



HARMONIZED SYSTEM
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CLASSIFICATION OF PRINT ENGINES

(Item IX.9 on Agenda)

I. BACKGROUND

1. At its 24th Session in October 1999, the Harmonized Systems Committee examined Doc. 42.448, "Possible Amendments to the Explanatory Note to Heading 84.71". Following its discussion, the Committee requested the Secretariat to prepare separate documents for the classification of twelve categories of products of which "print engines" is one (see Annex G/17 to Doc. NC0160E2). The Secretariat requested and received information on these products through the assistance of the International Chamber of Commerce. Having received no input from administrations, the following represents the Secretariat's view on the classification of "print engines".

II. SECRETARIAT COMMENTS

2. Laser printers, ink jet printers and thermal printers all contain print engines. These print engines have common elements and, in addition, may contain elements that are specific to the printer. A description of the functions performed by the print engines for these printers is found in the Annex to the present document. The following is a description of the parts relative to each printer and print engine.

Print engine elements common to all printers :

Input paper holder (usually a paper tray or paper cassette)
Paper pick-up mechanism
Paper registration mechanism for precise paper alignment
Paper drive mechanism consisting of feed rollers and guides to move paper through the engine
Motors and drive mechanisms to move the marking devices
Power supply
Print engine control electronics

File No. 2801

Elements specific to a laser printer

Laser scanner assembly

Photoconductor drum or belt (for an creating electrostatic image)*

Developer mechanism (to apply toner to photoconductor)*

Intermediate transfer drum or belt (in some designs)

Charging and cleaning mechanisms for conditioning above parts*

Mechanism for fusing the image (fuser)*

Formatter (circuits that communicate with the ADP machine or other data source and interpret the data received to produce the dot patterns for the print engine)**

* Because of the relatively short life of these parts, they are frequently incorporated into user replaceable cartridges (consumables) that may also include the toner supply. In this case, they are not considered part of the print engine.

**Not part of the print engine

Elements specific to an ink jet printer

Print mechanism (i.e., the cartridge/pen (print head), which is removable and replaceable.*

It is the device that ejects ink drops)*

Pen driver circuit*

Mechanism for drying ink (dryer)

Input/output circuits (circuits that communicate with the ADP machine or other data source and interpret the data received to produce the dot patterns for the print engine)**

* Because of the relatively short life of these parts, they are frequently incorporated into user replaceable cartridges along with the ink supply. In this case, they are not considered part of the print engine for the "liquid ink" process but a part of the print engine for the "solid ink" process.

**Not part of the print engine

Elements specific to a thermal printer

Mechanism for selectively heating paper to produce dots (print head)

Drive circuit for print head

Input/output circuits (circuits that communicate with the ADP machine or other data source and interpret the data received to produce the dot patterns for the print engine)**

The print mechanism requires use of heat sensitive paper but the paper is not considered part of the print engine.

**Not part of the print engine

Classification rationale

3. As previously stated, print engines have common elements and, in addition, may contain elements that are specific to the printer. Consequently, the Secretariat suggests that the Committee look at the classification of "print engines" within the context of the printer in which it is used.

4. The print engine is the major subassembly for a laser printer, containing most of the mechanical and electrical components of the printer. However, in order to complete the printer, the formatter and any user replaceable cartridges (photoconductor, developer, fuser, etc.) must be added. General Interpretative Rule (GIR) 2(a) extends the scope of any heading which refers to a particular article to cover not only the complete article but also that article incomplete or unfinished, **provided** that, as presented, it has the essential character of the complete or finished article. The question therefore is whether or not the print engine has reached such a stage in the assembly process that it has the essential character of a complete or finished laser printer within the meaning of GIR 2(a).
5. The Secretariat's view on the classification of laser print engines is that, while the print engine contains the mechanics to control the movement of the paper and to rotate the replaceable cartridges, it does not contain the imaging drum, which is required to build the image. In addition, it does not contain the developer, which is required to apply toner to the image and then to the paper. It also does not contain the formatter, which is required to receive data from the source (ADP machine or other data source) and translate it into a form useable by the print engine. Based on the importance of these components to the overall functioning of the printer, the Secretariat believes that the print engine has not reached such a stage in the assembly process that it has the essential character of a complete or finished laser printer within the meaning of GIR 2 (a). Consequently, the Secretariat would be inclined to classify the print engine as a "part" of a unit of an automatic data processing (ADP) machine of heading 84.71, in subheading 8473.30.
6. The Secretariat has reviewed two additional printing processes.
 - (a) Thermal "solid ink" (wax-based) and "liquid ink" (water-based) processes for ink jet printers. In this process, the ink is heated to the boiling point, at the print head, and the ink is "spit" onto the page to form a dot and then dry.

The print engine for use with the solid ink process contains the print head and only requires the addition of the solid "ink sticks" to perform the print function. In the liquid ink process, the print engine does not contain the print head, normally referred to by the industry as a cartridge or pen, which requires replacement when the ink supply runs out. It should be noted that the print head contains not only the ink but also the means for ejecting droplets and aiming them at the paper. Thus, in the absence of the print head, the print engine for the liquid ink process is unable to perform the basic function of marking on paper.
 - (b) Thermal "contact" process for thermal printers. In this process, the heated tip, contained in the print head, hits the heat sensitive paper and burns it to form a dot. The print engine for use with this process contains the print head and no other components need to be added to complete the printer.
7. The Secretariat is of the view that the print engine for the water-based "liquid ink" process does not have the essential character of the complete printer, as it is missing the component that produces the mark. Consequently, the Secretariat would be inclined to classify such a print engine as a "part" of an ink jet printing machine of heading 84.43 (subheading 8443.90) or a "part" of a unit of an ADP machine of heading 84.71, in subheading 8473.30, as the case may be.

8. The print engines used in the wax-based "solid ink" process and the "contact" process contain the component that produces the mark and, in the Secretariat's view, have the essential character of the complete printer. Consequently, the Secretariat would be inclined to classify the former as an ink jet printing machine of heading 84.43 (subheading 8443.51) or as a unit of an ADP machine of heading 84.71 (subheading 8471.60) and the latter as a unit of an ADP machine of heading 84.71 (subheading 8471.60). The Secretariat understands that the "contact" printer cannot be used in applications appropriate to heading 84.43.

III. CONCLUSION

9. The Committee is invited to take account of the Secretariat's comments and the descriptions of the product in the Annex when it examines this agenda item.

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Description of a print engine for a laser printer

The print engine is the major subassembly of a laser printer. This assembly contains the mechanical and electrical components, except for certain key parts of the print mechanism that are included in the consumable cartridges (imaging drum and developer) and except for the circuits that interpret computer data to create the printed image (formatter). Some of the mechanical functions performed by the print engine are : (1) paper transfer, (2) precise paper alignment, (3) laser scanning, (4) fusing (powder melted onto paper) of the image and (5) supplying mechanical power to the drum and developer cartridges. The basic electrical functions are to : (1) supply electrical power to all parts of the printer, (2) interpret signals coming from the formatter to control the print mechanism and movement of the paper.

Description of a print engine for an ink jet printer

The print engine is the major subassembly of an ink jet printer. This assembly contains the mechanical and electrical components, except for the actual ink ejection mechanism* which resides in the inkjet pen. Some of the mechanical functions performed by the print engine are : (1) paper transfer, (2) precise paper alignment, (3) movement of the pen, and (4) drying of the ink. The basic electrical functions are to : (1) supply electrical and mechanical power to all parts of the printer, (2) interpret signals coming from the data source (usually an ADP machine) to control the print mechanism and movement of the paper.

* This is only for the liquid ink process. The ink ejection mechanism (print head) is included in the print engine for the solid ink process.

Description of a print engine for a thermal printer

The print engine is the major subassembly of a thermal printer. This assembly contains the mechanical and electrical components required for printing on the special heat sensitive paper. Some of the mechanical functions performed by the print engine are : (1) paper transfer, (2) precise alignment, and (3) movement of the print head. The basic electrical functions are to: (1) supply electrical power to all parts of the printer, (2) interpret signals coming from the data source (usually and ADP machine) to control the motion of the paper and print head and to activate the heating elements in the print head.