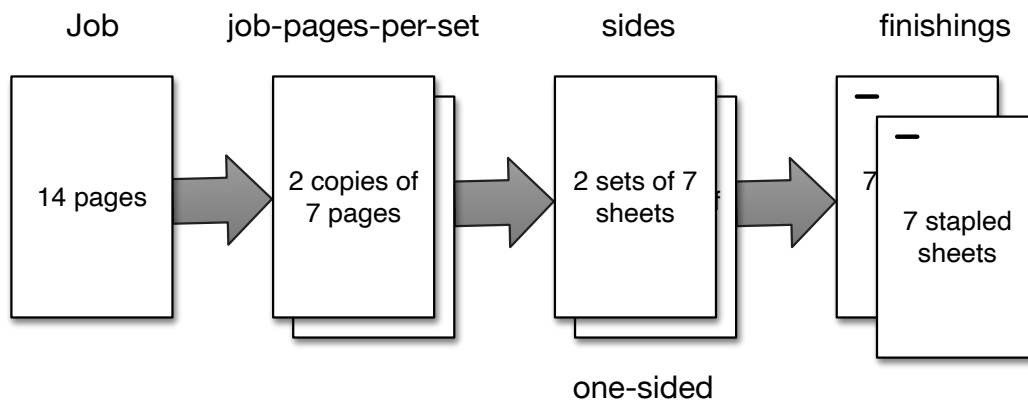


Figure 4 - Handling of "job-pages-per-set" with One-Sided Printing

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.

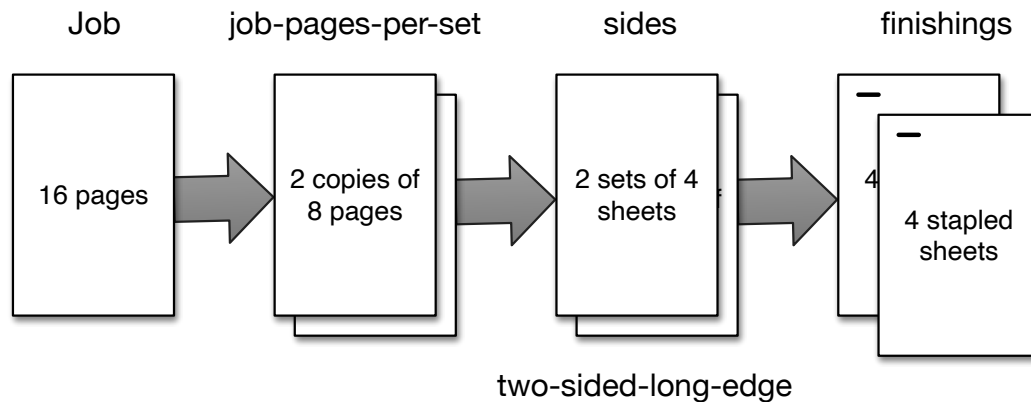


Figure 5 - Handling of "job-pages-per-set" with Two-Sided Printing

6. Printer Description Attributes

Table 4 lists the Printer Description attributes defined in this specification and their associated Printer conformance requirements.

Table 4 - 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

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

1075 **6.1 baling-type-supported (1setOf (type2 keyword | name(MAX)))**

1076 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
 1077 of the "baling-type" member attribute (section 5.2.1.1). A Printer MUST support this attribute
 1078 if it supports the "baling-type" member attribute.

1079 **6.2 baling-when-supported (1setOf type2 keyword)**

1080 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
 1081 of the "baling-when" member attribute (section 5.2.1.2). A Printer MUST support this attribute
 1082 if it supports the "baling-when" member attribute.

1083 **6.3 binding-reference-edge-supported (1setOf type1 keyword)**

1084 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
 1085 of the "binding-reference-edge" member attribute (section 5.2.2.1). A Printer MUST support
 1086 this attribute if it supports the "binding-reference-edge" member attribute.

1087 **6.4 binding-type-supported (1setOf type2 keyword)**

1088 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
 1089 of the "binding-type" member attribute (section 5.2.2.2). A Printer MUST support this
 1090 attribute if it supports the "binding-type" member attribute.

1091 **6.5 coating-sides-supported (1setOf type1 keyword)**

1092 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
 1093 of the "coating-sides" member attribute (section 5.2.3.1). A Printer MUST support this
 1094 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 (name(MAX) | type2 keyword))

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 5. If a Printer receives a Job Creation request supplying a "finishings-col" Job Template attribute containing any of the member attributes listed in Table 5, then the Printer MUST reject the request and return the 'client-error-bad-request' status code [STD92].

Table 5 - 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
  }
}
```

```

1175         stitching-reference-edge='top'
1176     }
1177 },
1178 {
1179     finishing-template='punch-triple-left'
1180     media-sheets-supported=1-100
1181     media-size-name='na_letter_8.5x11in'
1182     punching=
1183     {
1184         punching-locations=5715,16510,27305
1185         punching-offset=1300
1186         punching-reference-edge='left'
1187     }
1188 },
1189 {
1190     finishing-template='staple-top-left'
1191     media-sheets-supported=1-150
1192     stitching=
1193     {
1194         stitching-locations=635
1195         stitching-offset=635
1196         stitching-reference-edge='left'
1197     }
1198 }

```

1199 **6.9.1 imposition-template (type2 keyword | name(MAX))**

1200 This RECOMMENDED member attribute specifies the default "imposition-template" Job
 1201 Template attribute [PWG5100.3-2001] used for the finishing process defined by the
 1202 collection. For example, when processing Input Pages and applying a 'booklet-maker'
 1203 finishing process, a Printer could automatically apply a 'signature' imposition template.

1204 **6.9.2 media-sheets-supported (rangeOfInteger(1:MAX))**

1205 This RECOMMENDED member attribute specifies the minimum and maximum number of
 1206 Media sheets supported for the finishing operation described by the collection. For example,
 1207 a Printer implementing the 'fold-half' Finishing Template that has a minimum of 1 sheet and
 1208 a maximum of 5 sheets indicates this limit with a value of '1-5'. A Printer MUST report a
 1209 value for this attribute that is within the range reported by the Printer's "job-media-sheets-
 1210 supported" Printer Description attribute [STD92].

1211 **6.9.3 media-size (collection)**

1212 This RECOMMENDED member attribute specifies the applicable media size for the finishing
 1213 process described by the collection, represented by "x-dimension (integer(0:MAX))" and "y-
 1214 dimension (integer(0:MAX))" member attributes semantically equivalent to those defined by
 1215 the "media-size" member attribute of "media-col" [PWG5100.7].

1216 A Printer MUST report a value for this attribute listed by its "media-size-supported" Printer
 1217 Description attribute [PWG5100.7]. A Printer MUST NOT include both this member attribute
 1218 and the "media-size-name" member attribute (section 6.9.4) in the same collection.

1219 6.9.4 media-size-name (type2 keyword | name(MAX))

1220 This RECOMMENDED member attribute specifies the applicable media size for the finishing
1221 process described by the collection, represented as a keyword or name.

1222 A Printer MUST report a value for this attribute listed by its "media-supported" Printer
1223 Description attribute [STD92]. A Printer MUST NOT include both this member attribute and
1224 the "media-size" member attribute (section 6.9.3) in the same collection.

1225 6.10 finishings-col-default (1setOf collection | no-value)

1226 This REQUIRED Printer Description attribute contains the default value for the "finishings-
1227 col" Job Template attribute (section 5.2). This attribute MUST report the same finishing
1228 processes as the "finishings-default" Printer Description attribute [STD92]. If "finishings-
1229 default" has the value '3' (none), then the value of this attribute MUST be the 'no-value' out-
1230 of-band value [STD92]. A Printer SHOULD omit all media-specific member attributes from
1231 the collection values.

1232 6.11 finishings-col-ready (1setOf collection)

1233 This REQUIRED Printer Description attribute lists collections from the "finishings-col-
1234 database" Printer Description attribute (section 6.9) that are ready for use.

1235 6.12 finishings-col-supported (1setOf keyword)

1236 This REQUIRED attribute lists the supported member attributes of the "finishings-col"
1237 Job/Document Template attribute (section 5.2).

1238 6.13 folding-direction-supported (1setOf type1 keyword)

1239 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1240 of the "folding-direction" member attribute (section 5.2.6.1). A Printer MUST support this
1241 attribute if it supports the "folding-direction" member attribute.

**1242 6.14 folding-offset-supported (1setOf (integer(0:MAX) |
1243 rangeOfInteger(0:MAX)))**

1244 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1245 of the "folding-offset" member attribute (section 5.2.6.2). A Printer MUST support this
1246 attribute if it supports the "folding-offset" member attribute.

1247 6.15 folding-reference-edge-supported (1setOf type1 keyword)

1248 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1249 of the "folding-reference-edge" member attribute (section 5.2.6.3). A Printer MUST support
1250 this attribute if it supports the "folding-reference-edge" member attribute.

1251 6.16 laminating-sides-supported (1setOf type1 keyword)

1252 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1253 of the "laminating-sides" member attribute (section 5.2.7.1). A Printer MUST support this
1254 attribute if it supports the "laminating-sides" member attribute.

1255 6.17 laminating-type-supported (1setOf (type2 keyword | name(MAX)))

1256 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1257 of the "laminating-type" member attribute (section 5.2.7.2). A Printer MUST support this
1258 attribute if it supports the "laminating-type" member attribute.

1259 6.18 job-pages-per-set-supported (boolean)

1260 This CONDITIONALLY REQUIRED Printer Description attribute indicates whether the "job-
1261 pages-per-set" Job Template attribute (section 5.3) is supported. A Printer MUST support
1262 this attribute if it supports the "job-pages-per-set" Job Template attribute. A Printer MUST
1263 report a value of 'true' for each Document format listed by its "document-format-supported"
1264 Printer Description attribute [STD92] that does not support the "copies" attribute.

1265 6.19 punching-hole-diameter-configured (integer(0:MAX))

1266 This CONDITIONALLY REQUIRED Printer Description attribute supplies the diameter of the
1267 hole produced by the Printer's hole punch, measured in hundredths of millimeters (1/2540th
1268 of an inch). A Printer MUST support this attribute if it supports the "punching" member
1269 attribute (section 5.2.8).

1270 Note: Prior versions of this specification did not require the "punching-hole-diameter-
1271 configured" Printer Description attribute. If a Printer does not support this attribute, a Client
1272 SHOULD can the value is 790 (7.9mm or 5/16in.) for media sizes with dimensions measured
1273 in inches and 650 (6.5mm) for media sizes with dimensions measured in millimeters.

**1274 6.20 punching-locations-supported (1setOf (integer(0:MAX) |
1275 rangeOfInteger(0:MAX)))**

1276 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1277 of the "punching-locations" member attribute (section 5.2.8.1). A Printer MUST support this
1278 attribute if it supports the "punching-locations" member attribute.

1279 **6.21 punching-offset-supported (1setOf (integer(0:MAX) |**
1280 **rangeOfInteger(0:MAX)))**

1281 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1282 of the "punching-offset" member attribute (section 5.2.8.2). A Printer MUST support this
1283 attribute if it supports the "punching-offset" member attribute.

1284 **6.22 punching-reference-edge-supported (1setOf type1 keyword)**

1285 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1286 of the "punching-reference-edge" member attribute (section 5.2.8.3). A Printer MUST
1287 support this attribute if it supports the "punching-reference-edge" member attribute.

1288 **6.23 stitching-angle-supported (1setOf (integer(0:359) |**
1289 **rangeOfInteger(0:359)))**

1290 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1291 of the "stitching-angle" member attribute (section 5.2.9.1). A Printer MUST support this
1292 attribute if it supports the "stitching-angle" member attribute.

1293 **6.24 stitching-locations-supported (1setOf (integer(0:MAX) |**
1294 **rangeOfInteger(0:MAX)))**

1295 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1296 of the "stitching-locations" member attribute (section 5.2.9.2). A Printer MUST support this
1297 attribute if it supports the "stitching-locations" member attribute.

1298 **6.25 stitching-method-supported (1setOf type2 keyword)**

1299 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1300 of the "stitching-method" member attribute (section 0). A Printer MUST support this attribute
1301 if it supports the "stitching-method" member attribute.

1302 **6.26 stitching-offset-supported (1setOf (integer(0:MAX) |**
1303 **rangeOfInteger(0:MAX)))**

1304 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1305 of the "stitching-offset" member attribute (section 5.2.9.4). A Printer MUST support this
1306 attribute if it supports the "stitching-offset" member attribute.

1307 **6.27 stitching-reference-edge-supported (1setOf type1 keyword)**

1308 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1309 of the "stitching-reference-edge" member attribute (section 0). A Printer MUST support this
1310 attribute if it supports the "stitching-reference-edge" member attribute. A Printer MUST
1311 support the 'left' value.

1312 **6.28 trimming-offset-supported (1setOf (integer(0:MAX) |**
1313 **rangeOfInteger(0:MAX)))**

1314 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1315 of the "trimming-offset" member attribute (section 5.2.10.1). A Printer MUST support this
1316 attribute if it supports the "trimming-offset" member attribute.

1317 **6.29 trimming-reference-edge-supported (1setOf type1 keyword)**

1318 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1319 of the "trimming-reference-edge" member attribute (section 5.2.10.2). A Printer MUST
1320 support this attribute if it supports the "trimming-reference-edge" member attribute.

1321 **6.30 trimming-type-supported (1setOf type2 keyword)**

1322 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1323 of the "trimming-type" member attribute (section 0). A Printer MUST support this attribute if
1324 it supports the "trimming-type" member attribute.

1325 **6.31 trimming-when-supported (1setOf type2 keyword)**

1326 This CONDITIONALLY REQUIRED Printer Description attribute lists the supported values
1327 of the "trimming-when" member attribute (section 5.2.10.4). A Printer MUST support this
1328 attribute if it supports the "trimming-when" member attribute.
1329

7. Printer Status Attributes

Table 4 lists the Printer Status attributes defined in this specification and their associated Printer conformance requirements.

Table 6 - 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 7.

Table 7 - 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 ";"

```

```

1355 finisher-opt = finisher-capacity
1356
1357 finisher-type = "type" "=" 1*ALPHA
1358 ; enumerated value as an alpha string (e.g.,
1359 ; 'stitcher') of finDeviceType [RFC3806] mapped
1360 ; indirectly from the *label* in FinDeviceTypeTC
1361
1362 finisher-unit = "unit" "=" 1*ALPHA
1363 ; enumerated value as an alpha string (e.g., 'other') of
1364 ; finDeviceCapacityUnit in [RFC3806] mapped indirectly from
1365 ; the *label* in PrtCapacityUnitTC [RFC3805]
1366
1367 finisher-max-capacity = "maxcapacity" "=" 1*[DIGIT / "-"]
1368 ; integer value as a numeric string mapped directly from
1369 ; finDeviceMaxCapacity [RFC3806]
1370
1371 finisher-capacity = "capacity" "=" 1*[DIGIT / "-"]
1372 ; integer value as a numeric string mapped directly from
1373 ; finDeviceCurrentCapacity [RFC3806]
1374
1375 finisher-index = "index" "=" 1*DIGIT
1376 ; integer value as a numeric string mapped directly from
1377 ; finDeviceIndex [RFC3806]
1378
1379 finisher-presentonoff = "presentonoff" "=" "other"/ "on" /
1380 ; "off" / "notPresent"
1381 ; string value as an alpha string of
1382 ; finDevicePresentOnOff [RFC3806] mapped indirectly
1383 ; from the *label* in PresentOnOff [RFC3805]
1384
1385 finisher-status = "status" "=" 1*DIGIT
1386 ; integer value as a numeric string mapped directly from
1387 ; finDeviceStatus [RFC3806]
1388
1389 finisher-ext      = finisher-extname "=" finisher-extvalue
1390 finisher-extname  = 1*[ALPHA / DIGIT / "-"]
1391 finisher-extvalue = 1*[ALPHA / DIGIT / "-" / "." / ","]
1392 ; extension point for other MIB values not mapped

```

1393 7.1.1 Example of printer-finisher

1394 Figure 7 describes an example "printer-finisher" attribute listing two strings describing staple
 1395 and punch finisher subunits, presented using PAPI textual encoding [PAPI] with line breaks
 1396 added for readability.

1397 Figure 7 - PAPI Example of "printer-finisher"

```

1398 printer-finisher[1] = "index=8;
1399 ; type=stitcher;
1400 ; unit=sheets;
1401 ; maxcapacity=500;"
1402
1403 printer-finisher[2] = "index=3;
1404 ; type=puncher;
1405 ; unit=sheets;

```

1406 `maxcapacity=100;"`

1407 **7.2 printer-finisher-description (1setOf text(MAX))**

1408 This REQUIRED Printer Status attribute lists localized descriptions for each currently
1409 installed finisher subunit listed by the "printer-finisher" Printer Status attribute (section 7.1).

1410 This attribute MUST have the same cardinality (supply the same number of values) as the
1411 "printer-finisher" attribute. The i^{th} value in the "printer-finisher-description" attribute
1412 corresponds to the i^{th} value in the "printer-finisher" attribute.

1413 If a Printer implements the IETF Finishing MIB [RFC3806], then the Printer MUST support
1414 this attribute and MUST map each human-readable (localized) value from
1415 finDeviceDescription to one of the strings supplied by this attribute using the following
1416 process:

- 1417 1. The value of finDeviceDescription is converted from the character set specified by
1418 prtGeneralCurrentLocalization and prtLocalizationCharacterSet to the character
1419 set specified by the "charset-configured" Printer Description attribute [STD92];
1420 and
- 1421 2. The new "printer-finisher-description" value is tagged with the natural language
1422 specified by prtGeneralCurrentLocalization, prtLocalizationLanguage, and
1423 prtLocalizationCountry unless the natural language matches the language to be
1424 used in the response as indicated by the "attributes-natural-language" operation
1425 attribute [STD92].

1426 **7.2.1 Example of printer-finisher-description**

1427 Figure 8 describes an example "printer-finisher-description" attribute listing two values
1428 corresponding to the values in Figure 7, each tagged with the natural language identifier for
1429 "de" (German), presented using PAPI textual encoding [PAPI] with line breaks added for
1430 readability.

1431 **Figure 8 - PAPI Example of "printer-finisher-description"**

```
1432 printer-finisher-description[1] = "Hefter SN:BEISPIEL-12345"(de)
1433 printer-finisher-description[2] = "Lochstanze S/N:BEISPIEL-67890"(de)
```

1434 **7.3 printer-finisher-supplies (1setOf octetString(MAX))**

1435 This CONDITIONALLY REQUIRED Printer Status attribute lists a string for each supply
1436 used by the Printer's installed finishing subunits. A Printer MUST support this attribute if it
1437 implements the IETF Finishing MIB [RFC3806] finSupplyTable. A Printer that supports this
1438 attribute MUST support the "printer-finisher-supplies-description" attribute (section 7.4).

1439 Each value consists of an unordered sequence of key/value pairs, structured according to
1440 the ABNF [STD68] [FIN-ABNF] defined in Figure 9. Table 8 lists the keys defined in this

1441 specification and their derivation from the corresponding elements in the finSupplyTable
1442 defined in the IETF Finishing MIB [RFC3806].

1443 **Table 8 - Keywords for "printer-finisher-supplies"**

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

1444 Notes:

- 1445 1. REQUIRED to associate the supply to the finisher subunit using that supply.
1446 2. OPTIONAL because correlation with the original MIB order is not needed.

1447 This attribute MUST have the same cardinality (supply the same number of values) as the
1448 "printer-finisher-supplies-description" attribute. The i^{th} value in the "printer-finisher-supplies"
1449 attribute corresponds to the i^{th} value in the "printer-finisher-supplies-description" attribute.

1450 A Printer MUST encode the values of "printer-finisher-supplies" using printable characters
1451 from the Net-ASCII subset of the US-ASCII character set [RFC5198].

1452 **Figure 9 - ABNF for "printer-finisher-supplies" Values**

```

1453 finisher-supply = 1*supply-required *supply-optional
1454       ; set of finisher supply elements encoded into one value
1455 supply-required = supply-req ";"
1456 supply-req = supply-class / supply-type / supply-description /
1457             supply-unit / supply-max / supply-current-level /
1458             supply-color
1459
1460 supply-optional = supply-opt ";"
1461 supply-opt = supply-index / supply-device-index / supply-ext
1462
1463 supply-class = "class" "=" 1*ALPHA
1464       ; enumerated value as an alpha string (e.g., 'supplyThatIsConsumed')
1465       ; of prtMarkerSuppliesClass in [RFC3805] mapped indirectly from
1466       ; the *label* in PrtMarkerSuppliesClassTC in [RFC3805]
1467
1468 supply-type = "type" "=" 1*ALPHA
1469       ; enumerated value as an alpha string (e.g., 'staples') of
1470       ; prtMarkerSuppliesType in [RFC3805] mapped indirectly from
1471       ; the *label* in PrtMarkerSuppliesTypeTC in [RFC3805]
1472
1473 supply-unit = "unit" "=" 1*ALPHA
1474       ; enumerated value as an alpha string (e.g., 'items' or 'percent')
1475       ; of finSupplyUnit in [RFC3806] mapped indirectly from the *label*

```

```

1476         ; in PrtMarkerSuppliesSupplyUnitTC in [RFC3805]
1477
1478     supply-max = "max" "=" 1*[DIGIT / "-"]
1479         ; integer value as a numeric string mapped directly from
1480         ; finSupplyMaxCapacity in [RFC3806]
1481
1482     supply-current-level = "level" "=" 1*[DIGIT / "-"]
1483         ; integer value as a numeric string mapped directly from
1484         ; finSupplyCurrentLevel in [RFC3806]
1485
1486     supply-color = "color" "=" 1*ALPHA
1487         ; enumerated value as an alpha string (e.g., 'silver') of
1488         ; finSupplyColorName in [RFC3806] mapped indirectly from the color
1489         ; names from PWG Media Standardized Names 2.0 [PWG5101.1]
1490
1491     supply-index = "index" "=" 1*DIGIT
1492         ; integer value as a numeric string mapped directly from
1493         ; finSupplyIndex in [RFC3806]
1494
1495     supply-device-index = "deviceIndex" "=" 1*ALPHA
1496         ; string value as an alpha string mapped directly from
1497         ; finSupplyDeviceIndex in [RFC3806]
1498
1499     supply-ext      = supply-extname "=" supply-extvalue
1500     supply-extname  = 1*[ALPHA / DIGIT / "-"]
1501     supply-extvalue = 1*[ALPHA / DIGIT / "-" / "." / "," ]
1502         ; extension point for other MIB values not mapped

```

1503 7.3.1 Example of printer-finisher-supplies

1504 Figure 10 shows an example "printer-finisher-supplies" listing one finisher supply,
 1505 referencing the stitcher finisher device subunit listed in Figure 7, presented using a PAPI
 1506 [PAPI] encoding (line breaks added for readability).

1507 Figure 10 - PAPI Example of "printer-finisher-supplies"

```

1508     printer-finisher-supplies = "class=supplyThatIsConsumed;
1509                                type=staples;
1510                                unit=items;
1511                                max=500;
1512                                level=100;
1513                                color=silver;
1514                                index=8;"

```

1515 7.4 printer-finisher-supplies-description (1setOf text(MAX))

1516 This CONDITIONALLY REQUIRED Printer Status attribute lists localized descriptions of
 1517 finisher supplies listed by the "printer-finisher-supplies" Printer Status attribute (section 7.3).
 1518 A Printer MUST support this attribute if it supports the "printer-finisher-supplies" attribute. A
 1519 Printer MUST support this attribute if the Printer implements the IETF Finishing MIB
 1520 [RFC3806] finSupplyTable.

1521 The values of this attribute are consistent with the `finSupplyDescription` element [RFC3806].
1522 If the Printer implements the IETF Finishing MIB `finSupplyTable`, it MUST map each human-
1523 readable (localized) `finSupplyDescription` value to one of the strings supplied by this attribute
1524 using the following process:

- 1525 1. The value of `finSupplyDescription` is converted from the character set specified by
1526 `prtGeneralCurrentLocalization` and `prtLocalizationCharacterSet` to the character
1527 set specified by the "charset-configured" Printer Description attribute [STD92];
1528 and
- 1529 2. The new "printer-finisher-supplies-description" value is tagged with the natural
1530 language specified by `prtGeneralCurrentLocalization`, `prtLocalizationLanguage`,
1531 and `prtLocalizationCountry` unless the natural language matches the language to
1532 be used in the response as indicated by the "attributes-natural-language"
1533 operation attribute [STD92].

1534 This attribute MUST have the same cardinality (supply the same number of values) as the
1535 "printer-finisher-supplies" attribute. The i^{th} value in the "printer-finisher-supplies-description"
1536 attribute corresponds to the i^{th} value in the "printer-finisher-supplies" attribute.

1537 7.4.1 Example of printer-finisher-supplies-description

1538 Figure 11 shows an example of "printer-finisher-supplies-description" listing a description for
1539 the supply listed in Figure 10, tagged with the "de" (German) natural language identifier,
1540 presented using a PAPI [PAPI] encoding.

1541 **Figure 11 - PAPI Example of "printer-finisher-supplies-description"**

1542 `printer-finisher-supplies-description = "Heftklammern"(de)`

1543 8. Conformance Requirements

1544 This section summarizes the Conformance Requirements detailed in the definitions in this
1545 document for Clients and Printers.

1546 8.1 Conformance Requirements for Clients

1547 For a Client to claim conformance to this specification, the Client MUST support:

- 1548 • The REQUIRED IPP Job Template attributes defined in section 5;
- 1549 • The REQUIRED IPP Printer Status attributes defined in section 0;
- 1550 • The REQUIRED IPP Printer Description attributes defined in section 6;
- 1551 • 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 CONDITIONALLY REQUIRED IPP Printer Status attributes defined in section 0 for all the finishing features the Printer supports;
- 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 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

- 1581 • Unicode Line Breaking Algorithm [UAX14]– character classes and wrapping
- 1582 • Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]
- 1583 • Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences
- 1584 • Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization
- 1585 • Unicode Character Encoding Model [UTR17] – multi-layer character model
- 1586 • Unicode in XML and other Markup Languages [UTR20] – XML usage
- 1587 • Unicode Character Property Model [UTR23] – character properties
- 1588 • Unicode Conformance Model [UTR33] – Unicode conformance basis+
- 1589 • Unicode Collation Algorithm [UTS10] – sorting
- 1590 • Unicode Locale Data Markup Language [UTS35] – locale databases

1591 **10. Security Considerations**

1592 In addition to the security considerations described in the IPP/1.1: Model and Semantics
 1593 [STD92], implementations MAY support different access control to various finishing features,
 1594 depending on the identity of the User submitting the Job.

1595 Implementations of this specification SHOULD conform to the following standards on
 1596 processing of human-readable Unicode text strings, see:

- 1597 • Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks
- 1598 • Unicode Security FAQ [UNISECFAQ]– common Unicode security issues

1599 **11. IANA and PWG Considerations**

1600 **11.1 Attribute Registrations**

1601 The attributes defined in this document will be published by IANA according to the
 1602 procedures in IPP Model and Semantics [STD92] in the following location:

1603 <https://www.iana.org/assignments/ipp-registrations>

1604 The registry entries will contain the following information:

1605	Job Template attributes:	Reference
1606	-----	-----

1607	finishings-col (no-value 1setOf collection)	[PWG5100.1]
1608	baling (collection)	[PWG5100.1]
1609	baling-type (type2 keyword name(MAX))	[PWG5100.1]
1610	baling-when (type2 keyword)	[PWG5100.1]
1611	binding (collection)	[PWG5100.1]
1612	binding-reference-edge (type1 keyword)	[PWG5100.1]
1613	binding-type (type2 keyword name(MAX))	[PWG5100.1]
1614	coating (collection)	[PWG5100.1]
1615	coating-sides (type1 keyword)	[PWG5100.1]
1616	coating-type (type2 keyword name(MAX))	[PWG5100.1]
1617	covering (collection)	[PWG5100.1]
1618	covering-name (type2 keyword name(MAX))	[PWG5100.1]
1619	finishing-template (name(MAX) type2 keyword)	[PWG5100.1]
1620	folding (1setOf collection)	[PWG5100.1]
1621	folding-direction (type1 keyword)	[PWG5100.1]
1622	folding-offset (integer(0:MAX))	[PWG5100.1]
1623	folding-reference-edge (type1 keyword)	[PWG5100.1]
1624	imposition-template (type2 keyword name(MAX))	[PWG5100.1]
1625	laminating (collection)	[PWG5100.1]
1626	laminating-sides (type1 keyword)	[PWG5100.1]
1627	laminating-type (type2 keyword name(MAX))	[PWG5100.1]
1628	media-sheets-supported (rangeOfInteger(1:MAX))	[PWG5100.1]
1629	media-size (collection)	[PWG5100.1]
1630	media-size-name (type2 keyword)	[PWG5100.1]
1631	punching (collection)	[PWG5100.1]
1632	punching-locations (1setOf integer(0:MAX))	[PWG5100.1]
1633	punching-offset (integer(0:MAX))	[PWG5100.1]
1634	punching-reference-edge (type1 keyword)	[PWG5100.1]
1635	stitching (collection)	[PWG5100.3]
1636	stitching-angle (integer(0:359))	[PWG5100.1]
1637	stitching-method (type2 keyword)	[PWG5100.1]
1638	trimming (1setOf collection)	[PWG5100.1]
1639	trimming-offset (integer(0:MAX))	[PWG5100.1]
1640	trimming-reference-edge (type1 keyword)	[PWG5100.1]
1641	trimming-type (type2 keyword name(MAX))	[PWG5100.1]
1642	trimming-when (type2 keyword)	[PWG5100.1]
1643	job-pages-per-set (integer(1:MAX))	[PWG5100.1]
1644		
1645	Printer Description attributes:	Reference
1646	-----	-----
1647	baling-type-supported (1setOf (type2 keyword name(MAX)))	[PWG5100.1]
1648	baling-when-supported (1setOf type2 keyword)	[PWG5100.1]
1649	binding-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
1650	binding-type-supported (1setOf type2 keyword)	[PWG5100.1]
1651	coating-sides-supported (1setOf type1 keyword)	[PWG5100.1]
1652	coating-type-supported (1setOf (type2 keyword name(MAX)))	[PWG5100.1]
1653	covering-name-supported (1setOf (type2 keyword name(MAX)))	[PWG5100.1]
1654	finishing-template-supported (1setOf (name(MAX) type2 keyword))	[PWG5100.1]
1655		
1656	finishings-col-database (1setOf collection)	[PWG5100.1]
1657	< member attributes are the same as finishings-col >	[PWG5100.1]
1658	folding-direction-supported (1setOf type1 keyword)	[PWG5100.1]
1659	folding-offset-supported (1setOf (integer(0:MAX) rangeOfInteger(0:MAX)))	[PWG5100.1]
1660		
1661	folding-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
1662	laminating-sides-supported (1setOf type1 keyword)	[PWG5100.1]

```

1663 laminating-type-supported (1setOf (type2 keyword | name(MAX)))
1664                                     [PWG5100.1]
1665 job-pages-per-set-supported (boolean) [PWG5100.1]
1666 printer-finisher (1setOf octetString(MAX)) [PWG5100.1]
1667 printer-finisher-description (1setOf text(MAX)) [PWG5100.1]
1668 printer-finisher-supplies (1setOf octetString(MAX)) [PWG5100.1]
1669 printer-finisher-supplies-description (1setOf text(MAX)) [PWG5100.1]
1670 punching-hole-diameter-configured (integer(0:MAX)) [PWG5100.1]
1671 punching-locations-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))
1672                                     [PWG5100.1]
1673 punching-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))
1674                                     [PWG5100.1]
1675 punching-reference-edge-supported (1setOf type1 keyword) [PWG5100.1]
1676 stitching-angle-supported (1setOf (integer(0:359) | rangeOfInteger(0:359)))
1677                                     [PWG5100.1]
1678 stitching-method-supported (1setOf (type2 keyword)) [PWG5100.1]
1679 trimming-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))
1680                                     [PWG5100.1]
1681 trimming-reference-edge-supported (1setOf type1 keyword) [PWG5100.1]
1682 trimming-type-supported (1setOf type2 keyword) [PWG5100.1]
1683 trimming-when-supported (1setOf type2 keyword) [PWG5100.1]

```

1684 11.2 Type2 keyword Registrations

1685 The keyword attribute values defined in this document will be published by IANA according
 1686 to the procedures in the IPP Model and Semantics [STD92] in the following location:

1687 <http://www.iana.org/assignments/ipp-registrations>

1688 The registry entries will contain the following information:

Attributes (attribute syntax)	Reference
Keyword Attribute Value	
-----	-----
balancing-type (type2 keyword name(MAX))	[PWG5100.1]
band	[PWG5100.1]
shrink-wrap	[PWG5100.1]
wrap	[PWG5100.1]
balancing-type-supported (1setOf (type2 keyword name(MAX)))	[PWG5100.1]
< all balancing-type values >	
balancing-when (type2 keyword)	[PWG5100.1]
after-sets	[PWG5100.1]
after-job	[PWG5100.1]
balancing-when-supported (1setOf type2 keyword)	[PWG5100.1]
< all balancing-when values >	[PWG5100.1]
binding-reference-edge (type1 keyword)	[PWG5100.1]
bottom	[PWG5100.1]
left	[PWG5100.1]
right	[PWG5100.1]
top	[PWG5100.1]
binding-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
< all binding-reference-edge values >	[PWG5100.1]

1712		
1713	binding-type (type2 keyword name(MAX))	[PWG5100.1]
1714	adhesive	[PWG5100.1]
1715	comb	[PWG5100.1]
1716	flat	[PWG5100.1]
1717	padding	[PWG5100.1]
1718	perfect	[PWG5100.1]
1719	spiral	[PWG5100.1]
1720	tape	[PWG5100.1]
1721	velo	[PWG5100.1]
1722	binding-type-supported ((1setOf type2 keyword name(MAX)))	[PWG5100.1]
1723	< all binding-type values >	[PWG5100.1]
1724		
1725	coating-sides (type1 keyword)	[PWG5100.1]
1726	back	[PWG5100.1]
1727	both	[PWG5100.1]
1728	front	[PWG5100.1]
1729	coating-sides-supported (1setOf type1 keyword)	[PWG5100.1]
1730	< all coating-sides values >	[PWG5100.1]
1731		
1732	coating-type (type2 keyword name(MAX))	[PWG5100.1]
1733	archival	[PWG5100.1]
1734	archival-glossy	[PWG5100.1]
1735	archival-matte	[PWG5100.1]
1736	archival-semi-gloss	[PWG5100.1]
1737	glossy	[PWG5100.1]
1738	high-gloss	[PWG5100.1]
1739	matte	[PWG5100.1]
1740	semi-gloss	[PWG5100.1]
1741	silicone	[PWG5100.1]
1742	translucent	[PWG5100.1]
1743	coating-type-supported ((1setOf type2 keyword name(MAX)))	[PWG5100.1]
1744	< all coating-type values >	[PWG5100.1]
1745		
1746	covering-name (type2 keyword name(MAX))	[PWG5100.1]
1747	plain	[PWG5100.1]
1748	pre-cut	[PWG5100.1]
1749	pre-printed	[PWG5100.1]
1750	covering-name-supported (1setOf (type2 keyword name(MAX)))	[PWG5100.1]
1751	< all covering-name values >	[PWG5100.1]
1752		
1753	finishing-template (name(MAX) type2 keyword)	[PWG5100.1]
1754	bale	[PWG5100.1]
1755	bind	[PWG5100.1]
1756	bind-bottom	[PWG5100.1]
1757	bind-left	[PWG5100.1]
1758	bind-right	[PWG5100.1]
1759	bind-top	[PWG5100.1]
1760	booklet-maker	[PWG5100.1]
1761	coat	[PWG5100.1]
1762	cover	[PWG5100.1]
1763	edge-stitch	[PWG5100.1]
1764	edge-stitch-bottom	[PWG5100.1]
1765	edge-stitch-left	[PWG5100.1]
1766	edge-stitch-right	[PWG5100.1]
1767	edge-stitch-top	[PWG5100.1]

1768	fold	[PWG5100.1]
1769	fold-accordion	[PWG5100.1]
1770	fold-double-gate	[PWG5100.1]
1771	fold-engineering-z	[PWG5100.1]
1772	fold-gate	[PWG5100.1]
1773	fold-half	[PWG5100.1]
1774	fold-half-z	[PWG5100.1]
1775	fold-left-gate	[PWG5100.1]
1776	fold-letter	[PWG5100.1]
1777	fold-parallel	[PWG5100.1]
1778	fold-poster	[PWG5100.1]
1779	fold-right-gate	[PWG5100.1]
1780	fold-z	[PWG5100.1]
1781	jdf-f2-1	[PWG5100.1]
1782	jdf-f4-1	[PWG5100.1]
1783	jdf-f4-2	[PWG5100.1]
1784	jdf-f6-1	[PWG5100.1]
1785	jdf-f6-2	[PWG5100.1]
1786	jdf-f6-3	[PWG5100.1]
1787	jdf-f6-4	[PWG5100.1]
1788	jdf-f6-5	[PWG5100.1]
1789	jdf-f6-6	[PWG5100.1]
1790	jdf-f6-7	[PWG5100.1]
1791	jdf-f6-8	[PWG5100.1]
1792	jdf-f8-1	[PWG5100.1]
1793	jdf-f8-2	[PWG5100.1]
1794	jdf-f8-3	[PWG5100.1]
1795	jdf-f8-4	[PWG5100.1]
1796	jdf-f8-5	[PWG5100.1]
1797	jdf-f8-6	[PWG5100.1]
1798	jdf-f8-7	[PWG5100.1]
1799	jdf-f10-1	[PWG5100.1]
1800	jdf-f10-2	[PWG5100.1]
1801	jdf-f10-3	[PWG5100.1]
1802	jdf-f12-1	[PWG5100.1]
1803	jdf-f12-2	[PWG5100.1]
1804	jdf-f12-3	[PWG5100.1]
1805	jdf-f12-4	[PWG5100.1]
1806	jdf-f12-5	[PWG5100.1]
1807	jdf-f12-6	[PWG5100.1]
1808	jdf-f12-7	[PWG5100.1]
1809	jdf-f12-8	[PWG5100.1]
1810	jdf-f12-9	[PWG5100.1]
1811	jdf-f12-10	[PWG5100.1]
1812	jdf-f12-11	[PWG5100.1]
1813	jdf-f12-12	[PWG5100.1]
1814	jdf-f12-13	[PWG5100.1]
1815	jdf-f12-14	[PWG5100.1]
1816	jdf-f14-1	[PWG5100.1]
1817	jdf-f16-1	[PWG5100.1]
1818	jdf-f16-2	[PWG5100.1]
1819	jdf-f16-3	[PWG5100.1]
1820	jdf-f16-4	[PWG5100.1]
1821	jdf-f16-5	[PWG5100.1]
1822	jdf-f16-6	[PWG5100.1]
1823	jdf-f16-7	[PWG5100.1]

1824	jdf-f16-8	[PWG5100.1]
1825	jdf-f16-9	[PWG5100.1]
1826	jdf-f16-10	[PWG5100.1]
1827	jdf-f16-11	[PWG5100.1]
1828	jdf-f16-12	[PWG5100.1]
1829	jdf-f16-13	[PWG5100.1]
1830	jdf-f16-14	[PWG5100.1]
1831	jdf-f18-1	[PWG5100.1]
1832	jdf-f18-2	[PWG5100.1]
1833	jdf-f18-3	[PWG5100.1]
1834	jdf-f18-4	[PWG5100.1]
1835	jdf-f18-5	[PWG5100.1]
1836	jdf-f18-6	[PWG5100.1]
1837	jdf-f18-7	[PWG5100.1]
1838	jdf-f18-8	[PWG5100.1]
1839	jdf-f18-9	[PWG5100.1]
1840	jdf-f20-1	[PWG5100.1]
1841	jdf-f20-2	[PWG5100.1]
1842	jdf-f24-1	[PWG5100.1]
1843	jdf-f24-2	[PWG5100.1]
1844	jdf-f24-3	[PWG5100.1]
1845	jdf-f24-4	[PWG5100.1]
1846	jdf-f24-5	[PWG5100.1]
1847	jdf-f24-6	[PWG5100.1]
1848	jdf-f24-7	[PWG5100.1]
1849	jdf-f24-8	[PWG5100.1]
1850	jdf-f24-9	[PWG5100.1]
1851	jdf-f24-10	[PWG5100.1]
1852	jdf-f24-11	[PWG5100.1]
1853	jdf-f28-1	[PWG5100.1]
1854	jdf-f32-1	[PWG5100.1]
1855	jdf-f32-2	[PWG5100.1]
1856	jdf-f32-3	[PWG5100.1]
1857	jdf-f32-4	[PWG5100.1]
1858	jdf-f32-5	[PWG5100.1]
1859	jdf-f32-6	[PWG5100.1]
1860	jdf-f32-7	[PWG5100.1]
1861	jdf-f32-8	[PWG5100.1]
1862	jdf-f32-9	[PWG5100.1]
1863	jdf-f36-1	[PWG5100.1]
1864	jdf-f36-2	[PWG5100.1]
1865	jdf-f40-1	[PWG5100.1]
1866	jdf-f48-1	[PWG5100.1]
1867	jdf-f48-2	[PWG5100.1]
1868	jdf-f64-1	[PWG5100.1]
1869	jdf-f64-2	[PWG5100.1]
1870	jog-offset	[PWG5100.1]
1871	laminate	[PWG5100.1]
1872	punch	[PWG5100.1]
1873	punch-bottom-left	[PWG5100.1]
1874	punch-bottom-right	[PWG5100.1]
1875	punch-dual-bottom	[PWG5100.1]
1876	punch-dual-left	[PWG5100.1]
1877	punch-dual-right	[PWG5100.1]
1878	punch-dual-top	[PWG5100.1]
1879	punch-multiple-bottom	[PWG5100.1]

1880	punch-multiple-left	[PWG5100.1]
1881	punch-multiple-right	[PWG5100.1]
1882	punch-multiple-top	[PWG5100.1]
1883	punch-quad-bottom	[PWG5100.1]
1884	punch-quad-left	[PWG5100.1]
1885	punch-quad-right	[PWG5100.1]
1886	punch-quad-top	[PWG5100.1]
1887	punch-top-left	[PWG5100.1]
1888	punch-top-right	[PWG5100.1]
1889	punch-triple-bottom	[PWG5100.1]
1890	punch-triple-left	[PWG5100.1]
1891	punch-triple-right	[PWG5100.1]
1892	punch-triple-top	[PWG5100.1]
1893	saddle-stitch	[PWG5100.1]
1894	staple	[PWG5100.1]
1895	staple-bottom-left	[PWG5100.1]
1896	staple-bottom-right	[PWG5100.1]
1897	staple-dual-bottom	[PWG5100.1]
1898	staple-dual-left	[PWG5100.1]
1899	staple-dual-right	[PWG5100.1]
1900	staple-dual-top	[PWG5100.1]
1901	staple-top-left	[PWG5100.1]
1902	staple-top-right	[PWG5100.1]
1903	staple-triple-bottom	[PWG5100.1]
1904	staple-triple-left	[PWG5100.1]
1905	staple-triple-right	[PWG5100.1]
1906	staple-triple-top	[PWG5100.1]
1907	trim	[PWG5100.1]
1908	trim-after-copies	[PWG5100.1]
1909	trim-after-documents	[PWG5100.1]
1910	trim-after-job	[PWG5100.1]
1911	trim-after-pages	[PWG5100.1]
1912	finishing-template-supported (1setOf (type2 keyword name(MAX)))	
1913		[PWG5100.1]
1914	< any finishing-template value >	[PWG5100.1]
1915		
1916	folding-direction (type1 keyword)	[PWG5100.1]
1917	inward	[PWG5100.1]
1918	outward	[PWG5100.1]
1919	folding-direction-supported (1setOf type1 keyword)	[PWG5100.1]
1920	< all folding-direction values >	[PWG5100.1]
1921		
1922	folding-reference-edge (type1 keyword)	[PWG5100.1]
1923	bottom	[PWG5100.1]
1924	left	[PWG5100.1]
1925	right	[PWG5100.1]
1926	top	[PWG5100.1]
1927	folding-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
1928	< all folding-reference-edge values >	[PWG5100.1]
1929		
1930	laminating-sides (type1 keyword)	[PWG5100.1]
1931	back	[PWG5100.1]
1932	both	[PWG5100.1]
1933	front	[PWG5100.1]
1934	laminating-sides-supported (1setOf type1 keyword)	[PWG5100.1]
1935	< all laminating-sides values >	[PWG5100.1]

1936		
1937	laminating-type (type2 keyword name(MAX))	[PWG5100.1]
1938	archival	[PWG5100.1]
1939	archival-glossy	[PWG5100.1]
1940	archival-matte	[PWG5100.1]
1941	archival-semi-gloss	[PWG5100.1]
1942	glossy	[PWG5100.1]
1943	high-gloss	[PWG5100.1]
1944	matte	[PWG5100.1]
1945	semi-gloss	[PWG5100.1]
1946	silicone	[PWG5100.1]
1947	translucent	[PWG5100.1]
1948	laminating-type-supported ((1setOf type2 keyword name(MAX)))	[PWG5100.1]
1949	< all laminating-type values >	[PWG5100.1]
1950		
1951	punching-reference-edge (type1 keyword)	[PWG5100.1]
1952	bottom	[PWG5100.1]
1953	left	[PWG5100.1]
1954	right	[PWG5100.1]
1955	top	[PWG5100.1]
1956	punching-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
1957	< all punching-reference-edge values >	[PWG5100.1]
1958		
1959	stitching-method (type2 keyword)	[PWG5100.1]
1960	auto	[PWG5100.1]
1961	crimp	[PWG5100.1]
1962	wire	[PWG5100.1]
1963	stitching-method-supported (1setOf type2 keyword)	[PWG5100.1]
1964	< all stitching-method values >	[PWG5100.1]
1965		
1966	trimming-reference-edge (type1 keyword)	[PWG5100.1]
1967	bottom	[PWG5100.1]
1968	left	[PWG5100.1]
1969	right	[PWG5100.1]
1970	top	[PWG5100.1]
1971	trimming-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
1972	< all trimming-reference-edge values >	[PWG5100.1]
1973		
1974	trimming-type (type2 keyword name(MAX))	[PWG5100.1]
1975	draw-line	[PWG5100.1]
1976	full	[PWG5100.1]
1977	partial	[PWG5100.1]
1978	perforate	[PWG5100.1]
1979	score	[PWG5100.1]
1980	tab	[PWG5100.1]
1981	trimming-type-supported (1setOf type2 keyword)	[PWG5100.1]
1982	< all trimming-type values >	[PWG5100.1]
1983		
1984	trimming-when (type2 keyword)	[PWG5100.1]
1985	after-documents	[PWG5100.1]
1986	after-job	[PWG5100.1]
1987	after-sheets	[PWG5100.1]
1988	after-sets	[PWG5100.1]
1989	trimming-when-supported (1setOf type2 keyword)	[PWG5100.1]
1990	< 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 the IPP Model and Semantics [STD92] in the following location:

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

The registry entries will contain the following information:

Attributes (attribute syntax)			
	Enum Value	Enum Symbolic Name	Reference
	-----	-----	-----
	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]

2042	93	fold-half	[PWG5100.1]
2043	94	fold-half-z	[PWG5100.1]
2044	95	fold-left-gate	[PWG5100.1]
2045	96	fold-letter	[PWG5100.1]
2046	97	fold-parallel	[PWG5100.1]
2047	98	fold-poster	[PWG5100.1]
2048	99	fold-right-gate	[PWG5100.1]
2049	100	fold-z	[PWG5100.1]
2050	101	fold-engineering-z	[PWG5100.1]

2051 12. Overview of Changes

2052 12.1 Changes in IPP Finishings v3.0

2053 IPP Finishings v3.0 included the following changes over the preceding revision:

- 2054 • Changed conformance requirements on "finishings" and "finishings-col" and related
2055 attributes to be stricter, requiring a new major version.
- 2056 • Finishings v2.1 Errata resolutions
 - 2057 ○ [Issue #56](#) - Section 11.1 lacks mention of attributes and language clarifying
2058 shape / size / rotation of staples and punch
 - 2059 ○ [Issue #87](#) - Section 5.1: uses of "feed-orientation" and "orientation-requested"
2060 lack source reference citations
 - 2061 ○ [Issue #88](#) - Section 5.1.1 says 'RFC 2911 "finishings" Values'
- 2062 • Moved the definition of the 'trim-after-pages', 'trim-after-documents', 'trim-after-
2063 copies' and 'trim-after-job' enum value here since the originating document was being
2064 updated at the time the errata issues were being resolved.
- 2065 • Created a new Printer Status Attributes section to match similar editorial changes in
2066 EPX and NODRIVER.
- 2067 • Added tables to the start of sections to list the conformance requirements for the
2068 attribute definitions within the sections.
- 2069 • Rewrote the sections for "printer-finisher", "printer-finisher-description", "printer-
2070 finisher-supplies", and "printer-finisher-supplies-description" with Mike Sweet and
2071 Steven Young
- 2072 • Fixed passive voice and modernized the editorial style in the "xxx-supported"
2073 definitions in section 6.

2074 12.2 Changes in IPP Finishings v2.1

2075 IPP Finishings v2.1 included the following changes over the preceding revision:

- 2076 • Added finishing enums and templates for multiple hole punching and an engineering
2077 Z fold.
- 2078 • Defined an extension naming convention for the "finishing-template" member
2079 attribute.
- 2080 • Added the "media-sheets-supported" member attribute for the "finishings-col-
2081 database" and "finishings-col-ready" attributes.
- 2082 • Added the "stitching-method" member attribute for the "finishings-col", "finishings-col-
2083 database", and "finishings-col-ready" attributes.
- 2084 • Added the "printer-finisher-supplies" and "printer-finisher-supplies-description"
2085 attributes.
- 2086 • Added the "punching-hole-diameter-configured" and "stitching-angle" attributes,
2087 clarified that punched holes are round and of a particular size, and defined staples'
2088 axis of rotation to be around their midpoint, to more specifically define the coordinates
2089 of the space occupied by the punched holes and staples.

2090 12.3 Changes in IPP Finishings v2.0

2091 IPP Finishings v2.0 included the following changes over the preceding revision:

- 2092 • Moved definition of PWG 5100.3 "finishings-col" attribute to this document and added
2093 new member attributes for all finishings processes.
- 2094 • Added finishing enums and templates for coating, lamination, triple stapling, various
2095 kinds of punching, and common folds.
- 2096 • Added the "finishings-col-database" and "job-pages-per-set" attributes.
- 2097 • Added the "media-size" and "media-size-name" member attributes for the "finishings-
2098 col-database" and "finishings-col-ready" attributes.

2099 13. References

2100 13.1 Normative References

- 2101 [ISO10646] "Information technology -- Universal Coded Character Set (UCS)",
2102 ISO/IEC 10646:2011

- 2103 [JDF1.5] CIP4 Organization, "JDF Specification, Release 1.5", December 2013,
2104 <https://www.cip4.org/>
- 2105 [PWG5100.11] T. Hastings, D. Fullman, "IPP: Job and Printer Operations – Set 2", PWG
2106 5100.11-2010, October 2010, [https://ftp.pwg.org/pub/pwg/candidates/cs-
2107 ippjobprinterext10-20101030-5100.11.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext10-20101030-5100.11.pdf)
- 2108 [PWG5100.13] M. Sweet, I. McDonald, P. Zehler, "IPP: Job and Printer Extensions - Set
2109 3 (JPS3)", PWG 5100.13-2012, July 2012,
2110 [https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext3v10-
2111 20120727-5100.13.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext3v10-20120727-5100.13.pdf)
- 2112 [PWG5101.1] R. Bergman, T. Hastings, "Standard for Media Standardized Names",
2113 PWG 5101.1-2002, February 2002,
2114 [https://ftp.pwg.org/pub/pwg/candidates/cs-pwgmsn10-20020226-
2115 5101.1.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-pwgmsn10-20020226-5101.1.pdf)
- 2116 [PWG5102.4] M. Sweet, "PWG Raster Format", PWG 5102.4-2012, April 2012,
2117 [https://ftp.pwg.org/pub/pwg/candidates/cs-ippraster10-20120420-
2118 5102.4.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippraster10-20120420-5102.4.pdf)
- 2119 [PWG5108.07] P. Zehler, "PWG Print Job Ticket and Associated Capabilities Version 1.0
2120 (PJT)", PWG 5108.07-2012, August 2012,
2121 [https://ftp.pwg.org/pub/pwg/candidates/cs-sm20-pjt10-20120801-
2122 5108.07.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-sm20-pjt10-20120801-5108.07.pdf)
- 2123 [RFC2119] S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels",
2124 RFC 2119/BCP 14, March 1997, <https://tools.ietf.org/html/rfc2119>
- 2125 [RFC3805] R. Bergman, H. Lewis, I. McDonald, "Printer MIB v2", RFC 3805, June
2126 2004, <https://tools.ietf.org/html/rfc3805>
- 2127 [RFC3806] R. Bergman, H. Lewis, I. McDonald, "Printer Finishing MIB", RFC 3806,
2128 June 2004, <https://tools.ietf.org/html/rfc3806>
- 2129 [RFC3808] I. McDonald, "IANA Charset MIB", RFC 3808, June 2004,
2130 <https://tools.ietf.org/html/rfc3808>
- 2131 [RFC5198] J. Klensin, M. Padlipsky, "Unicode Format for Network Interchange", RFC
2132 5198, March 2008, <https://tools.ietf.org/html/rfc5198>
- 2133 [RFC5646] A. Phillips, M. Davis, "Tags for Identifying Languages", September 2009,
2134 <https://tools.ietf.org/html/rfc5646>
- 2135 [RFC7230] R. Fielding, J. Reschke, "Hypertext Transfer Protocol (HTTP/1.1):
2136 Message Syntax and Routing", RFC 7230, June 2014,
2137 <https://tools.ietf.org/html/rfc7230>

- 2138 [STD63] F. Yergeau, "UTF-8, a transformation format of ISO 10646", RFC
2139 3629/STD 63, November 2003, <https://tools.ietf.org/html/std63>
- 2140 [STD68] D. Crocker, P Overell, "Augmented BNF for Syntax Specifications:
2141 ABNF", RFC 5234/STD 68, January 2008, <https://tools.ietf.org/html/std68>
- 2142 [STD92] M. Sweet, I. McDonald, "Internet Printing Protocol/1.1", STD 92, June
2143 2018, <https://tools.ietf.org/html/std92>
- 2144 [UAX9] Unicode Consortium, "Unicode Bidirectional Algorithm", UAX#9, June
2145 2014, <https://www.unicode.org/reports/tr9/tr9-31.html>
- 2146 [UAX14] Unicode Consortium, "Unicode Line Breaking Algorithm", UAX#14, June
2147 2014, <https://www.unicode.org/reports/tr14/tr14-33.html>
- 2148 [UAX15] M. Davis, M. Duerst, "Unicode Normalization Forms", Unicode Standard
2149 Annex 15, March 2008, <https://www.unicode.org/reports/tr15/>
- 2150 [UAX29] Unicode Consortium, "Unicode Text Segmentation", UAX#29, June 2014,
2151 <https://www.unicode.org/reports/tr29/tr29-25.html>
- 2152 [UAX31] Unicode Consortium, "Unicode Identifier and Pattern Syntax", UAX#31,
2153 June 2014, <https://www.unicode.org/reports/tr31/tr31-21.html>
- 2154 [UNICODE] Unicode Consortium, "Unicode Standard", Version 9.0.0, June 2016,
2155 <https://www.unicode.org/versions/Unicode9.0.0/>
- 2156 [UTS10] Unicode Consortium, "Unicode Collation Algorithm", UTS#10, June 2014,
2157 <https://www.unicode.org/reports/tr10/tr10-30.html>
- 2158 [UTS35] Unicode Consortium, "Unicode Locale Data Markup Language", UTS#35,
2159 September 2014, <https://www.unicode.org/reports/tr35/tr35-37/tr35.html>
- 2160 [UTS39] Unicode Consortium, "Unicode Security Mechanisms", UTS#39,
2161 September 2014, <https://www.unicode.org/reports/tr39/tr39-9.html>

2162 13.2 Informative References

- 2163 [FIN-ABNF] Collected ABNF for PWG 5100.1-YYYY,
2164 <http://ftp.pwg.org/pub/pwg/informational/pwg5100.1-abnf.txt>
- 2165 [IANA-IPP] Internet Assigned Numbers Authority (IANA) Internet Printing Protocol
2166 (IPP) Registrations, [http://www.iana.org/assignments/ipp-](http://www.iana.org/assignments/ipp-registrations/ipp-registrations.xml)
2167 [registrations/ipp-registrations.xml](http://www.iana.org/assignments/ipp-registrations/ipp-registrations.xml)
- 2168 [IANA-PEN] "IANA Registry of Private Enterprise Numbers",
2169 <http://www.iana.org/assignments/enterprise-numbers/>

- 2170 [ISO10175] "Document Printing Application (DPA)", ISO/IEC 10175, June 1996
- 2171 [PAPI] A. Hlava, N. Jacobs, M. Sweet, "Open Standard Print API (PAPI)", July
2172 2005, [http://prdownloads.sourceforge.net/openprinting/PAPI-](http://prdownloads.sourceforge.net/openprinting/PAPI-specification.pdf?download)
2173 [specification.pdf?download](http://prdownloads.sourceforge.net/openprinting/PAPI-specification.pdf?download)
- 2174 [PUNCH] "Hole punch", http://en.wikipedia.org/wiki/Hole_punch
- 2175 [PWG5100.1-2001] T. Hastings, D. Fullman, "IPP: 'finishings' attribute values extension",
2176 PWG 5100.1-2001, February 2001,
2177 [http://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings10-20010205-](http://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings10-20010205-5100.1.pdf)
2178 [5100.1.pdf](http://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings10-20010205-5100.1.pdf)
- 2179 [PWG5100.1-2014] M. Sweet, "IPP Finishings 2.0", PWG 5100.1-2014, December 2014,
2180 [https://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings20-20141219-](https://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings20-20141219-5100.1.pdf)
2181 [5100.1.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings20-20141219-5100.1.pdf)
- 2182 [PWG5100.1-2017] S. Kennedy, M. Sweet, "IPP Finishings 2.1", PWG 5100.1-2017,
2183 February 2017, [https://ftp.pwg.org/pub/pwg/candidates/cs-](https://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings21-20170217-5100.1.pdf)
2184 [ippfinishings21-20170217-5100.1.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings21-20170217-5100.1.pdf)
- 2185 [PWG5100.3-2001] K. Ocke, T. Hastings, "Internet Printing Protocol (IPP): Production
2186 Printing Attributes – Set1", PWG 5100.3-2001, February 2001,
2187 [https://ftp.pwg.org/pub/pwg/candidates/cs-ippprodprint10-20010212-](https://ftp.pwg.org/pub/pwg/candidates/cs-ippprodprint10-20010212-5100.3.pdf)
2188 [5100.3.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippprodprint10-20010212-5100.3.pdf)
- 2189 [PWG5100.7] M. Sweet, "IPP Job Extensions v2.0", August 2019,
2190 [https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobext20-20190816-](https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobext20-20190816-5100.7.pdf)
2191 [5100.7.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobext20-20190816-5100.7.pdf)
- 2192 [PWG5100.13-2012] M. Sweet, I. McDonald, P. Zehler, "IPP: Job and Printer
2193 Extensions - Set 3 (JPS3)", PWG 5100.13-2012, July 2012,
2194 [https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext3v10-](https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext3v10-20120727-5100.13.pdf)
2195 [20120727-5100.13.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext3v10-20120727-5100.13.pdf)
- 2196 [UNISECFAQ] Unicode Consortium "Unicode Security FAQ", November 2013,
2197 <http://www.unicode.org/faq/security.html>
- 2198 [UTR17] Unicode Consortium "Unicode Character Encoding Model", UTR#17,
2199 November 2008, <http://www.unicode.org/reports/tr17/tr17-7.html>
- 2200 [UTR20] Unicode Consortium "Unicode in XML and other Markup Languages",
2201 UTR#20, January 2013, <http://www.unicode.org/reports/tr20/tr20-9.html>
- 2202 [UTR23] Unicode Consortium "Unicode Character Property Model", UTR#23,
2203 November 2008, <http://www.unicode.org/reports/tr23/tr23-9.html>

2204 [UTR33] Unicode Consortium “Unicode Conformance Model”, UTR#33, November
2205 2008, <http://www.unicode.org/reports/tr33/tr33-5.html>

2206 14. Authors' Addresses

2207 Smith Kennedy
2208 HP Inc.
2209 11311 Chinden Blvd.
2210 Boise, ID 83714
2211
2212 Michael Sweet
2213 Lakeside Robotics Corporation

2214 Send comments to the PWG IPP Mailing List:

2215 ipp@pwg.org (subscribers only)

2216 To subscribe, see the PWG IPP workgroup web page:

2217 <https://www.pwg.org/ipp/>

2218 Implementers of this specification document are encouraged to join the IPP Mailing List to
2219 participate in any discussions of clarification issues and review of registration proposals for
2220 additional attributes and values.

2221 The authors would also like to thank the following individuals for their contributions to this
2222 standard:

2223 Don Fullman (original Author)
2224 Tom Hastings (original Author)
2225 Richard Blanchard (Apple)
2226 Ira McDonald (High North)
2227 Rick Yardumian (Canon)

2228 15. Change History

2229 15.1 February 7, 2022

2230 Stable draft following completion of prototyping in ippserver / ipptool. Other changes:

2231 • Updated section 6.9 to make it clear that variants of finishings operations that don't
2232 vary according to media size ("media-size" or "media-size-name") can be collapsed
2233 into a single collection, leveraging text from PWG 5100.7-2019 page 43; and

2234 • Updated copyright dates to 2022.

2235 **[15.1](#)[15.2](#) November 19, 2021**

2236 Several changes made after prototyping:

- 2237 • Added in the "finishings-col-supported", which is in the IANA registry but is strangely
2238 missing from Finishings 2.0 / 2.1 or earlier drafts of this document;
- 2239 • Moved the section for Printer Status attributes to be after the section for Printer
2240 Description attributes; and
- 2241 • Clarified the Finishing Offset and Finishing Reference Edge definitions, and simplified
2242 some attributes defining language to assume the reader is those definitions in context
2243 to eliminate superfluous language.

2244 **[15.2](#)[15.3](#) October 7, 2021**

2245 One minor change:

- 2246 • In section 12.1 "Changes in IPP Finishings v3.0", moved the bullet stating that version
2247 contains changes in the requirements necessitating a new major version to be the
2248 first bullet in the list.

2249 **[15.3](#)[15.4](#) October 6, 2021**

2250 One minor change:

- 2251 • Added text to the first paragraph of section 5.3 "job-pages-per-set" to clearly state the
2252 conditions under which the Printer MUST implement this attribute, which was missing
2253 from the previous draft.

2254 **[15.4](#)[15.5](#) September 2, 2021**

2255 Updated following IPP WG reviews on 2021-08-17, and 2021-09-02 with the following
2256 changes:

- 2257 • Removed mention of "max-sheets" since it isn't needed;
- 2258 • Fixed a few normative requirements;
- 2259 • Fixed the definitions of the "laminating-sides" keywords; and
- 2260 • Many small editorial changes to improve readability.

2261 ~~15.5~~15.6 April 12, 2021

2262 Updated following IPP WG review on 2021-03-11 and 2021-04-08:

- 2263 • Removed discussion of defaults from member attributes of the "finishings-col" Job
2264 Template attribute member attributes, but added description of the intended Printer
2265 behavior when only a "finishing-template" is supplied, and when other member
2266 attributes are supplied with or without a "finishing-template" member attribute
- 2267 • Removed "A Client MUST" for all Job Template attributes (we don't make these
2268 statements in IPP).
- 2269 • Updated attribute descriptions to use the language conventions in the wd-template-
2270 20210315.docx draft
- 2271 • Removed the "Jog" and "Jog Offset" use case / feature, and deprecated the 'jog-
2272 offset' enum for "finishings"

2273 ~~15.6~~15.7 March 11, 2021

2274 Updated following IPP WG review on 2021-02-25:

- 2275 • Updated description of "job-pages-per-set" after fixing its conformance requirement
- 2276 • Editorial changes following conformance requirements to a number of other attributes
- 2277 • Removed Client Conformance column from Table 2

2278 ~~15.7~~15.8 February 23, 2021

2279 Updated following IPP WG review:

- 2280 • Rolled the version to 3.0 to update normative requirements
- 2281 • Rewrote some sections to update or in some cases remove normative requirements
2282 that were no longer necessary because there were no longer conditions for something
2283 being required in some cases.

2284 ~~15.8~~15.9 January 8, 2021

2285 Resolved additional issues reported via email and IPP WG teleconference review:

- 2286 • Clarified "Note 1" for the table listing the keys for "printer-finisher" and "printer-
2287 finisher-supplies"

- 2288 • Created a new Printer Status Attributes section to match similar editorial changes in
2289 EPX and NODRIVER, and added tables to the start of sections to list the conformance
2290 requirements
- 2291 • Updated the conformance requirements
- 2292 • Rewrote the sections for "printer-finisher", "printer-finisher-description", "printer-
2293 finisher-supplies", and "printer-finisher-supplies-description" with Mike Sweet and
2294 Steven Young
- 2295 • Fixed passive voice and modernized the editorial style in the "xxx-supported"
2296 definitions in section 6.
- 2297 • Fixed section 5.1.4 to discuss FIN 2.1, and added an informative reference to FIN 2.1
- 2298 • Changed all references to RFC 8011 to instead reference STD92
- 2299 • Removed unused reference to RFC 20

2300 ~~15.9~~15.10 **October 22, 2020**

- 2301 • Resolved errata reported to PWG website:
 - 2302 ○ [Issue #56](#) - Section 11.1 lacks mention of attributes and language clarifying
2303 shape / size / rotation of staples and punch
 - 2304 ○ [Issue #87](#) - Section 5.1: uses of "feed-orientation" and "orientation-requested"
2305 lack source reference citations
 - 2306 ○ [Issue #88](#) - Section 5.1.1 says 'RFC 2911 "finishings" Values'
- 2307 • Moved the definition of the 'trim-after-pages', 'trim-after-documents', 'trim-after-
2308 copies' and 'trim-after-job' enum value here since the originating document
2309 [PWG5100.13] is being updated at the time these v2.1.1 errata issues were being
2310 resolved.