

**Internal distribution code:**

- (A) [ ] Publication in OJ  
(B) [ ] To Chairmen and Members  
(C) [ ] To Chairmen  
(D) [X] No distribution

**D E C I S I O N**  
**of 19 March 2004**

**Case Number:** T 0896/99 - 3.4.2

**Application Number:** 91308828.2

**Publication Number:** 0478348

**IPC:** G03G 15/00

**Language of the proceedings:** EN

**Title of invention:**

Methods for sheet scheduling in an imaging system having an endless duplex paper path loop

**Patentee:**

XEROX CORPORATION

**Opponent:**

Océ-Nederland B.V.

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Claim 1 - main request, inventive step (no)"

"Claim 1 - auxiliary request I, inventive step (no)"

"Appeal dismissed"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0896/99 - 3.4.2

**D E C I S I O N**  
of the Technical Board of Appeal 3.4.2  
of 19 March 2004

**Appellant:** XEROX CORPORATION  
(Proprietor of the patent) Xerox Square - 020  
Rochester  
New York 14644 (US)

**Representative:** Grünecker, Kinkeldey  
Stockmaier & Schwanhäusser  
Anwaltssozietät  
Maximilianstrasse 58  
D-80538 München (DE)

**Respondent:** Océ-Nederland B.V.  
(Opponent) St. Urbanusweg 43  
NL-5914 CC Venlo (NL)

**Representative:** Hanneman, Henri W., Dr.  
Océ-Technologies B.V.  
Patents & Information  
St. Urbanusweg 43  
P.O. Box 101  
NL-5900 MA Venlo (NL)

**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
9 July 1999 concerning maintenance of European  
patent No. 0478348 in amended form.

**Composition of the Board:**

**Chairman:** A. G. Klein  
**Members:** M. A. Rayner  
J. H. P. Willems

## Summary of Facts and Submissions

I. The patent proprietor has appealed against the interlocutory decision of the opposition division that account being taken of amendments made by the patent proprietor, European patent 478348 (application number 91308828.2) and the invention to which it relates meet the requirements of the Convention. The decision was based on an auxiliary request, higher order requests being rejected. The patent concerns sheet scheduling in an imaging system having an endless duplex paper path loop.

Page 13, lines 23-29 of the patent contain the following text:

"In the present description, a set is, for example, a document or multiple documents which belong together. For example, each of the pages in one chapter of a book can be considered to be a set (or a document) because all pages in the chapter belong together. Similarly, a book made from multiple chapters (or documents) can also be considered a set since all of the pages in all of the chapters belong together. A job is equal to one or more identical output sets. For example, a job can consist of printing one copy of a book (a set) or multiple copies of a book (here the job would consist of multiple sets). Multiple jobs can also be printed (e.g., job 1 = three copies of chapter 2 (3 sets); job 2 = five copies of chapter 10 (5 sets); etc.)."

II. The decision under appeal makes reference to a number of documents including the following:

D1 US-A-4 935 786

D2 US-A-4 453 841

D6 US-A-4 918 490

The opposition division was of the view that the subject matter of claim 1 as granted was not new having regard to the subject matter of document D2. The division referred to definitions of "job", "multiple job", "multiple job set" and "multiple sets" given in the patent in suit on page 13 and examples of the invention in its interpretation of claim 1, which involved printing of one set being regarded as one job. With respect to a request involving a combination of claims 1 and 2 as granted, document D2 was considered to show in Figure 6 the result of a scheduling scheme including the step of electronically reconfiguring batches by placing sheets from a subsequent batch into any preceding batch containing skip pitches so that each batch is filled, the step itself thus while not being described, being nevertheless obvious. In addition, document D6 was considered to teach that the efficiency of printing of a set of copies comprising a plurality of pages can be increased by electronically dividing the multistage job set to be printed into batches of plural page images per batch with the number of page images per batch corresponding to the copy sheet capacity of the duplex path.

III. The case of the appellant can be summarised as follows:

*Requests*

Maintenance of the patent unamended (main request) or in amended form based on the claims according to auxiliary request I.

The independent claims upon which the requests of the appellant are based are worded as follows:

*Main request*

1. A method of scheduling sheets for printing and outputting collated sets of plural copy sheets from a multiple job set of multiple electronically reorderable page images, wherein said collated outputted copy sheets include at least duplex sheets having one page image printed on one side of a copy sheet and another page image printed on an opposite side of said copy sheet, and wherein said method utilizes an endless duplex paper path loop providing a plural copy sheet capacity duplexing path for recirculating therein plural copy sheets imaged on one side back to be imaged on their opposite side to make said duplex copies, said method comprising:

determining the number of sheets required to print each collated set in each job to be printed;

determining the image to be printed on the first and second sides of each sheet in each job to be printed;

scheduling the sheets and images to be printed on each sheet for being passed through said duplex path so that said duplex path is substantially filled to capacity with sheets, wherein said scheduling proceeds to

substantially continuously fill said duplex loop to capacity with sheets while preserving the collated output of sets in each job regardless of set or job boundaries; and inserting sheets into said duplex paper path loop according to said scheduling.

*Auxiliary request I*

1. A method of scheduling sheets for printing and outputting collated sets of plural copy sheets from a multiple job set of multiple electronically reorderable page images, wherein said collated outputted copy sheets include at least duplex sheets having one page image printed on one side of a copy sheet and another page image printed on an opposite side of said copy sheet, and wherein said method utilizes an endless duplex paper path loop providing a plural copy sheet capacity duplexing path for recirculating therein plural copy sheets imaged on one side back to be imaged on their opposite side to make said duplex copies, said method comprising:

determining the number of sheets required to print each collated set in each job to be printed;

determining the image to be printed on the first and second sides of each sheet in each job to be printed;

scheduling the sheets and images to be printed on each sheet for being passed through said duplex path so that said duplex path is substantially filled to capacity with sheets, wherein said scheduling proceeds to substantially continuously fill said duplex loop to capacity with sheets while preserving the collated output of sets in each job regardless of set or job boundaries; and inserting sheets into said duplex paper

path loop according to said scheduling, said scheduling including:

electronically dividing each set in each job to be printed into batches of plural page images per batch with the number of page images per batch corresponding to said copy sheet capacity of said duplexing path; determining whether any of said batches includes skip pitches due to the number of page images in a set not being an integer multiple of said copy sheet capacity of said duplexing path; and electronically reconfiguring said batches by placing sheets from a subsequent batch into any preceding batch which contains skip pitches so that each batch is filled to said copy sheet capacity of said duplexing path.

A further independent claim, claim 16, is present in this request, but as it is not dealt with in this decision (see point 5.3 of the Reasons for the Decision) its wording is not given.

*Arguments*

Claim 1 of the main request applies to sheets of a multiple job set whereas the methods disclosed in the cited prior art documents are applied to a single job set. The definition of these terms is given on page 13, lines 23-29 of the specification. As stated on page 16, lines 48 and 49, the example on page 16 is for one job consisting of six sets of three duplex sheets.

Human nature is to process serially and this is the natural approach with a printer server to avoid mixing up jobs. However, there is then a problem with

efficiency between the jobs with only say 3 or 4 pages in an endless closed loop with a capacity of 8 used, i.e. only 3 or 4 of 8 possible pitches filled. The inventors therefore came up with the idea of "interleaving" or "mixing" jobs, so that space at the end of one job could be used for the next.

Document D1 deals mainly with multiple copies of one set, only an unlikely interpretation of the word document could also include a job. Even then, the teaching of the patent would be a specific interpretation to "job", which could not be deprived of novelty by a more general disclosure of "document". The sheet path cannot moreover be filled to capacity according to the interleave mode used in the duplex scheduling of document D1 as every other pitch is skipped, in fact this corresponds to the prior art already acknowledged in the patent. With reference to Figure 15, document D1 refers to interleaving of a second document before the first document is discharged, but this does not necessarily mean that interleaving the two documents takes place in the duplex paper path, it not being possible to see from Figure 15 how often pages cycle through. The patent in dispute does however mix jobs and does not operate in an interleave mode. There are different documents, which means it is necessary to decide how many pages are in each. In addition, the possibility of scheduling simplex sheets is left open in the method of claim 1 of the patent in dispute. The subject matter of claim 1 is thus not obvious in the light of document D1.

Looking at document D2, there is therein disclosed the sequencing of multiple sets of the same length in one



job. In the teaching of document D2, when one job nears its end, there is no requirement to assess any following job. Unlike sets which have the same start and finish, jobs are different documents of differing lengths. The skilled person is thus neither offered the means nor the motivation to move towards the invention by the teaching of document D2. The skilled person would not have considered, in relation to document D2, the teaching of document D1 relevant as this pertains to an interleave mode.

Document D6 cannot disclose or suggest mixing of jobs as it states explicitly that batches should not be mixed.

Therefore the subject matter of claim 1 involves an inventive step within the meaning of Article 56 EPC.

Auxiliary request I adds the feature of electronically reconfiguring batches by placing sheets from a subsequent batch into any preceding batch which contains skip pitches so that each batch is filled to the copy sheet capacity of the duplex path. This feature cannot be found in document D6, which points out on numerous occasions that processing from another batch is performed only after the preceding batch is completed. The skilled person would thus have been reluctant to combine the teachings of documents D6 with that of D2 requiring filling from the next set. Batches can be determined and then transmitted at the same or different times and are not to be understood just as printing sequences of the sort shown in document D2. The teachings of documents D1 and D6 can never be

combined because the batch and interleave modes are not compatible.

Thus, the subject matter of claim 1 of auxiliary request 1 also involves an inventive step within the meaning of Article 56 EPC.

IV. The case of the respondent (=opponent) can be summarised as follows:

*Requests*

Dismissal of the appeal

*Arguments*

Document D1 discloses a printer that is provided with a duplexing path. The operation of the printer is according to the so called interleave mode, image areas (pitches) only being skipped in the first print cycle where the duplexing path is filled with sheets printed on one side. One skip is made between each (single sided) printed sheet. In all subsequent cycles, the duplexing path is completely filled and no further image areas are skipped until the print task is completed, thus resulting in a very productive print process. Empty pitches thus occur only in the first and then the last cycle upon completion of the task.

Document D1 goes on to teach with reference to Figure 15 that the empty pitches occurring in the last cycle upon print completion are filled with the next page or pages of a subsequent job. Thus according to document D1 the scheduling proceeds regardless of job boundaries. The method disclosed in D1 with reference

to Figure 15 therefore satisfies all the conditions of claim 1 according to the main request, which in consequence lacks novelty.

Document D2 explicitly discloses the scheduling of successive copy sets of a document regardless of the set boundaries, while preserving the collated output, an example in Figure 6 being the production of three successive print sets of a 6 page document composed of 3 duplex sheets. Apparently, as correctly decided by the opposition division, the definitions of set and job are not to be interpreted so strictly that a set cannot be considered a job. Thus document D2 removes novelty from the subject matter of claim 1 of the main request. It is moreover obvious for a skilled person that the teaching of Figure 15 of document D1 relating to filling empty pitches occurring in the last cycle with the next page or pages of a subsequent job is also applicable to the scheduling method of document D2. Arguments of the appellant which are directed to the sheets passing the printing station and not being printed do not make practical sense, as this would entail an extra unnecessary and thus inefficient loop for the sheet concerned. Thus as far as job intermixing is concerned, the subject matter of claim 1 is at least obvious having regard to the disclosure of documents D1 and D2.

Claim 1 of the auxiliary request 1 adds to claim 1 of the main request that the scheduling and ordering procedure is performed electronically. According to the prior art documents, the scheduling proceeds electronically (i.e. with electronic means) and thus this claim is not directed to subject matter involving

an inventive step. The argument relating to sending different batches to the printing station at the same time is not relevant as the printing station must print in an in order ensuring the correct collation.

Dependent claims of the patent in dispute relate to insertion of simplex sheets, which document D2 treats as duplex sheets having a blank side.

Accordingly, the subject matter of claim 1 according to the auxiliary request I cannot be considered to involve an inventive step.

- V. Oral proceedings were appointed consequent to requests on an auxiliary basis to this effect by both parties. At the end of the oral proceedings, the board gave its decision.

### **Reasons for the Decision**

1. The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.

2. *Prior art*

- 2.1 Document D1

A feature described is that a user can begin printing one document or job unit in the printing apparatus before the last sheets of the previous document are discharged. Figure 15 discloses an example of a method of interleaving a second document before the last paper sheets of a previous duplex printed document are

discharged. The first document to be duplex printed comprises eight pages and, therefore, requires four paper sheets. The second document to be printed includes five sheets. The second document is interleaved between the sheets of the first document. According to Figure 15, after the first sheet of the first document is duplex printed, the first sheet of the second document is interleaved between the first and second sheets of the first document. Then, the subsequent sheets of the second document are interleaved between the sheets of the first document. Therefore, the duplex feed path does not have to be cleared of the sheets of the previous document before the subsequent document is printed.

## 2.2 Document D2

There is described a printing system for duplex printing a plurality of document images on a plurality of copy sheets including memory means for storing print control information defining the plurality of document images. This information is supplied to a printer, which selectively prints the desired document images on copy sheets transported past a print station. The sequence in which the page images are printed varies in dependence upon the number of pages in the document. Figure 6 illustrates a number of such sequences. For example, line 6 shows producing a number of copies of a six page document (three sheets) in a five pitch sheet capacity path. The sequence shown is 6-4-2-6-4-5-3-1-5-3-2-6-4-2-6-1-5-3-1-5. Thus, images provided first correspond to even pages in reverse order, pages 6 and 4 repeating to fill the capacity of five before any odd page information is made available thus avoiding having

to skip two positions. Each printing sequence is thus based upon the assumption that five copy sheets are maintained in the closed sheet path on a continuing basis, i.e., as duplex printed sheets are delivered to the output, they are replaced with unprinted sheets from the sheet supplies. Boundaries between documents in a job are thus ignored so as to avoid skipping of places in the path. Printing a blank page is provided for a sheet of a document with an uneven number of pages.

### 2.3 Document D6

A generic definition of the system involves a duplex job being electronically divided, sequentially one batch at a time as it is received, into plural batches of plural pages. The number of pages in each batch is twice the number of sheets of paper required to fill the duplex paper path. Within each batch, every other page is first printed on the first sides of the copy sheets for that batch in ascending order without skipping any pitches between sheets. This is followed by the printing of all of the remaining pages of that batch (e.g., the alternate pages not printed on the first sides) onto the second sides of that first batch of copy sheets, printed in ascending order, again without skipping any pitches between sheets. The entire first batch is completed before any pages of the second batch are printed. This sequence is repeated for the next batch, and so on, until the job is completed and one collated copy set has been produced. If further copy sets have been requested, the entire process is repeated. The dividing into batches of page images and the start of printing can occur while the rest of the

job is still being sent to the printer. For example, if the batch divisor is 4, for a 2 sheet buffer loop, then after only 4 pages have been received the conventional on-board or associated print server electronics will know that the job set is at least 4 pages long, and that the first batch buffer set can thus be divided out and these pages presented to the laser printer in the desired first batch set order, which is pages 2,4, 1,3 respectively. In order to further reduce the first copy out time, the printer can start printing after page 2 has been received while pages 3 and 4 of the first batch are still being downloaded from the host. There is no need for the entire batch to be completely downloaded prior to printing appropriate pages from that batch. After all pages from one batch are printed, the printer can then start printing appropriate pages from the next batch as they are received, whether or not the entire batch has been downloaded.

### 3. *Main request*

#### 3.1 Novelty

In the light of the definition given in the patent in dispute, the board considered Figure 15 of document D1 to relate to scheduling two jobs because the documents concerned are called a first or previous document and a second or subsequent document indicating they do not belong together, which is confirmed by their being of differing lengths, namely 4 and 5 sheets, respectively. Accordingly, the board disagrees with the opinion of the appellant that a specific interpretation of a general disclosure would be entailed in considering these documents jobs. The board agrees moreover with

the respondent that scheduling sheets to pass the printing station without being printed does not make practical sense to the skilled person. Nevertheless, document D1 is directed to an interleave method, involving alternate pitches being initially left empty, so the duplex path is not filled to capacity, thus the disclosure does not anticipate the subject matter of claim 1 in dispute.

3.2 Since the sheets in the sets described in document D2 belong together and the sets are the same length, the board does not consider document D2 to deal with scheduling of a multiple job within the meaning of the definition given on page 13, lines 23-29 of the patent. This opinion is not affected by the Table on page 16, which is not presented as a multiple job but is described as an example job including at least six sets. Therefore the board disagrees with the opposition division and the respondent that document D2 discloses a multiple job set within the meaning of claim 1. Document D6 also lacks disclosure of a multiple job set.

3.3 Therefore, the subject matter of claim 1 of the main request has novelty within the meaning of Article 54 EPC over the disclosure of any one of documents D1, D2 or D6.

#### 4. *Inventive step*

4.1 Document D2 can be taken to be the closest of the prior art documents in view of it dealing with jobs including several sets where the pitches in an endless duplex paper path loop are substantially continuously filled to capacity. The way this is done is to take pages from



a subsequent set (e.g. the second 6-4 in Figure 6, line 6) before a set of which the number of sheets has been determined has been finished, i.e. regardless of set boundaries. As can be seen from the Figure 6, line 6 for example, if say three copies are printed, the endless loop is filled right from the beginning, but it will nevertheless take 19 pitches to complete the three sets and reach the last page, the "1" of the third set, i.e. one pitch ( $=19-(3 \times 6)$ ), would have been skipped, which can be considered inefficient. The problem solved by the subject matter of claim 1 is therefore to improve efficiency.

- 4.2 This problem is solved in the teaching of document D1 because Figure 15 shows two documents, which means two jobs, pass the printing station with the first sheet of the second job in the first free pitch of the first job, i.e. the jobs are intermixed by filling what would otherwise have been a skipped pitch. The pertinent disclosure of document D1 in this context is intermixing by filling skipped pitches with the next job which is not a feature dependent on or specific to either an interleaving or batch mode operation. Therefore, contrary to the appellant, the board does not consider the interleaving mode of document D1, as such, as a bar to applying the solution taught by document D2 in an obvious way. This is all the more so because the "filling" of a skipped pitch with the first sheet of a subsequent set is already known from document D2 to increase efficiency. The board thus sees no inventive step in the subject matter of claim 1.

4.3 Arguments about the natural approach of sequential processing are not very relevant because document D2 is already "unnatural" in that sets are intermixed, intermixing jobs thus does not, as such, really move any further away from what the appellant considers the natural approach. Similarly, for the reasons given in section 3.1 above there is no reason to think that the separate documents of different length known from document D1 are not each a job within the meaning of claim 1 in dispute.

4.4 Claim 1 refers to "at least duplex sheets", which sets a minimum requirement and does not specify simplex sheets. For this reason arguments of the appellant in the direction that simplex sheets are not scheduled in the prior art documents misses the point and is thus not relevant. In addition, the prior art documents in any case deal with simplex sheets printed on one side simply by treating the reverse as a blank page.

4.5 The board therefore reached the conclusion that the main request cannot be accepted because the subject matter of claim 1 cannot be considered to involve an inventive step within the meaning of Article 56 EPC.

5. *Auxiliary request I*

5.1 Since document D2 discloses that images to be printed are stored in a memory before printing, there is an "electronic" processing in the scheduling. Moreover, since pages are scheduled to fit the number of pitches in the endless closed loop, the number of pages in the document is divided. The example in Figure 6 takes images from a subsequent set into preceding empty

pitches, i.e. reconfigures so as to fill the duplex path. Nevertheless, in document D2, the term "batch" is not used in relation to the capacity of the endless closed loop. However, dividing each set of each job to be printed electronically into batches of plural page images per batch, with the number of page images per batch corresponding to the copy sheet capacity of the duplex path, is what is disclosed in document D6. Thus whatever problem might be considered solved by the recitation of "batch" can be taken as solved by the teaching of document D6.

- 5.2 Unlike the appellant, the board does not see any contradiction in applying the teaching of one batch after another in an obvious way from document D6 to that of document D2 because some of the batches in the latter case then simply include the filled skipped pitches. Alleged advantages deriving from features relating to transmission of batches at the same or different times, which are known as such from document D6 and in fact not present in the claim, are not relevant. Moreover, they are not related to filling skipped pitches, the board agreeing with the respondent that the batches are obliged to be configured to meet the print sequence of document D2 as, so far as the printing station is concerned, the pages must be printed in the order necessary for collation. Since the teaching of document D6 is applied to document D2, the approach of the appellant according to which the teachings of documents D1 and D6 could never be combined misses the point.

5.3 The board therefore reached the conclusion that auxiliary request 1 cannot be accepted because the subject matter of claim 1 cannot be considered to involve an inventive step within the meaning of Article 56 EPC. As the request cannot be accepted for this reason, there is no need to consider claim 16.

## **Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

A. G. Klein