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The invention relates to a printing press with one or multiple printing couples according to the preamble of Claim 1 and a printing press according to the preamble of Claim 2. The invention furthermore relates to a method for operating a printing press according to Claim 10.

During printing, a substrate is moved through multiple printing couples, wherein in each printing couple a part print image is applied from a printing plate, if appropriate via a print blanket of a blanket cylinder onto the substrate. In the case of combined colour printing, the substrate is usually moved through at least four printing couples in order to apply part print images in the scale colours black, cyan, magenta and yellow onto the substrate. In further printing couples, part print images can be applied onto the substrate in special colours. Finally, one or multiple coatings for creating protective effects, for creating textures or for creating gloss or mat gloss effects can be applied onto print images created in such a manner.

As inking units, conventional ductor inking units, film inking units or Anilox inking units can be used in offset printing. Furthermore, combinations of such inking units can also be employed within the printing press. In offset printing couples, dampening units can also be employed which serve for feeding dampening solutions onto flat printing plates mounted on print cylinders and ensure that on the flat printing plate only the image regions can be moistened with printing ink. Dampening units are omitted in so-called dry offset printing, which is carried out with special printing plates.

On such printing presses, a functionality for the so-called de-inking is known. De-inking is used in particular when one of the printing plates is to be freed of printing ink without having to wash or elaborately clean these. In the case of a washing operation, the entire inking unit assigned to the respective printing plate would otherwise have to be washed as well. During de-inking, however, merely a certain number of printing sheets are transported through the printing couples without feeding printing ink to the printing plate, wherein printing couples are moved into impression throw-on and the printing sheets that happen to

pass through at that time thereby largely remove the residual ink that still remains on the inking plate and the printing blanket. The printing plate is keen even in the case of the de-inking operation that it can be removed or taken out of the respective printing couple – without causing further contamination of machine components or operating personnel. The number of printing sheets used for de-inking in this case can be set on a control station of the printing press by the operator based on empirical values, wherein the position of the printing plate to be cleaned within the printing press can be taken into account. The same applies to a functionality that is comparable to the de-inking, the so-called de-varnishing. In this case, a varnish form cylinder of a varnishing machine or of a varnishing unit integrated in a printing press is freed of excess varnish through sheets passing through the printing press after the actual printing or coating process. Here, too, the number of the printing sheets to be used can be preselected. The cleaning of the varnish form cylinder is then substantially less involved.

In this regard, a method and a device for controlling the layer thickness of an ink film for a multi-colour printing press is known from EP 0 983 852 B1. This publication takes into account that plate cylinders are present in printing couples, which hold a printing plate carrying the print image, wherein such printing plates have to be replaced. Here, the printing plates have to be supplied with printing ink in different ways. In this connection it is proposed to print a pre-selectable number of printing sheets in the printing couples where a printing plate is to be replaced with ink feed on the inking unit switched off. Thus, a reduction of the ink layer thickness on the ink rollers of the inking units results so that the conversion to a new ink profile is facilitated. The relevant printing plates in this case however are only cleaned conditionally since these – although to a decreasing amount – are continued to be supplied with printing ink by the inking units. For the plate change, a contaminated printing plate, merely a contaminated printing plate continues to be available even in this case, in particular also because in conventional inking units for example of offset printing presses a relatively large amount of ink is stored on a multitude of inking rollers.

To minimise a varnish residual layer thickness on a varnish roller and on a or each varnish form positioned on a form cylinder following the clearing out of impression throw-off in printing couples, it is already known from DE 33 12 128 A1 to determine a number of printing sheets via a control device which are to be still supplied to a relevant varnishing unit prior to the impression throw-off. Here it is left open how the varnish roller and the form cylinder are adjusted. For this reason, in the case of the disclosed varnishing unit, the situation can occur that with so-called pre-varnishing when converting the varnishing unit from impression throw-off to impression throw-on and during the so-called de-varnishing when converting the varnishing unit from impression throw-on to impression throw-off, printing sheets are only partially printed with a varnish image. Printing sheets, which are merely partly provided with a varnish image, are unusable and have to be separated out as waste sheets.

In principle it thus has to be decided after each order change how printing plates are to be placed for repeat orders. To this end, printing plates can be cleaned prior to the removal via the inking unit or ink-covered be removed by the plate changer in order to clean them manually outside. In the process, the plate changing elements are prematurely contaminated.

WO 2007/073834 A shows a printing press according to the preamble of Claim 1 and of Claim 2.

Starting out from this, the present invention is based on the object of creating a new type of method for operating printing, varnishing and inking units in printing presses.

This object is solved by means of a printing press according to Claim 1 or according to Claim 2 and in a printing press by means of a method according to Claim 10.

According to the invention, processes for the de-inking or de-varnishing are derived from adjusting data which are available in a system or a device for the pre-

stage processing with respect to a printing order among other things for producing the required printing plates. Data regarding area coverage, a paper type and employed printing inks and from a number of printed sheets that are available from pre-stage data the optimal number of printing sheets for de-inking the printing plate or printing plates is calculated by a control computer of the printing press or within the printing press. According to the invention, the exact printing couple of the printing press that has the greatest degree of contamination defines the total number of the necessary de-inking sheets. These are marked as waste. The following measures are suitable for this purpose:

- Marking in the stack by means of a tape inserter.
- Detectable individual markings by means of a printing device.
- Separating out of the de-inking sheets in sheet diverter/double stack delivery.

According to the invention, undershooting a certain ink density on the printing sheet can be measured during the de-inking with devices for the in-line ink density measurement and the paper supply on the feeder stopped. A control surface for measuring the ink density on the printing sheet supplies control signals, by means of which the number of the necessary de-inking sheets is determined. The exact printing couple having the greatest degree of contamination on the printing plates of the plate cylinders and on the blankets of the blanket cylinders can be automatically selected in this way so that on completion of the order as a result of a control with reference to a run counter corresponding to the number of printed good sheets the de-inking can proceed automatically. Equally, de-inking or de-varnishing can also take place before reaching a selected circulation figure. The respective process is then initiated by a targeted interruption of the running printing process from the control station of the printing press. Thereafter, the printing process can be recommenced or continued with clean printing plates and printing blankets.

The same previously described measures can be carried out during de-varnishing. The number of the de-varnishing sheets can be defined through the data

with respect to a cell volume of the Anilox roller, the type of the varnish used and the type of varnish (depending on whether suitable for the full area or for spot varnishing) and the number of the varnished sheets. The screen roller and its specific data can also be identified via logistic data or integrated RFID-systems in this case.

Alternatively, the number of de-varnishing sheets can be defined by means of in-line varnish layer thickness measurement so that when undershooting a minimal varnish layer thickness the paper supply on the feeder is stopped. In machines with in-line varnishing, the two methods can be carried out in one operation. The precise printing or varnish module for which the highest number of overrun sheets is calculated, defines the actual number of these sheets.

According to the selected working principles, the operations of paper supply to the printing press, throwing-off of the form rollers interacting with the form cylinder/the printing plate from the form cylinder or separating form cylinder relative to the impression cylinder are interlinked so that a printing plate mounted on the form cylinder is itself largely cleaned at the end of a printing order and of the printing process executed there. The supply of printing ink to the printing plate in this case is interrupted by throwing-off the ink form rollers so that in impression throw-on of the printing couple merely residual ink from the printing plate or the blanket cylinder can be printed. Thus, an ink image with continuously reducing ink application is printed on a number of waste sheets, wherein these waste sheets produced shortly before impression throw-off can be separated out of the production process.

After the method with pre-setting from pre-stage data or an in-line measurement, no superfluous waste is generated any longer. The residual contamination of the plate or of the varnish form is minimised. Pre-selection of the number of de-inking or de-varnishing sheets falls away. Thus, operating errors are avoided and the setting-up time shortened.

Advantageous in this method is that the ink layer that is still present on the surface of the printing plate can be very quickly removed through the interaction of form cylinder and blanket cylinder through discharging to the substrate being printed on the blanket cylinder. The ink layer is reduced to very small layer thicknesses through the in each case half splitting of the residual layer.

Many additional operations can be omitted with further handling advantages:

1. The blanket cylinder is largely free of ink and need no longer be cleaned by means of a washing device with major time expenditure.

2. The printing plates are almost free of ink and can be replaced with automatic plate changes without problems without contaminating these.

3. Other than when cleaning via inking units, no washing agent particles clog plate capillaries.

In the case of flying plate change in printing presses with individual drives, deinking via running-out sheets is separately possible in selected printing couples.

Thus, an ink discharge from the printing plate following completion of a production order is provided in order to be able to transport away printing plates without inserting a washing operation and in the process not to contaminate any automatic plate that may be employed in the process.

With throwing-on blanket cylinder, the ink and dampening form rollers are thrown off at a time that has been pre-calculated or determined through measurement of a defined number of sheets for the final print throw-off from the plate cylinder. Preferentially, a simultaneous throwing-off of ink and dampening form roller rollers is provided according to the invention since during the throwing-off of the ink form rollers alone a lower ink removal and thus a poorer cleaning effect was established. The delayed or separate throwing-off of the dampening

form roller rollers can be nevertheless practical as method for special subjects, substrates or printing inks.

Furthermore, throwing-off the varnishing units at least offset with regard to the throwing-off of the ink or dampening form rollers can take place within the scope of de-inking on a printing press having one or multiple varnishing units for the additional coating of the printing sheets. Here, de-varnishing can also be provided. However, this should only take place when the still existing ink quantity on the plate cylinder and the blanket cylinder is minimised so that in the varnishing unit or the varnishing units a feedback of printing ink from the printing sheets onto varnish forms or printing blankets in the varnishing units is securely avoided.

Preferred further developments of the invention are obtained from the subclaims and the following description. An exemplary embodiment is explained in more detail without being restricted to this.

A printing press comprises a sheet feeder and in the region of printing couples in each case at least one inking unit and, connected downstream of the printing couples, a sheet delivery. Usually, multiple printing couples are connected one behind the other. Printing sheets to be printed are moved through the printing press via multiple sheet guiding cylinders, wherein some sheet guiding cylinders are designed as transfer cylinders and other as impression cylinders. In the region of the inking units, a transfer cylinder or blanket cylinder rolls on the impression cylinder. A form cylinder or plate cylinder carrying at least one printing plates in turn interacts with the blanket cylinder. By way of an inking unit with ink form rollers and if appropriate a dampening unit with dampening form roller rollers printing ink and if applicable dampening solution agent beforehand is applied on the or each printing plate positioned on the plate cylinder. The ink form rollers and dampening form roller rollers can be thrown on and thrown off relative to the plate cylinder into a position in which they are thrown onto or thrown off the printing plate. The printing ink is applied in each printing couple as a

monochrome part print image via the blanket cylinder onto the printing sheets held on the impression cylinder.

The printing sheets which in the printing couples are printed with a complete printing image and if appropriate are refined in a varnishing unit with a colour or clear surface layer are conveyed out of the printing press via a conveying system and placed on top of one another on a delivery stack in the sheet delivery.

The plate cylinders each have lockup devices for printing plates, which are to be positioned on the plate cylinder. The plate cylinders are each assigned an automatic plate changer by means of which the supply and discharge of fresh or used printing plates on the plate cylinder is made possible.

According to a basic idea within the scope of the present invention, the throwing-off of at least the ink form rollers from the plate cylinder at the end of production always takes place before the completion of the sheet run or transport of printing sheets during a print application. However, plate cylinder, blanket cylinder and impression cylinder then still remain in contact with one another. This serves to achieve that on completion of a print order the printing sheets still passing through the printing press remove printing ink from the plate cylinder via the blanket cylinder without printing ink being supplied from the inking unit to the printing plate. Thus, a residual ink layer is quickly removed from the blanket and plate cylinders respectively the printing plate. The largely clean printing plate in this way can be removed via an automatic plate changer without risk and a new printing plate can be supplied.

The throwing on and throwing off of ink form rollers and of the plate and blanket cylinders is carried out via the control elements, which can be activated by a control device with respect to the working position of the printing press. If applicable, corresponding hold-back times or angles are provided depending on the machine speed so that the control elements react timeously.

The process of de-inking can be carried out both with dampening systems thrown off the printing plates or with dampening systems thrown on. The mode of operation is selectable and dependent on the employed substrates, the employed printing ink, the type of the printing plates or the area coverage of the subject on the respective printing plates. For this reason it is also provided that a different treatment of printing plates in different printing couples of the printing press is made possible.

As adjusting possibility it can be provided furthermore that in the case of the dampening system this remains thrown on with production rotation speed for the time while the de-inking sheets pass through. After this, it can be thrown off. Individual dampening systems however can continue to be thrown off.

Furthermore, a so-called permanent dampening can be selected so that each of the dampening systems can no longer be thrown off when the de-inking operation is in progress, i.e. de-inking has to take place in all used printing couples with dampening unit thrown on.

By way of the control device, a number of printing sheets can be determined which after the throwing-off of the ink form rollers in each case are still printed with an incomplete ink image by means of the residual ink that is still present on the blanket cylinder and the printing plate. The number of the printing sheets can be defined so that following the final impression throw-off, each print form positioned on the plate cylinder has a defined residual ink layer thickness and thereby is factually cleaned. During this operation called de-inking, ink images are printed with reduced ink application wherein this is due to the decreasing ink layer thickness since the ink supply to the printing plate and blanket cylinder is cut off from the inking unit. Thus, the surfaces of blanket and printing plate are largely cleaned and the risk of printing ink drying on is securely avoided there.

Sheet-fed printing presses are also known, in which plate cylinders are provided with mechanically separated, so-called individual drives which are separate from the further drives of the printing press. In such a printing press, a so-called

flying plate change is possible, during which with the help of the individual drives the replacement of printing plates on individual selected plate cylinders is also possible. In the process, the further printing plates remain on the relevant plate cylinders so that only a part image of the entire print image is replaced. Such a procedure can be practical when part image contents, e.g. explanations in continuously changing languages have to be printed into an otherwise static colour image. The plate changing operation that takes place during a flying plate change corresponds to a usual plate change, wherein the replacement of a certain printing plate and the following use of this printing couple with a new printing plate take place for the following continued printing.

The procedure is slightly changed for the flying plate change since a delay of the printing process is practical in order to be able to put the printing couple concerned back into service. The advantages of the method however apply also to the individual printing couple with individual drives.

Obviously, the ink form rollers are thrown off beforehand with this function and the excess printing ink remaining on the blanket and plate cylinders is removed from the selected printing couple even during the braking of the printing press before the flying plate change without inputting additional waste printing sheets. However, since during the braking of the printing press waste is normally already created, this can be directly utilised for the de-inking.

For cleaning printing plates to be conveyed out of the printing couple the greatest part of the residual ink quantity that is still present is removed by way of waste sheets. To this end, with the blanket cylinder thrown on, the ink and dampening form roller rollers are thrown off the plate cylinder at the time of a pre-selectable number of sheets before the final impression throw-off. Preferentially, with the method according to the invention, simultaneous throwing off of ink and dampening form roller rollers is implemented. It has been shown in practice that upon throwing-off of the ink form rollers while the dampening form rollers are still thrown on, reduced ink removal through the printing sheets from

the blanket cylinder and also between plate cylinder and blanket cylinder resulted. Thus, a poorer cleaning effect for the printing plates could be noted.

The delayed or separate throwing-off of the dampening form roller rollers can be practical as procedure for special subjects, substrates or printing inks. The prolonged dampening of the printing plate can be advantageous if a cleaning action on the printing plate with respect to contaminations other than the type originating from the printing ink is desired. This is conceivable for subjects with low colour assignment or coverage or for dusty substrates. Furthermore, certain printing inks can tend towards feedback which could be avoidable through prolonged dampening of the printing plate.

The method of de-inking is adaptable when it is carried out on a printing press which is equipped with one or multiple varnishing units for coating the printing sheets. The method of de-inking can then be carried out alone or combined with a method for de-varnishing. Preferentially, the throwing-off of the varnishing units will take place at least offset with respect to the throwing-off of the ink or dampening form roller rollers. Thus it is achieved that the waste sheets during the de-inking are still adequately covered with varnish or coating medium. In this way it is avoided that moist printing ink that is present on the waste sheets is fed back onto a varnish plate mounted on a varnish form cylinder of the varnishing unit or a suitably attached blanket, contaminating this in an undesirable manner. In a simplified embodiment, a varnish form roller can be thrown off the varnish form cylinder in the varnishing unit. A significantly faster reaction is thereby achieved than when the varnish feed would be shut off. Thus, feedback of printing ink onto elements of the varnishing unit is securely avoided and an exactly controllable removal of the residual varnish from the varnishing unit made possible.

De-varnishing thus is to take place only when the ink quantity that is still present on the plate cylinder and the blanket cylinder has been minimised. For this reason, a predefined number of printing sheets for removing printing ink passed through the printing press with thrown-off ink and if applicable dampening form

roller rollers with blanket cylinder thrown onto the plate and the impression cylinder, while the varnishing unit or varnishing units are still functional and feedback of printing ink from the printing sheets onto varnish forms or blankets in the varnishing units is securely avoided. Only then is a possibly predefined number of further printing sheets for removing the still present residual varnish or residual coating medium in the varnishing units conveyed through the printing plates and the varnishing units.

The method steps in a known printing couple with inking and dampening system are to be defined as follows:

- providing a certain number of waste sheets in the feeder
- pre-selection of a number of waste sheets on the printing press
- if applicable, order-based storing of the parameters
- throwing-off of the form rollers corresponding to the pre-selection of waste sheets
- removing printing ink from the blanket via the waste sheets which have been conveyed in a pre-selected manner through the printing press
- removing of printing ink from the printing plate with the blanket cylinder via the waste sheets conveyed through the printing press
- shutting off the varnish feed in varnishing units in a delayed manner in order to avoid feedback of printing ink from waste sheets in varnishing units, wherein the varnish form roller in the varnishing unit is thrown off if applicable
- if applicable, removing of residual varnish from varnish plate/printing blanket in the varnishing unit via the waste sheets conveyed through the printing press
- removing of printing plates without further cleaning from the printing couples
- if applicable, removing of the varnish plates to be changed without further cleaning.

According to the invention, process data for de-inking or de-varnishing is now obtained furthermore from adjusting data which are available in a pre-stage device regarding a printing order and in this case in particular data related to the printing image – such as for producing a printing plate. This data can then be stored in a work preparation station or a control station of a printing press and evaluated.

From the previously mentioned pre-stage data, data for applying the printing images or part printing images are obtained up to now for the pre-adjustment of printing presses which relate to parameters with respect to area coverage, a paper type and printing inks employed. Since it is thus already known how the printing plates are to be inked (with respect to a rear coverage of the image components, ink acceptance behaviour of the type of paper, coverage behaviour of the printing ink), the process-based cleaning parameters for the printing plates to be de-inked and/or for the varnish plates to be cleaned of varnish can be inferred from this data and from an additionally known number of sheets previously printed in the printing order.

To this end, the optimal number of printing sheets for de-inking the printing plate or printing plates is calculated by a control computer which is assigned to the printing press or is available within the printing press proper.

According to the invention, the printing couple of the printing press which has the highest degree of contamination defines the total number of necessary de-inking sheets. These printing sheets are distinct as waste sheets through the under-colouring which rapidly occurs because of the shutting-off of the ink supply and have to be separated from the good sheets in or after the sheet delivery.

The following measures are suitable for this:

- In order for the de-inking sheets to be more readily identifiable in the stack, these are marked within the delivery stack by means of a so-called tape inserter.
- De-inking sheets can be individually provided with markings, e.g. by means of an inkjet printing device (marking). Because of this, the de-inking sheets can be located upon further processing by means of suitable detectors and separated out.
- For separating-out the de-inking sheet, a so-called sheet diverter can be used which serves to remove individual printing sheets from the sheet stream on their transport path to the sheet delivery.
- The separation of the de-inking sheets can furthermore take place in a double stack delivery on a separate replacement stack.

A further development according to the invention of the method described before can consist in that by means of a device for the in-line ink density measurement or by means of an in-line sheet inspection system, if applicable including image analysis on the print respectively waste sheets used for de-inking the number of required de-inking sheets is defined. Here, the ink or varnish occupancy of the working units to be evaluated as contamination at the end of a printing order is determined out of the printing process with the help of specific data and used for determining the de-inking or de-varnishing process.

The procedure is that in particular when during the operation of the de-inking a certain ink density value is undershot on the de-inking sheets the paper supply on the feeder is stopped. For the cleaning of the printing plate has to be considered adequate then. To this end, merely the function for de-inking has to be selected by the operating personnel and the control of the printing press independently generates the process steps of de-inking with selection of the required de-inking sheets and the respective required switching of the printing couples during the de-inking.

To this end, a regulating circuit is established. By measuring the ink density that is present on the de-inking sheets control signals are generated which deter-

mine the number of the necessary de-inking sheets or make possible the further supply of printing sheets as de-inking sheets. Here, the printing ink or the printing couple with the greatest degree of contamination on plate and blanket cylinder is automatically selected. This in turn can take place with the help of the pre-stage data or with the help of the setting of the ink metering, wherein major ink supply also means major contamination in the printing couple or on the printing plate.

On completing the printing order, the operation of de-inking can be initiated and proceed completely automatedly within a defined order structure with the help of the data of a run counter of the respective printed good sheets.

The same previously described measures can be carried out during the de-varnishing for removing or cleaning a varnish form of excess varnish through printing sheets passing through the printing press after the printing process or in a controlled manner during interruptions of a printing process. Here, the number of the de-varnishing sheets is calculated through the varnish quantity which is dependent on the cell volume of the Anilox roller, the type of the varnish and the type of the varnish form, which can be designed over a full area or for spot varnishing, and the number of the printing sheets varnished during the printing order. The operating data addressed here are likewise a part of the order data, as described in connection with the printing couples, which are stored in a work preparation station or a control station of a printing press.

The data of the used screen roller can be alternatively identified also via logistics data or via RFID-system.

Alternatively to the previously described method, the number of de-varnishing sheets can be determined via an in-line varnish layer thickness measurement. Accordingly, the paper supply on the feeder can be stopped in particular when a certain minimal varnish layer thickness is undershot.

Equally, de-inking or de-varnishing can also take place before a selected circulation quantity is reached. The respective operation is then initiated through a targeted interruption of the running printing process from the control station of the printing press. Following this, the printing process can be recommenced or continued with cleaned printing plates and blankets. The print interruption can then be linked with the machine control with respect to the activation so that the de-inking of the printing plates or the de-varnishing of the varnish module/s takes place automatically or manually pre-selectedly. To this end, a pre-selection mode can also be provided by means of which it can be determined if the printing press is run down with or without de-inking or de-varnishing process. Equally, the adjustment can take place automatically when certain conditions such as severe ink application, paper tending towards contamination or sensitive printing inks are present. In turn, this can also take place combined with measurement devices (preferentially arranged in-line) for capturing ink densities or for sheet inspection.

Both methods can be carried out in machines with in-line varnishing in one operation. The printing or varnish module for which the highest number of overrun sheets is calculated, determines the actual number of the de-inking and de-varnishing sheets. The combination of de-inking and de-varnishing with respect to avoiding ink feedback into the varnishing unit takes place as described further above. Likewise, the combination of the throwing-off of ink and dampening form roller rollers according to the process is carried out as described further up.

The drawings in Figure 1 and 2 reflect sheet offset printing presses suitable for carrying out the invention.

As device according to the invention, a printing press 1A and 1B each with multiple printing couples 3, at least one varnishing unit 4 and if applicable additional further processing units in the form of stamping, cutting or embossing units 5 and numbering or calendaring couples 6 are provided in each case. Furthermore, a cold foil unit 23 for the transfer of a metallic foil layer onto a substrate can be provided within two printing couples 3.

To supply the printing presses 1A, 1B with substrate, a stack conveyor 12 is provided in connection with a feeder 14 and a stack transport system 13 with automatic stack feeding to the printing press 1A. For the away transport of printed material from each of the printing presses 1A, 1B a stack conveyor 2 in connection with a delivery 22 and a corresponding track transport system 7 is provided. The sheet feed can take place shingled from a reel-sheet feeder to the feeder 14 by means of a reel unwinder 16 and a transverse cutter 15.

The printing couples 3 are designed as offset printing couples for automated operation. To this end, devices are provided by means of which all settings and the supply with operating resources can take place without manual interventions.

The printing couples 3 of the printing presses 1A, 1B each have automated inking units 30 and dampening systems 31. These are equipped with devices for the remotely controllable and regulatable adjustment for ductor cycle, oscillation inserts and strokes, selectable roller separating and throw-offs, variations of the ductor rotational speed etc.

Optionally, the plate cylinders (form cylinder) of the printing presses 1A, 1B in the printing couples 3 are each provided with a direct drive that is independent of the main drive in each case. In using such a drive configuration, a simultaneous plate change and/or simultaneous washing functions and/or simultaneous ink forerun programs and/or flying order change can be carried out by means of suitable controls.

Furthermore, one or multiple varnishing units 4 are connected upstream, between or downstream of the printing couples 3 in the printing press 1A, 1B. The design can be as varnishing modules or in-line varnishing unit on the printing couple. In varnishing units, automatic varnish supply including temperature controlling of the varnish and/or viscosity regulating system for the varnish is additionally provided.

Furthermore, automated printing plate changing devices for the plate changing devices for the plate and form cylinders are provided in the printing couples 3 and if applicable in the varnishing units 4 of the printing presses 1A, 1B. By means of these devices, printing plates can be more easily replaced during the order change.

Furthermore, automated washing devices 32 for the blankets, inking units, dampening systems, printing cylinders, form cylinders and the varnish circuit can be provided in the printing couples 3 and varnishing units 4 of the printing presses 1A, 1B.

The sheet transport through the printing press 1A, 1B takes place in the printing couples by means of automated air tracks 18, transfer drums 19 and sheet guiding systems and in the delivery by means of sheet guiding tracks 21. In the printing press 1A, a so-called turning device 20 is provided.

For disposing of waste or for the distributed delivery, a sheet diverter 8 or a double delivery 9 is provided. For the safe and lubrication-free delivery, powder dusting 11, which is related to the print subject or the sheet format, and final dryers 10 and intermediate dryers are provided.

Quality monitoring is carried out by means of in-line inspection systems 9 in a printing press 1B and/or in-line densitometry devices 8. These can be arranged optionally as in-line ink density measurement and regulating device or as an inspection system upstream and downstream of a sheet turning device in order to be able to capture and evaluate both substrate sides.

Final machine control station is equipped with storage functions for all adjusting and measurement values related to the printing press and the order so that these can be accessed for repetition orders or current evaluations. The machine control station and the machine control are characterized furthermore through integration in a print shop network with the pre-stage, logistics, material supply, further printing presses and pre and further processing. For monitoring the prin-

ting process and the print order data, a good sheet counter and a waste sheet counter are used.

The consumption data recording for all materials (e.g. printing ink, dampening solution, varnish) for all substances needed in the printing process is provided. Because of this, printing process-relevant and order-relevant data are obtained continuously which also include faults and adjustment corrections.

For quality monitoring during the printing production, automated processes are used in that the ink density is measured in–line, i.e. during the printing within the printing press 1A, 1B and if applicable the sheets are subjected to a defect inspection at the same time. In connection with the ink measurement and regulation, automated dampening is carried out by adapting the dampening solution supply as a function of the colouration and the respective operating state of the printing press and of external parameters.

Finally, a check with regard to the coating with varnish is additionally carried out. In the case of in-line varnishing, a varnish layer thickness measurement is used for this purpose.

For printing presses 1A with turning device 20, in which substrate is printed on the front and back, an colour matching for the front and back sides of the printing sheets is preferentially effected through a double in-line measurement and regulating system 8. Here, the sheet front is measured before the sheet turning 20 and after completion of the reverse side print the image on the reverse side evaluated. To this end, a double in-line inspection system is provided which is automatically coupled to the regulating device of the printing press 1A in the event of the turning mode.

For the performance of the printing press 1A, 1B it is important to provide automated washing operations for inking unit, blanket, printing cylinder and form cylinder in the printing couples 3. These operations according to the invention can be triggered in particular during the de-inking or de-varnishing through quality

monitoring of the print production. For cleaning at least one cylinder and/or at least one roller of a printing press 1A, 1B, the circulation print is interrupted of terminated. A cleaning program is then started and after completion of the cleaning with interrupted circulation print the same is continued or with terminated circulation print, setting-up carried out. Operations for preparing the cleaning can be carried out with running circulation print wherein only after the termination or interruption of the printing the actual cleaning program is carried out. Directly after completion of the cleaning, the circulation print can be continued or setting-up carried out.

The integration of self-learning processes is also provided here. These have an effect on washing cycles, simultaneous washing preferably for example in connection with stack changing operations and measurable states of contamination of the printing press. To this end, the in-line density measurement devices 8 and the in-line inspection device 9 are used in conjunction with the automated inking units 30, dampening systems 31 and washing devices 32.

Patentkrav

1. Trykkemaskine, især arkoffsettrykkemaskine med et eller flere trykanlæg, som hver omfatter mindst et farveværk med farvepåføringsvalser og mindst en trykpladebærende pladecylinder, hvorved hvert farveværk overfører via farvepåføringsvalserne doseret trykfarve på trykpladen, og hvori endvidere mindst et fugteværk, som indeholder en fugtpåføringsvalse, kan være tilknyttet pladecylinderen, hvorved trykfarven overføres direkte hver for sig fra trykpladen på trykark, som bevæges igennem imellem pladecylinderen og en modtrykscylinder eller overføres via en trykdugcylinder, og hvorved farve- og fugtpåføringsvalserne er indrettet til at kunne kobles til og fra i forhold til pladecylinderen, hvorved fugt- og/eller farvepåføringsvalserne er frakoblelige fra pladecylinderen ved tryktilkobling imellem plade-, trykdug- og modtrykcylinder, og trykdugcylinderen er frakoblelige fra pladecylinderen og modtrykcylinderen efter gennemløb af et antal af trykark,
kendetegnet ved,
at der er tilvejebragt en styreindretning til frakoblingen af fugt- og/eller farvepåføringsvalserne i forhold til pladecylinderen og til frakoblingen af trykdugcylinderen i forhold til modtrykcylinderen på en sådan måde, at trykark som affarvningsark i en tryktilkobling af de pågældende trykanlæg trykkes uden farvetilførsel af farveværket med et farvebillede for et antal, som kan bestemmes på forhånd ud fra trykpåføringens data, hvorved trykkemaskinens pågældende trykanlæg, som har den største tilsmudsningsgrad, bestemmer det totale antal af de nødvendige affarvningsark.

2. Trykkemaskine, især arkoffsettrykkemaskine med et eller flere trykanlæg, som hver omfatter mindst et farveværk med farvepåføringsvalser og mindst en trykpladebærende pladecylinder, hvorved hvert farveværk overfører via farvepåføringsvalserne doseret trykfarve på trykpladen, og hvori endvidere mindst et fugteværk, som indeholder en fugtpåføringsvalse, kan være tilknyttet pladecylinderen, hvorved trykfarven overføres direkte hver for sig fra trykpladen på trykark, som bevæges igennem imellem pladecylinderen og en modtrykscylinder eller overføres via en trykdugcylinder, og hvorved farve- og fugtpåførings-

valserne er indrettet til at kunne kobles til og fra i forhold til pladecylinderen, **kendetegnet ved,**

at der er tilvejebragt en styreindretning til frakoblingen af fugt- og/eller farvepåføringsvalserne i forhold til pladecylinderen og til frakoblingen af trykdugcylinderen i forhold til modtrykcylinderen på en sådan måde, at trykark som affarvningsark i en tryktilkobling af de pågældende trykanlæg trykkes uden farvetilførsel af farveværket med et farvebillede for et antal, som kan bestemmes på forhånd ud fra trykpåføringens data, at der er tilvejebragt et eller flere lakeringsværk med hver en lakpåføringsvalse, som er indrettet til at kunne frakobles en lakformcylinder, og som er anbragt før eller imellem eller efter trykanlæggene, og trykarkene er indrettet til at kunne føres igennem imellem lakformcylinderen og en modtryksvalse til påføringen af en belægning, og at frakoblingen af farve- og/eller fugt- og/eller lakpåføringsvalsen og frakoblingen af trykdugs- og/eller lakformcylinderen i forhold til modtrykcylinderen er således gennemførlig, at affarvningsark er påtrykkelige med et farvebillede i en tryktilkobling for et på forhånd valgbart antal af ark uden farvetilførsel ved hjælp af farvevalserne, og hvorved der endvidere sker en lakpåføring,

hvorved de af trykmaskinens trykanlæg, som har den største tilsmudsningsgrad, bestemmer det totale antal af nødvendige affarvningsark, og

hvorved antallet af aflakeringsark er bestemt ved hjælp af dataene i forhold til rastervalsens skålvolumen, typen af anvendt lak og typen af lakform.

3. Trykkemaskine ifølge krav 2,

kendetegnet ved, at fugt- og/eller farvepåføringsvalsen er frakoblelig fra pladecylinderen ved tryktilkobling imellem plade-, trykdug- og modtrykcylinder, og efterfølgende er trykdugscylinderen frakoblelig fra pladecylinderen og trykdugscylinderen eller først fra placecylinderen og derpå fra modtrykscylinderen, og at efterfølgende lakpåføringsvalsen er frakoblelig fra lakformcylinderen og samtidigt eller forsinket i forhold hertil lakformcylinderen fra modtrykscylinderen.

4. Trykkemaskine ifølge krav 1 til 3,

kendetegnet ved, at styreindretningen er indrettet til at fastlægge et antal af affarvningsark, der skal trykkes med et restfarvebillede før en trykfrakobling af trykanlægget, og

at herved antallet af affarvningsark er således bestemmelige, at efter indtagelsen af trykfrakoblingen har trykdugscylinderens trykdug og hver på en pladecylinder positioneret trykplade en bestemt, fortrinsvis minimal, farverestlagtykkelse.

5. Trykkemaskine ifølge krav 2 eller 3, **kendetegnet ved,** at styreindretningen er indrettet til at fastlægge et antal af aflakeringsark, der skal belægges med et restlaklag før en trykfrakobling af lakeringsværkerne, og at antallet af aflakeringsark er således bestemmelige, at efter trykfrakoblingen har de på lakformcylinderen positionerede lakplader en bestemt fortrinsvis minimal lakrestlagtykkelse.

6. Trykkemaskine ifølge krav 1 til 5, **kendetegnet ved,**

at styreindretningen før en trykfrakobling og/eller under en trykfrakobling automatisk reducerer en produktionshastighed.

7. Trykkemaskine ifølge et eller flere af kravene 1 til 6,

kendetegnet ved, at styreindretningen er indrettet til at fastlægge et antal af affarvningsark, som før en trykfrakobling gennemløber trykværket uden farvetilførsel fra farveværk og konstant aftagende farvepåføring, og/eller

at styreindretningen er indrettet til at fastlægge antallet af aflakeringsark, som før en trykfrakobling gennemløber lakeringsværket med ingen laktilførsel og konstant aftagende lakpåføring.

8. Trykkemaskine ifølge krav 6 til 7, **kendetegnet ved,** at styreindretningen er forbundet med en indretning til bestemmelse af antallet af trykark, som før en trykfrakobling gennemløber trykværket uden farvetilførsel fra farveværket og konstant aftagende farvepåføring, og som har en dataforbindelse med en indretning til forarbejdning af mellemtrinsdata, hvorved mellemtrinsdataene anven-

des til forindstillingen af trykkemaskinen med henblik på doseringsindstillingen af farveværkerne.

9. Trykkemaskine ifølge krav 6 til 8, **kendetegnet ved,**
at styreindretningen er forbundet med en indretning til bestemmelse af antallet af affarvningsark, som før en trykfrakobling gennemløber trykanlægget med ingen farvetilførsel og konstant aftagende farvepåføring, og som har en dataforbindelse til en måleindretning fortrinsvis en inline-massefylde- eller -farvemåleindretning eller en inline-inspektionsindretning med en sensorik til farvemassefyldemåling, til bestemmelse af farvemassefyldeværdier på affarvningsarkene, hvorved antallet af affarvningsark bestemmes og/eller meldes, når måleindretningen bestemmer signalet for en fastlagt minimal farvemassefylde, og/eller
at styreindretningen er forbundet med en indretning til bestemmelse af antallet af aflakeringsark, som før en trykfrakobling gennemløber lakeringsværket med ingen laktilførsel og konstant aftagende lakpåføring, og som har en dataforbindelse med en måleindretning til registrering af laklags-massefyldeværdier på aflakeringsarkene, hvorved antallet af aflakeringsark bestemmes og/eller meldes, når måleindretningen bestemmer signalet for en fastlagt minimal laklagstykkelse.

10. Fremgangsmåde til drivning af en trykkemaskine ifølge et af kravene 1 til 9 med et eller flere trykanlæg, som indeholder mindst farveværk eller farveværk og fugtværk, hvorved trykfarve overføres til en på en pladecylinder fastholdt trykplade via farvepåføringsvalser og fra disse til trykark via en trykdugcylinder, som har en trykdug, hvorved endvidere valgfrit fugtmiddel overføres til en på pladecylinderen fastholdt trykplade via mindst en fugtpåføringsvalse, og hvorved endvidere farvepåføringsvalser og fugtpåføringsvalser er til- og frakoblelige i forhold til pladecylinderen, hvorved et antal af affarvningsark fastlægges ud fra trykpåføringsdata, at en frakobling af farvepåføringsvalsen fra pladecylinderen og en frakobling af trykdugcylinderen i forhold til modtrykcylinderen gennemføres på en sådan måde, at affarvningsarkene under en tryktilkobling af gummidugcylinderen ved frakoblet farvepåføringsvalse trykkes med en restmængde af på trykdugen og trykpladen værende restdugfarve.

11. Fremgangsmåde ifølge krav 10, **kendetegnet ved,**
at antallet af de affarvningsark, som skal trykkes med et restfarvebillede før trykfrakoblingen, fastlægges på en sådan måde, at efter trykfrakoblingen har en eller hver på en pladecylinder placeret trykplade et minimalt fortrinsvis imod nul tenderende restfarvelag.

12. Fremgangsmåde ifølge krav 10 eller 11, **kendetegnet ved,**
at der fastlægges et antal af affarvningsark, som gennemløber trykanlægget imellem to trykpåføringer og en derimellem indskudt trykfrakobling med ingen farvetilførsel fra farveværket.

13. Fremgangsmåde ifølge krav 10 til 12, **kendetegnet ved,**
at i en trykkemaskine med trykværk og mindst et lakeringsværk fastlægges et antal af affarvnings- og/eller aflakeringsark, som før en trykfrakobling gennemløber trykanlægget eller trykanlæggene og lakeringsværket eller lakeringsværkerne uden farvetilførsel fra farveværket og/eller uden laktilførsel fra lakeringsværket.

14. Fremgangsmåde ifølge krav 13, **kendetegnet ved,**
at der fastlægges et antal af aflakeringsark, som gennemløber lakeringsværket eller lakeringsværkerne uden laktilførsel fra lakeringsværket imellem to trykpåføringer og en derimellem indskudt trykfrakobling-

15. Fremgangsmåde ifølge krav 10 til 14, **kendetegnet ved,**
at antallet af affarvnings- og/eller aflakeringsark fastlægges, idet tilsmudsningen af mindst en af trykanlæggenes trykplader eller mindst en af lakeringsværkernes lakplader bestemmes ud fra påføringsdata.

16. Fremgangsmåde ifølge krav 10 til 15, **kendetegnet ved,**
at et fugteværk i et trykanlæg, der skal rengøres, til- eller frakobles under en affarvningsproces for antallet af affarvningsark

17. Fremgangsmåde ifølge krav 16, **kendetegnet ved,**

at et fugteværk i et trykanlæg, der skal rengøres, tilkobles under en affarvningsproces for varigheden af gennemløbet af det bestemte antal af affarvningsark igennem trykanlægget, eller

at et fugteværk i et trykanlæg, der skal rengøres, frakobles under en affarvningsproces for varigheden af gennemløbet af et bestemt antal af affarvningsark igennem trykanlægget.

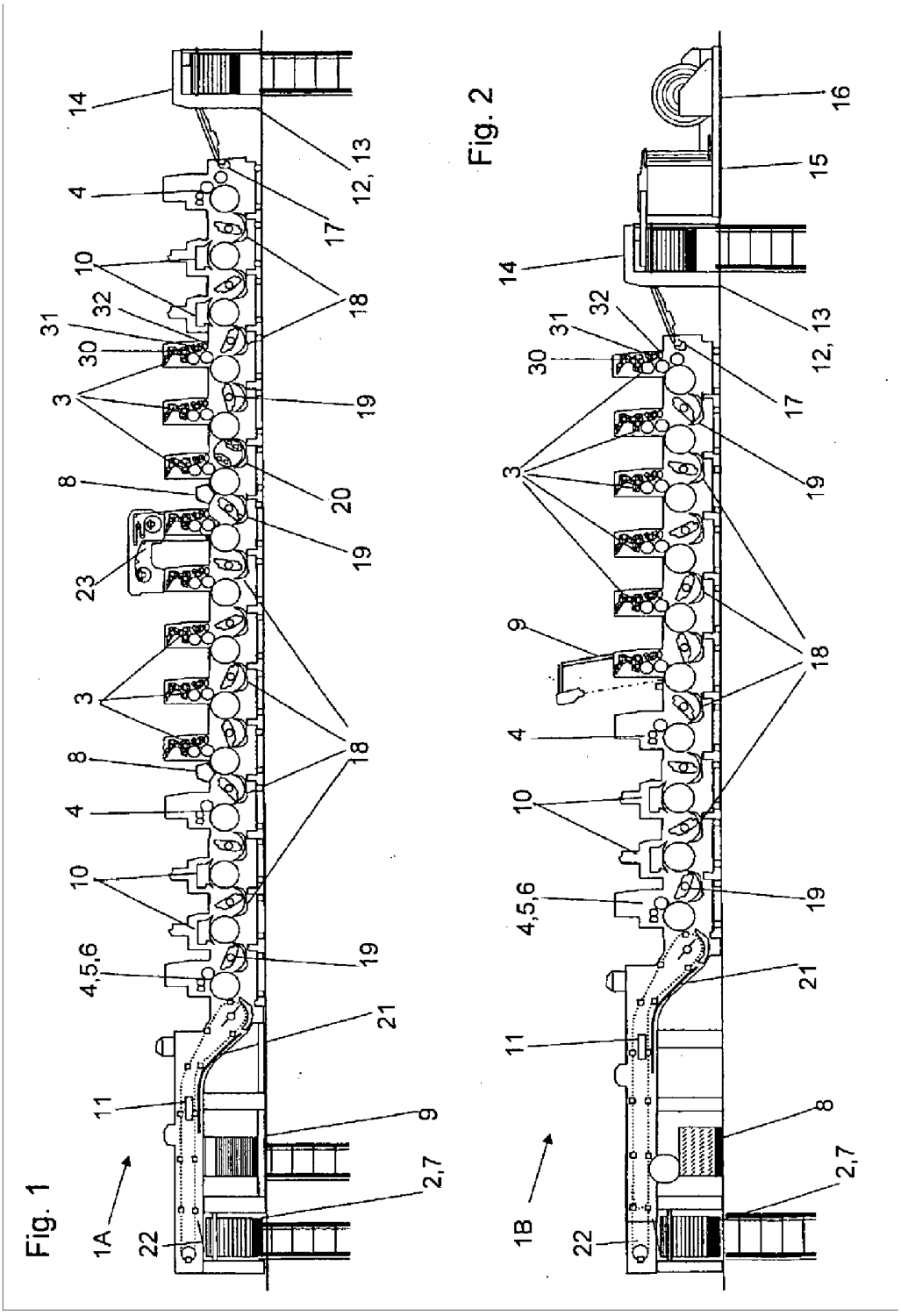
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Fig. 1
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Fig. 2