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Information technology — Office equipment — Method for measuring digital printing productivity

Technologies de l'information — Équipements de bureau — Méthode de mesure de la productivité d'impression numérique

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 28, *Office equipment*.

This third edition cancels and replaces the second edition (ISO/IEC 24734:2014), which has been technically revised. It also incorporates the Corrigenda ISO/IEC 24734:2014/Cor 1:2016.

The main changes compared to the previous edition are as follows:

— added a “Normative references” clause;

— annex structure was changed to be consistent with other productivity standards;

— “Terms and definitions” clause has been modified to add new definitions and removed definitions of terms not used in the text;

— added a requirement that single copy output shall use the default “output order” setting and the alternate “order output” is an optional test;

— added reporting of the “output order” setting as part of the summary and detailed reports since it has a direct impact on the ability for results to be repeatable;

— added “ready delay time” requirement to “test measurement” procedures;

— added Annex D for the procedure to determine the “ready delay time”;

— changed paper weight to paper grammage in body and reporting.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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Introduction

Many digital printing devices produce printed pages at a different rate than their nominal speed when running with different modes (simplex, duplex, print quality modes), different substrate grammage, system environments, applications and file content, and finishing options. The degree to which a reduction in productivity is experienced depends significantly on multiple parameters of the job workflow. The most dominant of the parameters of the job workflow are: system environment, application, and job characteristics such as the number of pages in a set to be printed, single-sided or double-sided output pages, quality mode, number of print sets to be produced, substrate grammage/size used, and finishing options, and job content complexities such as monochrome vs. colour, text/vector vs. raster, page scaling and colour conversion. The existing International Standard (ISO/IEC 10561) only addresses printing throughput for Class 1 and Class 2 printers and, therefore is not suitable for comparing colour printing devices or high-speed page-oriented printing devices with many finishing options and connectivity configurations.

This document provides a general method for measuring the productivity when the above-mentioned job workflow parameters for digital printing devices are taken into consideration. This document also includes a suite of test files, test-platform (hardware and software) setup guidelines, and a procedure to be used for measuring digital printing productivity. It allows manufacturers and buyers of digital printing devices to describe the productivity of various digital printing devices with respect to representative office usage patterns.

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Information technology — Office equipment — Method for measuring digital printing productivity

1 Scope

This document specifies a method for measuring the digital printing productivity of digital printing devices with various office applications and print job characteristics. This document is applicable to digital printing devices, including single-function and multi-function devices, regardless of print technology (e.g. inkjet, laser). Devices can be equipped with a range of paper feed and finishing options either directly connected to the computer system or via a network. It is intended to be used for black and white (B&W) as well as colour digital printing devices. It allows for the comparison of the productivity of machines operating in various available modes (simplex, duplex, size of substrates, etc.) and office applications when the test system environment, operating modes, and job mix for each machine are held identical. This document includes test files, test setup procedure, test runtime procedure, and the reporting requirements for the digital printing productivity measurements.

This document is not intended to be used for devices which are not able to print on a media size of A4/8,5" × 11" or for devices which are not able to collate multiple copies of a print.

This document is not intended to replace manufacturer's rated speeds.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 536, *Paper and board — Determination of grammage*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
category test
test pertaining to one of two separate categories: office category, and advertising and graphics category

Note 1 to entry: The office category test is used to test and report *first set out time (FSOT)* (3.10), *estimated saturated throughput (ESAT)* (3.7) and *effective throughput (EFTP)* (3.6) using content from typical office applications and the advertising and graphics category test is used to test and report *FSOT*, *ESAT* and *EFTP* using applications and files representing more complexity, higher coverage and a higher ratio of image and graphic content such as pictures, gradients and embedded elements.

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3.2
collate
collation
device's ability to produce multiple hard copies of an electronic document in repeating original order which may be achieved through either software features or via a hardware finishing device

EXAMPLE Repeating original order 1234, 1234, 1234, etc.

Note 1 to entry: Hard disk drive (HDD) is an example of a device feature that can be used to ensure proper *output order* (3.19) by saving the images to disk then reading the saved pages to output in order.

3.3
default driver
printing device driver that is automatically selected as the default per the manufacturers' installation procedure

3.4
dual output order device
printing devices that support both *original order output* (3.18) and *reverse order output* (3.25)

3.5
duplex
duplex printing
two-sided printing
two-sided perfecting
<print> printing where the printing device can make a number of prints with the printing being done to both sides of the sheet

3.6
EFTP
effective throughput
rate at which a device produces pages measured from the initiation of the job through the complete exit of the last page of the last *test set* (3.32)

Note 1 to entry: *EFTP* is expressed in *images per minute (ipm)* (3.13). *EFTP* can be affected by the digital processing time of the test set as well as the run time of the test set.

3.7
ESAT
estimated saturated throughput
rate at which a device produces pages measured from the complete exit of the last page of the first *test set* (3.32) through the complete exit of the last page of the last test set

Note 1 to entry: *ESAT* is expressed in *images per minute (ipm)* (3.13).

3.8
feature performance ratio
ratio of the device performance [such as *first set out time (FSOT)* (3.10) and *estimated saturated throughput (ESAT)* (3.7)] with the subject feature ON versus the device default baseline performance (without the subject feature ON)

3.9
feature performance test
<print> optional test used to evaluate productivity changes with various printing and finishing features enabled

Note 1 to entry: The feature performance test suite is run with default printing system settings to establish a base line, and then with the selected feature (e.g. stapling) ON, for comparison.

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3.10
FSOT
first set out time
number of seconds between the initiation of the job to the complete exit of the last page of the first *test set* (3.32)

3.11
full detailed report
presentation of information including machine setup and full measured test results

Note 1 to entry: An example of a full detailed report is shown in Annex B.

3.12
full report
<print> presentation of results including the *first set out time (FSOT)* (3.10), *effective throughput (EFTP)* (3.6) and *estimated saturated throughput (ESAT)* (3.7) values for each file tested for a given category or feature test as well as the calculated averages for the overall *FSOT*, *EFTP* and *ESAT* values

3.13
ipm
images per minute
printing rate, excluding time to first page printed, as measured when producing pages in a continuous print mode for one minute with a single static document using a nominal grammage substrate

Note 1 to entry: Nominal printing speed is expressed in pages per minute or images per minute.

3.14
initial installation state
state of the *test platform* (3.30) after the installation and configuration of the operating system and applications but before the installation of unique software, e.g. print driver for the printing device under test

3.15
interface
data transmission between the host and the printing device, such as a direct (via parallel, serial, USB, Firewire, network or wireless) or an indirect (via network router/server) connection

3.16
LSOT
last set out time
number of seconds between the initiation of the job to the complete exit of the last page of the last *test set* (3.32)

3.17
N-up
inclusion of *N* page images on a single side of a single sheet of paper

Note 1 to entry: *N* is typically 1, 2 or 4 original images.

EXAMPLE 2-up copy mode scans two originals and creates one sheet of paper with two originals on it.

3.18
original order output
in-order output
printed document output stack is in the same order as the original electronic document

Note 1 to entry: For a device that prints *simplex* (3.27) imaged media side up, the device would print pages in reverse order 4321 for the output stack to be in the same order 1234 as the original electronic document when viewed by the user.

Note 2 to entry: For a device that prints simplex imaged media side down, the device would print pages in order 1234 for the output stack to be in the same order as the original electronic document when viewed by the user.

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3.19
output order
order of printed pages in the output stack relative to the original electronic document

Note 1 to entry: The original document is ordered 1234, the printed output can be either 1234 or 4321.

3.20
PDL
page description language
commands and data structures that a printing system interprets to produce an intended print page image

3.21
performance test
test used to evaluate productivity by providing *first set out time (FSOT)* (3.10), *effective throughput (EFTP)* (3.6) and *estimated saturated throughput (ESAT)* (3.7) without using any special feature or mode, including both the *simplex* (3.27) printing mode and *duplex* (3.5) printing mode if available

3.22
RIP
raster image processor
component used in a printing system, which produces a bitmap

3.23
ready
ready state
state which a device typically enters after the exit of the last page of the last job and the device is in a stable condition, but fully warmed up and prepared to operate

Note 1 to entry: While in the ready state, systems not directly involved with marking the media are allowed to be in motion.

EXAMPLE Fans may still be spinning and all other motors stopped.

3.24
ready delay time
required delay time from the complete exit of the last page of the previous job to the start of the next job

3.25
reverse order output
printed document output stack is in the reverse order as the original electronic document

Note 1 to entry: For a device that prints *simplex* (3.27) imaged media side up, the device would print pages in order 1234 for the output stack to be in the reverse order 4321 as the original electronic document when viewed by the user.

Note 2 to entry: For a device that prints simplex imaged media side down, the device would print pages in reverse order 4321 for the output stack to be in the reverse order 4321 as the original electronic document when viewed by the user.

3.26
set count
total number of sets printed during a *test run* (3.31), with set count *N*, and then *N* (as in *N test sets* (3.32)) × *M* (number of pages in one *test file* (3.29)) pages will be printed

Note 1 to entry: This is often referred to as copy count in the application or print driver setting.

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3.27
simplex
simplex printing
use of a printing device when only a single side of a sheet is printed on

Note 1 to entry: Single-sided printing mode is similar to the copying modes often referred to as 1:1 mode, simplex to simplex, or single-sided originals to single-sided copies.

3.28
summary report
presentation of results including the average overall *first set out time (FSOT)* (3.10) and *estimated saturated throughput (ESAT)* (3.7) values calculated for a given category or feature test

3.29
test file
individual files used for testing as per the test method

EXAMPLE A single Microsoft® Excel®[1)] file within the office test is a “test file”.

3.30
test platform
set of hardware and software system components configured to perform the collection of digital printing productivity tests

Note 1 to entry: The test platform includes, but is not limited to, a computer installed with an operating system and applicable application software, installed printing device software, hardware and software *interfaces* (3.15), and timing devices (stopwatch or automated).

3.31
test run
operation of printing one *test file* (3.29), in a particular system configuration, with a particular set and page count

Note 1 to entry: Print times are recorded for each test run.

3.32
test set
<print> all of the pages of a single *test file* (3.29)

3.33
test suite
combination of *test files* (3.29) for each *category test* (3.1)

EXAMPLE 1 The office category test suite consists of three test files.

EXAMPLE 2 The advertising and graphics category test suite consists of four test files.

4 Test parameters and conditions

4.1 Test platform

Due to the rapid change of computer technology, a common test platform (hardware and software) that can be used for productivity testing over time is not considered practical. Instead, when a test platform is used, the test platform system parameters that may affect digital printing productivity measurements (see Annex E) shall be recorded.

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