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(56) Documents Cited:
US 4223453 A **US 20060037375 A1**
US 20010034592 A1

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Other: **Online: EPODOC, PAJ, WPI.**

(54) Abstract Title: **Printing machine simulator, particularly for training.**

(57) A simulator for a printing machine has a simulation unit 15 which, on the basis of input data specified during the simulation, simulates a printing process or the behaviour of a printing machine and generates output data serving for visualisation purposes. According to the invention the simulation unit 11 accesses a database 12 which comprises real printing machine data gathered at a printing machine of the same type. The simulator is designed to be used for training operators.

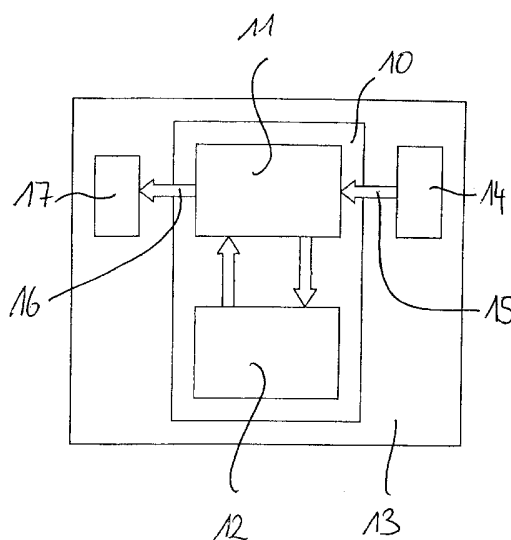


Fig 1

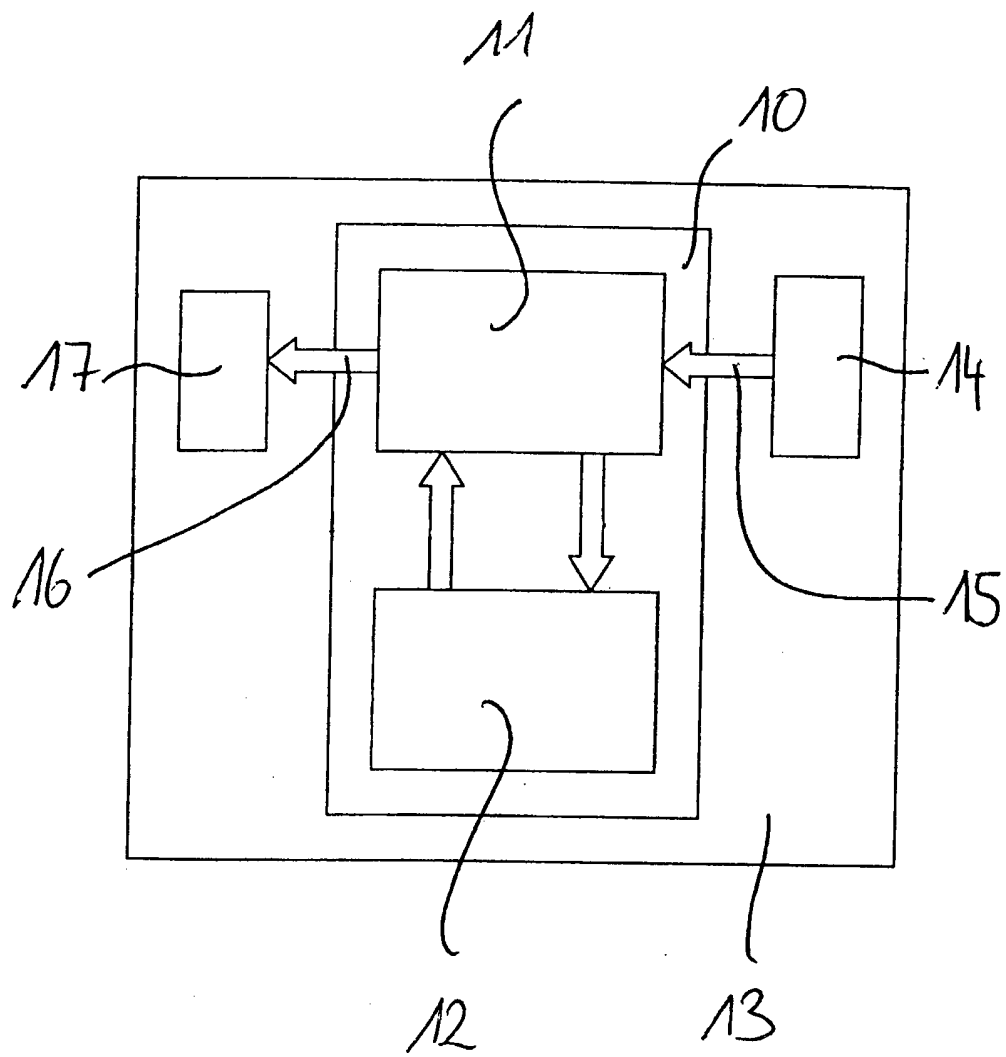


Fig 1

Printing-machine simulator

The invention relates to a simulator for simulating the behaviour of a printing machine or press.

From the prior art, simulators are known which can be
5 used to simulate the behaviour of printing machines. A
printing machine simulator of this type is known for
example from US 2001/0034592 A1. Printing machine
simulators of this type are isolated from the printing
machine and constructed as fully self-sufficient devices.
10 The printing machine simulators known from the prior art
operate on the basis of prefabricated default data which
are substantially the same for all types of printing
machine and are therefore not matched to the
configuration of a specific printing machine. The
15 printing machine simulators known from the prior art
cannot therefore be used to carry out a training
operation or diagnosis operation matched to a specific
printing machine configuration.

Taking this as a starting point, the object of the
20 present invention is to provide a novel printing machine
simulator.

This invention is concerned with a printing machine
simulator according to claim 1. According to the
invention, for simulation purposes, the simulation unit
25 accesses a data bank or database which comprises real
printing machine data gathered at a typical printing
machine.

According to the present invention, it is proposed that,
for simulation purposes, the printing machine simulator
30 exclusively accesses a database that contains real
printing machine data gathered as database entries at a
printing machine of the same type. The printing machine
simulator according to the invention therefore operates
on the basis of real printing machine data previously

determined in a printing machine of the same type.

Printing machine simulators using the invention do not reproduce the printing machine to be simulated on the basis of complex system-dynamic or system-theoretical models; instead, simulation results are determined from the database which comprises real printing machine data gathered as data entries in a printing machine of the same type. This results in a considerably simpler construction.

10 Printing machine simulators using the invention enable an individual training mode matched to the printing machine configuration acquired by the customer. This enables considerably more effective training than with the printing machine simulator known from the prior art. The printing machine simulator is integrated in the control centre of the printing machine configuration acquired by the customer so that training is carried out at the real control centre and not on a simulator which is removed from reality. This also enables more effective training.

20 The database includes printing machine data collected at a printing machine of the same type during the production of real print products, to which end the respective printing parameters, on the one hand, and printing results obtained using these printing parameters on the other are recorded in a synchronised manner during production with the printing machine of the same type. Therefore, for a multiplicity of printing parameters, printing results obtained using these printing parameters at the printing machine of the same type are stored in the database.

During simulation, printing parameters are specified as input data for the simulation unit of a printer, with the simulation unit accessing the database on the basis of these specified printing parameters and determining from the database the printing results obtained using identical printing parameters during production in the

printing machine of the same type. The simulation unit outputs these printing results as simulation results and therefore as output data for visualisation purposes.

For a better understanding of the invention, embodiments of it will now be described, by way of example, with reference to the accompanying drawing, in which:

Fig. 1: shows a block diagram of a printing machine simulator according to the invention.

Fig. 1 shows a block diagram of a printing machine simulator 10 in accordance with the invention, which comprises a simulation unit 11 and a database or data bank 12. The printing machine simulator 10 is preferably integrated in a control centre 13 of a printing machine acquired by a customer. Alternatively, the printing machine simulator can also be integrated in a control centre of the same type without a printing machine being present. By way of input devices 14 of the control centre 13, input data 15 or printing parameters can be specified for simulation of a printer and used as a basis for the printing machine simulator 10, in particular the simulation unit 11, to generate output data 16 as simulation results, it being possible to visualise the output data 16 on display devices 17 of the control centre 13. As a result of the fact that the printing machine simulator 10 is integrated in the control centre 13 of the printing machine acquired by the customer or in a control centre of the same type, it is possible for training to resemble reality closely.

According to the present invention, the printing machine simulator 10, in particular the simulation unit 11, accesses the database 12 for simulation purposes, the database 12 containing real printing machine data previously gathered at a printing machine of the same type. The database 12 here comprises printing machine data recorded at a printing machine of the same type during production or when printing real print products.

To this end, printing parameters of the printing operation, on the one hand, and printing results obtained using these printing parameters on the other are collected and recorded in automatic and synchronised
5 manner during a printing operation at the printing machine of the same type. The printing parameters recorded also include machine parameters such as setting parameters for the inking units, web tension devices and also register devices of the printing machine. Process
10 parameters, such as printing paper type or printing ink type, can also be recorded.

The print product printed with the respective printing parameters at the printing machine of the same type are collected and measured inline, preferably with cameras,
15 and corresponding measured values are recorded in synchronised manner as printing results. In addition to real printing parameters, the database 12 of the printing machine simulator 10 therefore also contains real
measured results for real print products printed with the
20 respective printing parameters at the printing machine of the same type. As already mentioned, the printing parameters and the measured data are collected in a synchronised manner so that the database contains a clear association between printing parameters and measured data
25 or print product data.

During simulation, input data 15 for the printing machine simulator 10 are specified or generated by a printer by way of the input devices 14 of the control centre 13. These input data 15 are printing parameters such as
30 machine parameters and process parameters.

The simulation unit 11 of the printing machine simulator 10 is provided with these input data 15, with the simulation unit 11 accessing the database 12 on the basis of the input data 15 specified by the printer and
35 determining from the database 12 the printing results which were obtained using identical printing parameters

during production at the printing machine of the same type. These data are read from the database 12 and output as output data 16 by the simulation unit 11 to the display devices 17 of the control centre 13 for
5 visualisation on the display devices 17.

The input data 15, namely printing parameters, are generated or specified during simulation of a printer. The simulation unit 11 of the printing machine simulator 10 searches the database 12 of the printing machine
10 simulator 10 on the basis of the specified input data 15 and determines printing results obtained using the printing parameters corresponding to the input data 15 during production at the printing machine of the same type. The relevant database entry is then output for
15 visualisation purposes. There is therefore no calculation of simulation results on the basis of complex system-dynamic or system-theoretical models; instead, the simulation results are determined from the database 12 which comprises the real printing machine data gathered
20 as data entries in a printing machine of the same type.

If, when input data 15 for which corresponding printing results are stored in the database 12 are specified during simulation, the function of the printing machine simulator 10 merely extends to searching the database 12
25 for the corresponding entry. If, on the other hand, printing parameters for which no corresponding printing results are stored in the database 12 are specified as input data 15 during simulation, the present invention provides for the simulation unit 11 to carry out an
30 interpolation.

The interpolation is carried out between the printing results recorded at the printing machine of the same type with printing parameters which come closest to the printing parameters specified as input data 15 for
35 simulation purposes. It is alternatively possible to omit the interpolation procedure and to provide the

printing results as simulation results recorded at the printing machine of the same type with printing parameters that come closest to the printing parameters specified during simulation.

- 5 A further development of the present invention consists in the database 12 being updated continuously. To this end, input parameters of the printing operation and printing results obtained with the input parameters can be recorded automatically in synchronised manner during
- 10 the printing operation of the printing machine. In this case, the printing machine data gathered at a printing machine of the same type are then supplemented or updated with printing machine data determined at the concrete printing machine of the customer during the printing
- 15 operation. It is thus possible to adapt the printing machine simulator continuously to the concrete printing machine configuration of a customer. This enables customised training of operating personnel and rapid trouble-shooting in the event of printing machine errors.
- 20 As mentioned above, the printing machine simulator can also be integrated in a control centre of the same type without a printing machine being present. This is advantageous in that training can take place before the printing machine is delivered.

List of reference numerals

- 10 Printing machine simulator
11 Simulation unit
12 Database
13 Control centre
14 Input device
15 Input data
16 Output data
17 Display device

Claims

1. A printing-machine simulator for a printing machine, having a simulation unit (10) which, on the basis of input data (15) specified during the simulation, simulates a printing process or the behaviour of a printing machine and generates output data (16) serving for visualisation purposes,
characterised in that, for simulation purposes, the simulation unit (11) accesses a database (12) which comprises real printing machine data from a printing machine.
2. A printing-machine simulator according to claim 1, in which the database (12) comprises printing machine data collected at a printing machine of the type to be simulated during the production of real print products, to which end printing parameters, on the one hand, and printing results obtained using these printing parameters on the other are recorded in a synchronised manner during production at the printing machine.
3. A printing-machine simulator according to claim 2, in which, during simulation, printing parameters of a printer are specified as input data (15) for the simulation unit (11), the simulation unit (11) accessing the database (12) on the basis of these specified printing parameters and determining from the database (12) the printing results obtained using identical printing parameters during production in the printing machine of the same type, and outputting these printing results as output data (16) for visualisation purposes.
4. A printing-machine simulator according to claim 3, in which, when printing parameters for which no corresponding printing results are stored in the database (12) are specified as input data (15) for

the simulation unit (11) during simulation, the simulation unit (11) carries out an interpolation between the printing results recorded at the printing machine of the same type with those printing parameters that come closest to the printing parameters specified during the simulation.

5. A printing-machine simulator according to claim 3, in which, when printing parameters for which no corresponding printing results are stored in the database (12) are specified as input data (15) for the simulation unit (11) during simulation, the simulation unit (11) provides as simulation results the printing results recorded in the printing machine of the same type with parameters coming closest to the printing parameters specified during the simulation.
6. A printing-machine simulator according to any preceding claim, in which the database (12) can be updated continuously, to which end printing parameters and printing results obtained using the printing parameters are recorded automatically in a synchronised manner during the printing operation of the printing machine.
7. A printing-machine simulator substantially as described with reference to the attached drawing.
8. A printing machine including a simulator according to any preceding claim, integrated in a control centre (13) of the printing machine.
9. A method of simulating a printing machine using a simulation unit (11) that accesses a database (12) which comprises a real printing machine data from a printing machine.

Application No: GB0606782.1

Examiner: Matthew Jefferson

Claims searched: 1 to 8

Date of search: 24 August 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1 to 5.	US 2001/034592 A1 (HERMAN) See whole document.
A,P	1.	US 2006/037375 A1 (BETZMEIER ET AL.) See abstract and figures.
A	1.	US 4223453 A (MEYER) See abstract and figures.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^x :

Worldwide search of patent documents classified in the following areas of the IPC

G09B

The following online and other databases have been used in the preparation of this search report

Online: EPODOC, PAJ, WPI.