

manroland

manroland AG

Business Sector
Sheetfed
P. O. Box 10 12 64
63012 Offenbach
Germany

manroland AG

Business Sector
Webfed
86219 Augsburg
Germany
www.manroland.com

Subjects of Print

Issue 1/2008

manroland



manroland EcoLogic Economy through Ecology



Preface



Dear Reader,

Welcome to “Subjects of Print”. In this new series of manroland publications we’re dealing with subjects of particular importance for the printing industry today and tomorrow.

With good reason we’ve devoted the first issue of “Subjects of Print” to the subject of ecology in the pressroom. Everybody involved in the chain of print product manufacture recognizes the growing importance of resource protection, energy efficiency and environment-friendly production. For customers of printing companies, factors of ecology and sustainability are criteria of increasing significance for order placement.

The responsibility we carry in this respect, as one of the globally leading manufacturers of printing systems, is a welcome challenge to us. Conducting business with proper care of the environment is a crucial strategic factor of success for manroland. This sustainability characterizes the sites of our printing press manufacture; and it applies to the resource-protecting operation of the products made by us and used by printers throughout the world. Our credo: ecology and printing must be in harmony with each other.

Which technologies, processes and innovations we use to turn this credo into results – and what you can do for it in your daily work – you’ll find out in this issue of “Subjects of Print”.

I wish you sustainably inspiring and interesting reading.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'M. Rall', written in a cursive style.

Dr. Markus Rall
Member of the Executive Board
manroland AG

Responsibility starts in printing press manufacture

Conducting business with proper care of the environment is a crucial strategic factor of success for manroland. This sustainability characterizes the sites of our printing press manufacture; and it applies to the resource-protecting operation of the products made by us and used by printers throughout the world.

Long-term commitment

A central department for environmental protection was set up in our company as early as 1975. Since 1982, environmental protection has been an integral part of all planning processes at manroland. Environmental protection is part of the company's organization, and various guidelines deal with environmentally correct handling of production equipment and the waste produced.

Environmental protection at manroland widely recognized

The company's measures for environmental protection have earned it a number of official recognitions, including a medal for "Special Services to the Protection of the Environment", the "1989/90 Environmental Protection for the Industry Award", and a prize for "Environment-Oriented Business Management".

The high recognition accorded the environment protection activities at manroland is signified by the company's admission into the "Hessian Environment Alliance".

Decisive for this above all else were the step-wise introduction of an environmental management system and the reduction of drinking

water consumption by 75,000 cubic meters within three years. The members of the "Hessian Environment Alliance" commit themselves not only to observing the legal environmental regulations but also to additional voluntary actions aimed at improving the environmental situation.

In recent years, several million euros have been invested in the manroland production sites at Offenbach and Mainhausen, earmarked to realize energy-saving measures and minimize waste production. Now the measures are paying off in the central heating facility and the compressor station of the main factory.

Growing sales at lower energy consumption

The Minister for the Environment had called it a "great performance": the fact that it had been possible for manroland to strongly reduce energy consumption despite growing sales and therefore higher productivity. Since 2001, the company's energy consumption decreased by 30 % (from 60,000 to 47,300 MWh), similarly its consumption of natural gas (38 %) and water (32 %). Figures that are confirmation of achievement and motivation for continuing with the same energy advancing the company's environmental commitment. For these achievements, the Hessian Environment Minister awarded to manroland, in 2007, the "Glanzlicht" (highlight) honor of the Hessian Environmental Alliance. The award confirmed manroland in its ambitious environmental policy. Immission control, waste avoidance and disposal, handling water-polluting substances, handling hazardous substances, working safety, health

protection, fire protection and emergency regulations: all this requires investments that increase costs in the short term but will in the long run have cost-saving and environmentally positive effects, which is what matters.

Environmental protection at manroland starts in printing press manufacture. manroland thus proves its environmental responsibility from production of its printing presses to their use. How manroland printing presses can be operated in environment-compatible ways is shown in the following chapters.

By: Felix Ehardt, SelectSystems
E-mail: felix.ehardt@manroland.com



Ecobalance for the offset printer

Human activity and the resulting products always somehow affect the environment. How and how strongly they affect the environment is a question that poses itself in connection with every production process – also in the production of printed products.

Though the ecobalance of a printed product is not a central concern of the printing industry, it gains more importance, especially in view of the rising prices of energy, the constantly increasing shortage of resources and the discussions centered around the the global climate change. The destruction of the natural environment is a problem that has established itself in the consciousness of the society. Therefore, many printing companies make an effort – through the consistent implementation of ecological production methods in excess of the minimum legal requirements – to provide evidence of their social responsibility.

In the following chapters, manroland describes its pioneering endeavours from the aspect of numerous ecologically sustainable technologies, the relevant material flows within the printing companies as well as the

corresponding flows of energy. At the same time, manroland offers ways and solutions to a resource-efficient, ecologically sensible, while also economical printing production.

Most important factors and potential affecting the climatic change

Printing production is always a direct and indirect source of “greenhouse” relevant pollutants. The most important originators of such emissions – the consumers of electrical energy – are continuously monitored, measured and evaluated. Some basic theoretical knowledge, which is explained below, is however necessary to understand the evaluation.

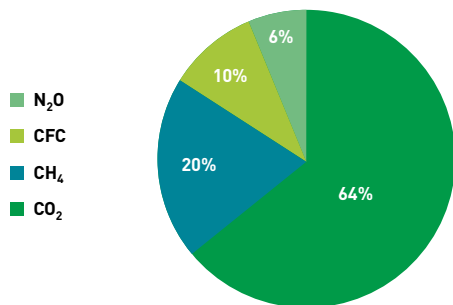
The 1997 Kyoto protocol to the convention on climate specifies six pollutants as the most important greenhouse gases (see table below).

Gases such as carbon dioxide (CO₂) cannot be measured as emissions but have to be mathematically calculated on the basis of their chemical conversion. The effect the different greenhouse gases have on the environment varies widely: CO₂ has generally a small effect on the environment but, due to

its huge volume, it is one of the most dangerous factors damaging the climate. A standardization system such as the Global Warming Potential (GWP) allows us to compare the effect of the different greenhouse gases on the environment. Carbon dioxide, expressed in CO₂e, is taken as the reference value for the mathematical calculation, whereby the “e” stands for “equivalent”.

The e-value describes the warming effect of a CO₂-particle over a defined period of time, as a rule 100 years. This heating effect is set at 1: according to this, a methane particle has a 21 times stronger effect and the heating effect of an CFC particle is as much as 6,500 times stronger than CO₂. The emission volumes of the different greenhouse gases differ markedly from each other so that the greenhouse potential (CO₂e) is not equal to the effective share of the global warming. The figure on the next page offers a clear picture of the quantitative proportions.

Substance	Chem. formula	Generated (e.g.) by	GWP (basis 100 years)
Carbon dioxide	CO ₂	Combustion of fossil fuels	1
Methane	CH ₄	Cattle breeding, waste dumps, wet rice cultivation	21
Nitrous oxides	N ₂ o	Nitrogen, waste dumps	310
Perfluorocarbons	PFC/FKW	Aluminum production	6,500
Hydrofluorocarbons	H-FKW/HFC	Refrigerant in refrigeration plants, chemical industry propellant gas in high-voltage switchgear	11,700
Sulfur hexafluoride	SF ₆	Insulating gas in high-voltage switchgear	23,900



Ecobalance encompasses the process, the product and the company's environment

In the ecobalance all the material and energy flows, as well as all the related environmental effects that occur within and outside the enterprise, are systematically recorded and evaluated. An enterprise ecobalance records all the input flows (for example raw materials, auxiliary and operating supply materials, external services, energy) and all output flows (products, services, waste, pollutants, noise and emissions) of an enterprise over a previously defined period of time.

Material and energy flows in sheetfed offset printing

All the material and energy flows occurring in a typical sheetfed offset printing production process, which further more cause corresponding greenhouse gases and consume natural resources, are determined and numbered below.

The environmental effects of the printing process are, on the one hand, caused by the consumption of electrical energy, which is necessary to drive the press and the aggregates; on the other hand, by raw materials and preliminary products used in produc-

tion. These include especially the printing substrate, the printing ink and forme, the blanket, dry powder, dampening solutions and washing and cleaning agents. The figure on the next page illustrates the material and energy flows in the offset printing.

The different energy and material flow factors as well as technological solutions offered by manroland are described in the text below. The second part of the booklet draws up a balance of these flows and parameters on the basis of a concrete example with genuine values.

“Emission Certificate”

With the ecological “Emission Certificate” validation of the Berufsgenossenschaft Druck und Papierverarbeitung (BGDP, Institution for statutory accident insurance and prevention in the printing and paper processing industry) for construction series ROLAND 200, ROLAND 500, ROLAND 700 DirectDrive and ROLAND 900, manroland proves that a high degree of emission reduction and thus ecological operation of these sheetfed presses is possible. The presses operate well below the legal limit values or recommendations set by EU directive for emissions from dampening water (IPA), washing agents, ink mist, varnish, powder and noise. Investment aids provided by the state via environment programs, especially support machines bearing the “Emission Certificate” seal.

A. Energy flows in the printing process

The energy consumption of manroland is determined by the specific output of the machine drive, the drying and air supply aggregates, and by the tempering of the inking and dampening units.

Machine drive technology with constant printing quality

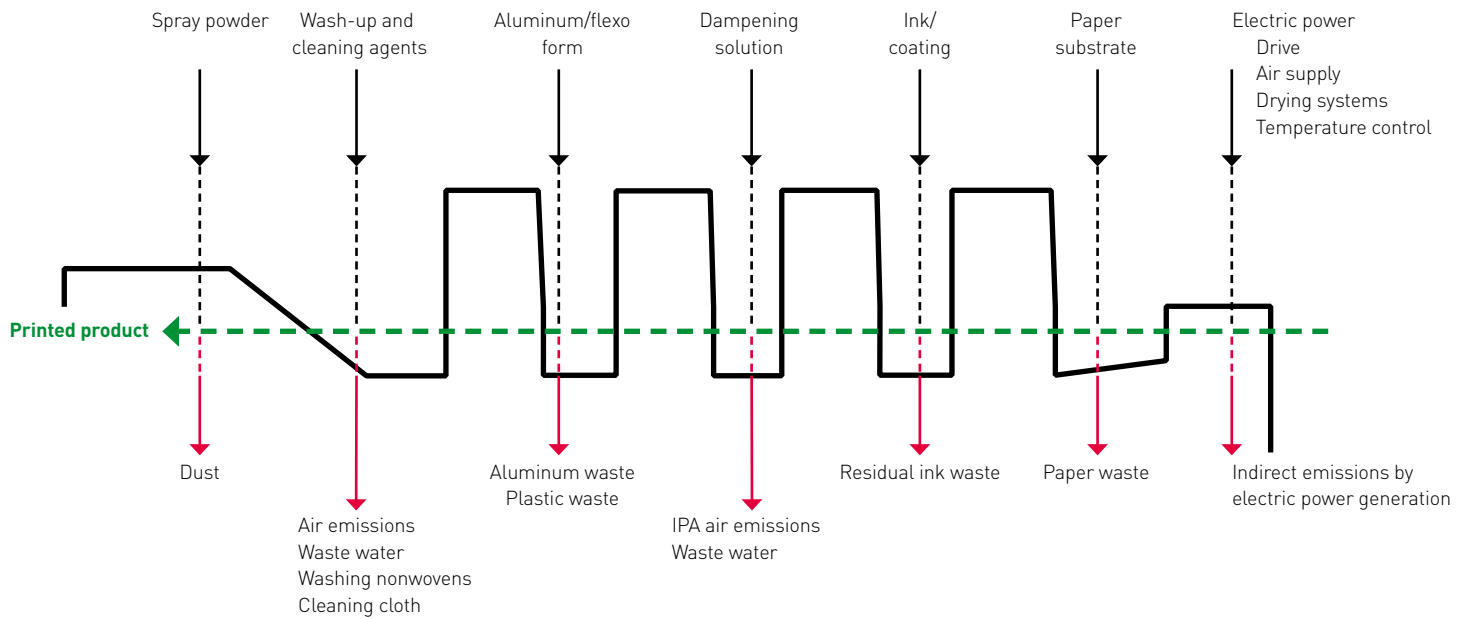
manroland drive technology via gear train and longitudinal shaft allows a constant register and a minimized waste rate, which as well makes ecological sense. The strength of the drive mechanism manifests itself in form of a constant printing quality, especially at changing press speeds.

Brushless DC drive with variable speed

The actual electrical drive is a variable DC drive. The DC drive features the following positive properties:

- High energy conversion efficiency (high level of utilization of the applied energy and a low loss of current in the conversion of energy into heat)
- Very high rev range
- High concentricity also at low revolutions
- Excellent rev accuracy
- Exact torque control possibility
- High start-up torque

The disadvantage of conventional DC drives so far was the need of regular service of the brush apparatus. With the brushless manroland drives this has become unnecessary. The brushless drives feature an efficiency factor that is up to 7 % higher than with conventional devices.



Flows of material and energy in sheetfed offset process.

An asynchronous AC motor (DA main drive) for highest energy efficiency, is available for the ROLAND 200 and ROLAND 500 press series. The features of this motor are:

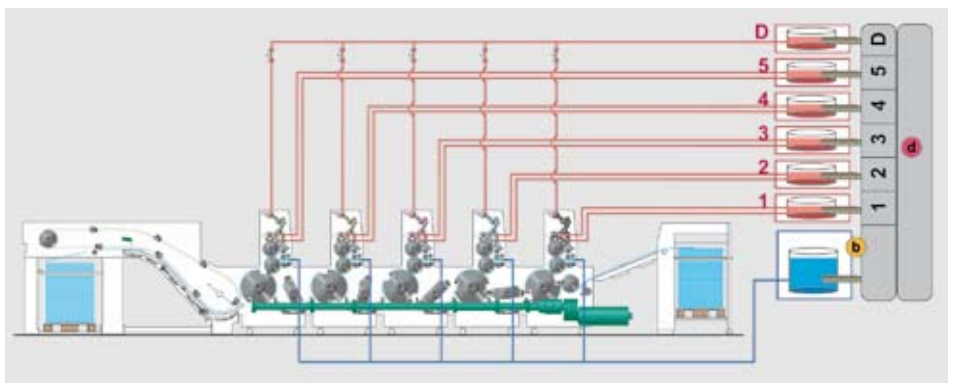
- Energy efficiency through a high efficiency factor
- Robust and compact design
- High torque accuracy
- Excellent concentricity properties

Ink unit temperature control offers a high level of process stability

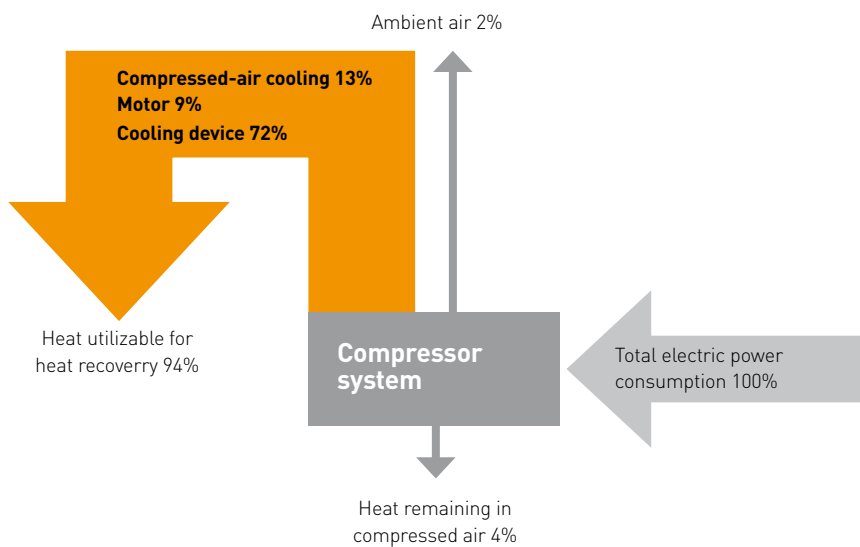
The use of an ink unit temperature control system offers a high level of stability of the printing process: the system makes ecological sense because the higher process stability reduces the waste rate. Alcohol-free or alcohol-reduced production requires ink unit temperature control, which also leads to a reduction

of greenhouse related emissions. Therefore, over 75 % of the manroland printing press clients have upgraded their systems with ink unit temperature control SelectInktempSystem. Although this system increases the energy

demand, the energy consumption depends on the given press condition.



Ink unit temperature control system.



Dampening solution cooling as a condition for a stable printing process

A stable production process requires an almost constant dampening solution temperature and minimal evaporation of isopropanol from the dampening solution circulation. Dampening solution filtration allows for a dampening solution interval of up to twelve months: this option drastically reduces the volume of dampening solution that needs to be disposed of. The combination device for the cooling of the dampening solution and inking unit temperature control **SelectCombiCenter eco**, offers both an ecologically and economically reasonable variant: performance controlled components reduce considerably the energy consumption of the cooling device and cooling water pump. Externally controlled temperature (open air cooling) is an interesting option: this allows to control the inking units in moderate climatic zones over 70 % of the year without any additional refrigeration device.

Dampening solution cooling in combination with ink unit temperature control

A combination device integrates both, the ink unit temperature control system and the dampening solution cooling, in one device. The combination of the sources of heat makes efficient management of waste heat easier. A single cooling device can thus control the functions of the **SelectInktempSystem** and **SelectDampeningSystem**. The inflowing currents control and meter a number of regulation and measuring instruments. They measure, record and supply key figures for the consumption of materials. This sophisticated measuring technology ensures constant process stability.

Disengageable inking units are more economical

Sometimes it is unnecessary to use all printing units at the same time: in this case disengageable inking units reduce energy consumption and the wear of the rubber rollers. The cleaning effort and consumption of resources is reduced by not using compressed oil for roller lubrication.

Air supply systems for trouble-free press operation

Compressed and blast air are crucial energy consumers when it comes to trouble-free operation of the printing press. For every production operation it is necessary to choose the ecologically and economically most appropriate variant.

Screw-type compressors for the generation of compressed air

The selection of a suitable compressor type should depend on the number of printing units and equipment variants: manroland favors the modern **SelectCompressor** of the screw-type compressor design. Low compressor revolutions lead to a higher specific power, longer service life and longer maintenance intervals at the same time. The excellent encapsulation of the compressors reduces the noise level within the pressroom considerably. The relation between the efficiency factor and waste heat recovery is important for ecological reasons: the waste heat generated by the compressed air can be recovered and used, for example, for heating the pressroom and for the heating of warm water. Waste heat recovery increases the efficiency factor of the aggregate greatly.

Central air supply systems used when operating several presses can be ecologically and economically profitable. Very long supply lines, however can cause leaks and loss of pressure and thus reduce the efficiency of the system.

Blowers with and without an appropriate control system

There are blowers for suction air and blast air consumers with and without appropriate control systems: ecologically and economically sensible solutions, however, are only those solution that use devices with demand controlled control, since they always produce only so much blast air or suction air as the given printing production step requires. Frequency modulated blowers of the blast station (**SelectAirStation**) provide each consumer with just the amount of air that is necessary for the given work operation. The number of revolutions of the frequency modulated motors is conveniently set by the operator at the central control console; the air requirement changes the performance output of the blowers. Waste heat recovery is especially ecologically sensible, if the blowers are centrally located in a noise-reduced cabinet.

As opposed to that, blower aggregates with side-channel or rotation-slide compressors do not function in keeping with the actual need of the given process; in this case the compressors work in the maximum range of power consumption. Such individual devices release the unused energy in form of waste air and waste heat into the ambient surroundings; furthermore, their decentralized location makes waste heat recovery more

difficult. Blowers with a control system that is tuned to the needs of the process are the economically and ecologically more sensible alternative over the whole life cycle of the system.

Environmentally friendly waste heat concept

Many powerful aggregates, such as the dampening solution cooling devices, ink unit temperature control systems, air supply devices, drying systems and motor cooling systems, allow for a smoothly running production and high productivity. At the same time, constant high quality production requires also a pressroom climate with a stable air temperature and relative air humidity. The heat of the air-cooled aggregates heats up the pressroom and thus worsens the ambient conditions. Ventilation and air conditioning installations prevent the increase of temperature in the pressroom. However, this is connected with an increased consumption of energy and higher costs of operation.

Heat removal using an ecologically harmless water-glycol mixture offers a good alternative. The specific heat capacity of water is four times higher than air and its density is also much higher. A system consisting of tubes of a small diameter can remove up to 50% of the total waste heat from the pressroom.

An external cooler, functioning as a heat exchanger that transports the heat via the water-glycol mixture and ventilators outside. This function principle is known as "free cooling", since only the outside air is used for the cooling of the cooling medium. At high temperatures of over 40 °C, additional adia-

batic cooling caused by the evaporation of water via a spray system may be considered. Furthermore, optional waste heat recovery used for the heating of buildings in the winter or for heating warm water, depending on the clients' priorities, is possible. Compared to air cooled aggregates, this system does not require a supply of air into the pressroom and consequently also no temperature control and supplied air moistening. Moreover, a water cooled aggregate does not cause the air to move, which raises dust and powder and is generally unpleasant for the operators. Compared to air cooled aggregates, the much lower operation costs represent a great advantage because no permanent air change is necessary. There are no costs of electricity for ventilators, for the heating of the outside air in winter and for air moistening. In this way it is possible to reduce energy costs and protect the environment while maintaining the high quality and productivity.

Choosing ink drying aggregates according to need

In the ink drying process of offset printing there is a difference between pure IR systems (**SelectDryer IR**), IR-/thermo-air dryers (**SelectDryer IR/TL**) and UV-curing systems (**SelectDryer UV**). The deployment of the different drying aggregates depends on application and need.

IR ink drying systems with pile temperature control (ASR)

Infrared dryers (SelectDryer IR) are deployed for accelerated ink drying. From an ecological point of view, however, before using these devices, one should determine whether it is possible to save energy in a different way, by using fast drying or fast absorbing printing inks. The IR drying method can be useful if such ink systems cannot be used or if the finishing processes take place immediately after printing. The selected heat input for the pile temperature, though, must not be too high because the ink layer softened by the heat poses the danger of the ink being set off in the pile. Therefore using the IR radiator in combination with pile temperature control is ecologically and economically sensible.

Employment of an IR /hot-air dryer with infinitely variable output regulation (ASR)

Infrared/hot-air dryer (SelectDryer IR/TL) is used for the drying of water-based coating: in this process the water is removed from the coating by means of heat and evaporation. Soft and even drying is achieved by an alternating arrangement of IR and hot-air elements. Besides the connecting power for the dryer, it is also necessary to consider the exhaust air because the drying process is efficient only with massive air exchange. For this purpose the system contains infinitely adjustable output control with automatic pile temperature regulation (ASR), however, the following applies: use only as much power as necessary! The reuse of heated air via the waste air supply into the drying circuit further increases the efficiency factor.

UV-curing systems for dramatic waste reduction

SelectDryer UV curing systems are used for the polymerisation of UV-curable inks or coating layers. Only about 28 to 30 % of the employed energy is converted to effective radiation energy; the rest is emitted in form of visible light or heat radiation or is lost otherwise. With UV drying the ink or coating layer is cured almost instantaneously following the effect of the radiation. As opposed to printing with conventional systems, with UV drying of non-absorbing substrates, or substrates that are difficult to print for other reasons, it is necessary to consider ecologically significant waste reduction. Ozone, which is a possible by-product generated during UV curing, must be completely extracted.

Electronic power supply units (PSU)

The power supply units of UV systems feature two different systems. On the one hand the systems with transformers, which are currently mostly employed, and, on the other hand, electronic power supply units (PSU). An electronic power supply unit consists of a "conventional"



stray field transformer and a "digital" frequency converter. The transformers are used to build up of ignition voltage and for the subsequent operation of the UV radiator. As opposed to the simple design of the transformer-type systems, PSUs comprise different electronic components and offer decisive advantages:

- Ca. 5 – 10 % higher UV performance
- Standby output can be lower
- Possibility to synchronize the UV radiator
- Even load on the current mains
- The operation of doped radiators is possible
- Compact design
- Energy saving of up to 5 %

B. Material flows in the process of printing

Printing substrate accounts for the main share in production

The printing substrate is naturally the main material flow in printing production. From the ecological point of view, paper and board have an advantage because they are made of renewable primary products and their recycling rate is higher.

"PaperProfiles" contain ecological parameters

Even so, paper and board in printing production represent a 70 to 80 % contribution to the overall emission of CO₂: the high value stems from the production and transport energy required for production. The production of the paper alone does not generate any process-related greenhouse emissions; these are generated indirectly by the amount of electrical energy needed to drive the paper producing machine and for the production necessary auxiliary aggregates. The method of energy production is decisive for the



amount of emitted CO₂. If nuclear energy or regenerative energy sources are used, a relatively small amount of greenhouse gases is produced in contrast to the amount generated when fossil fuels are burnt.

Manufacturers of paper therefore publish the so-called “PaperProfile” with ecologically important parameters, whereby the given conditions of the different production locations are considered.

Waste reduction in the focus of manroland

Paper is produced in a sophisticated process that uses valuable raw materials and a lot of energy. Fiber production and the production of energy contaminate watercourses and cause air emissions. As a printed product, paper is the component responsible for the greatest part of ecological damage. Waste reduction is thus the most important contribution the printing process in printing companies can make to environment protection, since paper, as regards its volume, is the most frequently used raw material. High waste rates cause high hidden costs because

paper must be stored and processed, operations that proportionally increase production costs. A low level of waste spares the natural resources and reduces costs.

This is why the reduction of waste represents the biggest contribution to CO₂ reduction in printing production. It contributes to the reduction of CO₂ emissions by reducing the share of unprofitable used amounts of substrate. This is why waste reduction has been in the focus of manroland in recent years, because the appropriate options considerably improve the ecological and economical balance of printing production. These options include different QuickChange options, such as improved sheet control or color management: computer controlled ink slide presetting of the QuickChange Color is designed to consider empirical values in a self-learning process thus reaching required ink density values even faster.

The throw-on sequence of the ink forme roller of a QuickChange Color inking unit pre-

vents production stops and the typical over- and undershooting of the ink profile when resuming production. The QuickChange Air technology helps to save the air settings and QuickStart the start-up of the presses at production speed. The ColorPilot color control system is responsible for efficient color control and the ROLAND InlineInspector detects early in the printing process waste sheets that can be automatically sorted out by the ROLAND InlineSorter. All these developments made by manroland contribute to the reduction of unnecessary waste.

Ecological appraisal of printing inks and varnishes – conventional printing inks and printing ink containers

Conventional sheetfed offset printing inks dry chemically via oxidation and physically by absorption of printing ink components by the substrate. They are not affected by the VOC guideline since they contain oils with a high boiling point as a binding agent. From the environmental point of view, vegetable-based printing inks are to be preferred since living plants absorb CO₂ from the atmosphere. The packaging of printing inks, also, is ecologically significant. Perfectly clean tinplate containers can be recycled but tins with ink residue must be treated as special waste.

Ink cartridge systems are more ecological

SelectInkSupply ink cartridge systems prevent excessive ink residue and always meter just the necessary amount of printing ink into the ink fountain. The process is consequently more constant, since the hydrodynamic pressure in the ink gap is maintained at a constant

level due to the even level of the available ink: less waste owing to reduced ink fluctuations follows. The lower filling level also reduces the consumption of the washing solution.

Furthermore, the easy to clean polymer surface of the manroland QuickChange Surface ink fountain also reduces the quantity of required washing solution and cleaning rags.

UV printing inks require special handling

UV printing inks do not contain any volatile substances yet, during application, special safety handling instructions must be observed. UV printing inks are cured by the effect of UV radiation and form a hard ink film relatively spontaneously. The reaction requires so-called polymer starters or photoinitiators: If the curing is not correct these and other substances may migrate the packaged goods.

Ink mist extraction reduces waste

Ink mist in form of aerosols, which is dangerous to health if inhaled, may be formed at high production output within the inking unit. A combination of ink mist extraction and ink roller setting reduces this danger and, at the same time, improves the process stability: the ink-water balance becomes stable,

the production time window increases and the waste rate falls.

Ecological solutions for manroland coating processes

Dispersion varnish dries physically via water removal: the surface becomes very quickly dry and non-adhesive. The standardized protection against damage to a packaging surface by coating keeps the valuable resources free of premature wear.

Different equipment variants of manroland reduce the quantity of coating waste and spare resources. So, for example, manroland **SelectCoatingSystem** with only about 1.5 liters requires a very small circulation volume for operation. In this connection, the reduced “dead volume” lowers the potential waste by not being available for the actual job but being present only to keep the transporting system running.

The **SelectCoatingSupply** hose pumps, the transporting direction of which can be reversed, are self-suction systems designed safely so that they cannot run dry. The reversibility enables the hose pumps to pump dry and transport the fluid in both directions before

washing: in this way the mixing of coating with the washing solution is avoided. Expensive coating can thus be returned to production and valuable resources are spared.

IPA-containing dampening solution represents an important factor in the ecobalance

Isopropanol (IPA) in the dampening solution has a big effect on greenhouse emissions. At usual operation temperatures IPA has a low boiling point and evaporates from open systems. Due to the high volatility of IPS it is classified as a highly volatile organic compound (VOC) and is thus subject to regulations that apply to solvents.

manroland presses offer a number of practically tested options for IPA-free and IPA-reduced production. The significance of this aspect for the ecobalance is described in detail in the next section “Isopropanol reduction in print”.

Ecological advantages of recyclable aluminium printing plates in offset printing

Aluminium printing plates are the main printing form in offset print. However, their production requires a lot of energy which may be reduced by a factor of eight if the plates are recycled (rather than newly produced) which is possible without prior preparation. Due to this, aluminium plates pose an ecological advantage over other printing technologies: in flexo printing, for example, it is not possible to reuse a printing forme. The recycling of printing plates is nowadays a standard procedure in offset printing companies. Yet, when extracting bauxite for the



production of aluminium, red sludge, which is an environmentally harmful “by-product” of the extraction process, is also produced: this alkaline sludge is bad for the environment and therefore must be deposited in dumps. With modern CTP-plate exposure devices, printing plate production became even more environment-friendly. In contrast to conventional plate exposure, it is not necessary anymore to use film contact copies the development of which required chemical developers. State-of-the-art plate systems do not need developers, they are developed within the printing press. As regards plate production, offset printing is also economically and ecologically more advantageous than flexo printing: flexo printing plates need to be exposed, washed and dried and that is connected with higher energy and material consumption.

Blankets with a long service life spare the environment

Blanket production with the use of solvents is a very energy-intensive process – rubber mixtures are kneaded, dissolved and coated, calendered and finally the blanket must be grinded. If appropriate recycling systems are used, it is possible to maintain a large part of the solvents needed for blanket production. The effect of the blanket on the eco-balance therefore largely depends on its production as well as the quality and composition of the used printing substrates. However, most blankets become prematurely damaged and must be exchanged, and thus do not reach the end of their nominal service life, which again implies increased energy consumption for the production of new blankets. An efficient sensor system featured by manroland presses – for example the double sheet detection – reduces blanket damage to the minimum, prolongs its service life and spares the environment.

Washing and cleaning agents as a contribution to eco-efficiency

Ink-guiding parts of the press can be cleaned only by certain washing agents that are especially released for this purpose: their high flashing point of over 55 °C results in a relatively low level of evaporation and helps to reduce the share of greenhouse emissions. Furthermore, optimized washing programs cut the quantity of the used washing agent which in turn improves the eco-efficiency.

Avoiding the use of washing agents with modern ink change technology

The aim of all efforts though, is avoiding the use of washing agents altogether: the frequent change of special inks is avoided by the use of special printing ink systems such as the patented printing ink and screen technology FMsix®. One of its key functions is the basic rule of color structure with the CMYK scale and three special colors consisting of FMsix®-Orange, FMsix®-Blue and FMsix®-Green, which are available worldwide and which can be used to print all subjects. These inks are available as standard inks and as UV inks for all types of offset printing. Shorter makeready times make the system more economical, since ink change processes are eliminated during a subject change.

Ecologically sustainable production requires also efficient employment of washing agents: because the better the washing agent is adjusted to a given ink type, the faster and more efficiently it washes it. The fact is, that especially in alternating operation between conventional and UV printing



inks, many companies simply use combined washing agents which represent just a compromise solution. These have negative ecological consequences – long washing times and large quantities of washing agent.

Optional alternating washing agent operation on manroland presses

Therefore manroland presses optionally offer an operation with alternating washing agents which allows for a choice between two different washing substances. This system can be directly attached to the press without additional makeready or conversion times and without a loss of washing agent. It is even possible to wash individual printing units with different washing agents. Moreover, there is a separate supply and drain line for each of the appropriate transport systems. The washing procedure thus becomes ecologically efficient as the optimal washing agent simply always reaches the wash-up device.

Special cleaning agents for washing from dark to light

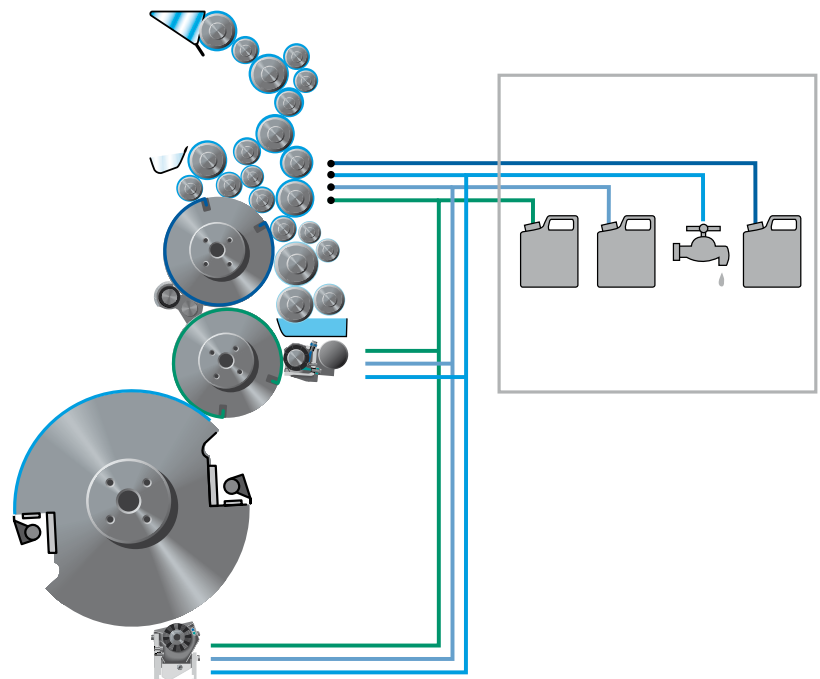
As a rule large quantities of washing agent are required when washing the inking unit that used a dark printing ink and now light ink is to be used. Therefore many users start several ecologically less sensible washing runs so as to prevent the dark ink residue from corrupting a light printing ink. Special cleaning agents can reduce the time of these washing procedures and offer the possibility of an intensive and thorough wash of the rollers. manroland press users can press a button on the central control system to start such an optionally available supply system

that uses a special alkaline washing agent for in-depth cleansing. This option minimizes the number of required washing runs and, at the same time, is highly economical owing to the reduced makeready time.

The ecological aspects of blanket and brush washing devices

manroland presses offer alternately two **SelectCleaning** washing systems for rubber blanket washing: the brush washing system and the blanket washing system. Both systems provide excellent washing results and are ecologically of equal value, although the amount of washing agent per washing run differs. The **SelectCleaning** blanket washing

device requires 10 to 30 ml per washing cycle, the brush washing device 50 to 85 ml (ROLAND 700). The disadvantage of the blanket washing device with a lower consumption is that the washing agent in the blanket release vapor into the pressroom atmosphere and the blanket must be disposed of. The **SelectCleaning** brush washing device with the higher washing agent consumption is ecologically equalized by the smaller amount of vapors contaminating the ambient atmosphere.



C. Output flows in the printing process

Significant output flows:

- Printed product
- Waste
- Ink residue
- IPA air emissions
- Waste water
- Aluminium waste
- Dust
- Washing fleece material
- Cleaning rags
- Noise
- Indirect emissions through the production of electricity

The printed product in form of a newspaper, magazine, book or packaging are the main outputs of a printing company. Printed matter is either a part of our culture or protect products against perishing or damage and circulate over a longer period of time.

Ecological recycling of printed products

The question of ecology is usually posed only at the end of the life cycle of a product: the recycling of printed products is often very well organized. In many countries recycling is not only important for substrate production but, in the meantime, it has become an independent branch of industry others depend on. In particular the separation of paper and glass waste has become quite usual in many European countries. The recycling rate of these products is very high: in Germany over 80 % for paper, whereby paper can be recycled up to five times. Much of the packaging and board materials consist of 90 % recycled paper. The European recycling rate for plastic waste is on the other hand much lower: a part of the plastic waste is burnt and used to generate energy. However, in this way it is not possible to recover all the energy used in the initial production process.

The clear advantage of paper in the recycling circuit

Many countries of the world do not have a well established recycling circuit where plastic waste is partly upgraded and reused which is very common in Germany; this is where paper displays its genuine ecological advantages. Paper very quickly decays in nature very quickly whereas the disintegration of plastic packaging takes very long.

The de-inking of old paper to a white substrate

When converting recycled paper to a white substrate, it is first necessary to remove the printing ink from the paper, a process known as “de-inking”. The printing ink is removed in a floating procedure, where the paper is mixed with water, the contaminants are mechanically removed and, eventually, chemicals that displace the printing ink are added to the paper pulp. Chlorine-based or – ecologically preferable chlorine-free – bleaching is used.

Offset printing inks are very well suited for de-inking

Offset printing inks can be very well removed from paper pulp since the hydrophilic paper fibre and the hydrophobic printing ink enhance the separation process. The separation of substrate printed in the flexo printing or ink-jet process is much more difficult or even impossible because these inks are not water repellent: This results in an unacceptable whiteness. The downgrading level of recycled offset printed products is much lower compared to flexo printing.



Ecological circuit of other waste from printing companies and waste reduction

In principle waste should be recycled and reused, since many of the products used in printing plants represent valuable raw materials. These include, beside the printing substrate, also aluminium printing plates, ink cartridges and tins. Of course, waste reduction is the most ecological approach: this is where manroland waste reduction solutions offer an important contribution to an improved ecobalance.

By: Vincent Krafft, SelectSystems

E-mail: vincent.krafft@manroland.com

Matthias Rapp, SelectSystems

E-mail: matthias.rapp@manroland.com

Thomas Walther, New Technology

E-mail: thomas.walther@manroland.com

The environmental impact of isopropyl alcohol

Isopropyl alcohol (IPA) is a volatile solvent that is used as a dampening solution additive in print shops. At first glance IPA shows a number of very positive properties for the printer:

1. The viscosity of the dampening solution is increased by the addition of IPA and solution transport over the rollers of the dampening unit is facilitated.
2. In particular the dynamic surface tension of the dampening solution is reduced by addition of IPA and a uniform dampening solution film forms rapidly on the printing plate.
3. The volatile IPA evaporates very rapidly and in this way contributes to the cooling of the printing unit.
4. The emulsifying behavior of the inks is improved by the addition of IPA to the dampening solution. A stable ink/water balance is formed rapidly.
5. IPA counteracts the formation of microorganisms in the dampening solution.

Nevertheless, is isopropyl alcohol more a curse than a blessing?

As dampening solution additive IPA possesses a bundle of positive properties, which make the life of the user easier. However, in spite of the range of positive properties IPA appears to possess at first glance, its use is being widely discussed and criticized. Complex dampening solution additives for the replacement of IPA have been developed and are coming into use to an increasing extent.

The reason for this is the relevance of IPA for the environment. Like all volatile organic compounds and together with nitrogen

oxides IPA contributes to the formation of ozone close to the ground. Although its effect is small in comparison to that with carbon dioxide and methane, IPA also contributes to the greenhouse effect. In addition IPA is a burden on the health of printing company employees.

Isopropyl alcohol:

Degreasing of skin (dermatitis) with skin contact possible. If a person swallows IPA and then vomits, aspiration of the IPA into the lungs can result and this can lead to chemical pneumonia or asphyxia. IPA causes retardation of the central nervous system. Swallowing it can cause intoxication and unconsciousness. Contact eczema. The following symptoms can occur: headaches, dizziness, nausea, narcosis, dry skin. IPA vapors cause irritation of the eyes and respiratory tracts, headaches, dizziness and disruptions of the central nervous system. Skin: slight poisonous effect; frequent or extended contact with the skin can cause this to lose its grease and run dry which can lead to discomfort of the skin and inflammation of the skin (dermatitis). Irritation and damaging of the tissue of the eye takes place if the substance is not removed immediately. If even the very smallest quantities get into the lungs, which can happen if the product is swallowed and vomiting then takes place, pulmonary oedema or pneumonia can come about.

[Source: Ökopol database]



Highly flammable



Irritant

The legal framework conditions require that printing is carried out with no or only a low amount of IPA. The legal instruments used to enforce this requirement range from a complete prohibition on the use of IPA as, for example, in California to incentive taxes with which the tax loading of the IPA is increased in stages. Within the framework of the environmental discussion, further restrictions are to be expected.

To an ever increasing extent end customers are attaching value to printing production methods which only pollute the environment to a low extent. By dispensing with or reducing its use of IPA, a print shop can offer proof of its ecological commitment and frequently secure for itself in this way the order being tendered for.

In addition, when print shops are investing in new presses, a decision in favor of environment-friendly operations are being rewarded to an increasing extent with grants which are already being made available by a state's own promotional programs.

Accordingly there are many good reasons for carrying out printing with only a low amount of IPA or none at all. A large number of print shops printing with manroland presses have been proving day after day for more than ten years that stable and economic production is possible with low or zero inputs of IPA.

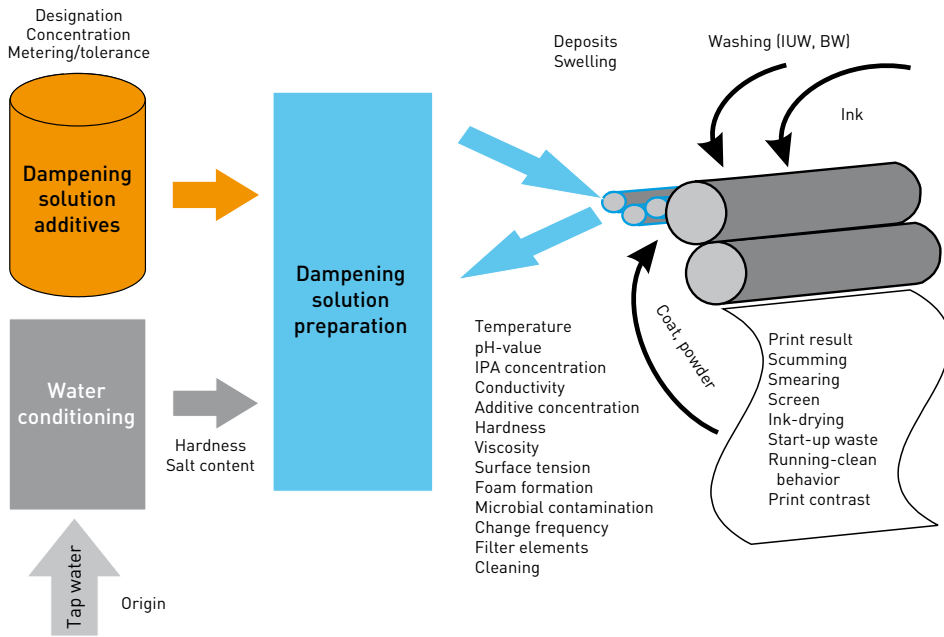


Fig.: The composition of the dampening solution is of great importance for the complex printing process.

Cost aspects

An all-inclusive figure cannot be put on the costs for the consumption of IPA by reason of all the different press configurations, quantities of additive added and legal framework conditions. Nevertheless it can be roughly estimated that the owner of a medium-sized print shop with medium-format presses will save a five-figure sum in Euro when dispensing with the use of IPA. Special additive units and special roller types necessitate higher investment but this can very rapidly be redeemed through the IPA cost savings. At the same time expenditure for the storage of solvents can be reduced.

manroland offers comprehensive solutions for IPA-free and IPA reduced printing

manroland has been developing solutions for IPA-free and IPA-reduced printing for ten years. The development of suitable components requires that the printing press manufacturer possesses the relevant expertise for each specific press since each dampening unit has its own philosophy, its own friction and speed conditions and requires a specific volume of ink to be applied to the plate dampers. These special conditions must be taken into account when selecting each component. manroland press components are suited to manroland presses and in the form of the printcom product range certified dampening solution additives are available for each application with differentiations

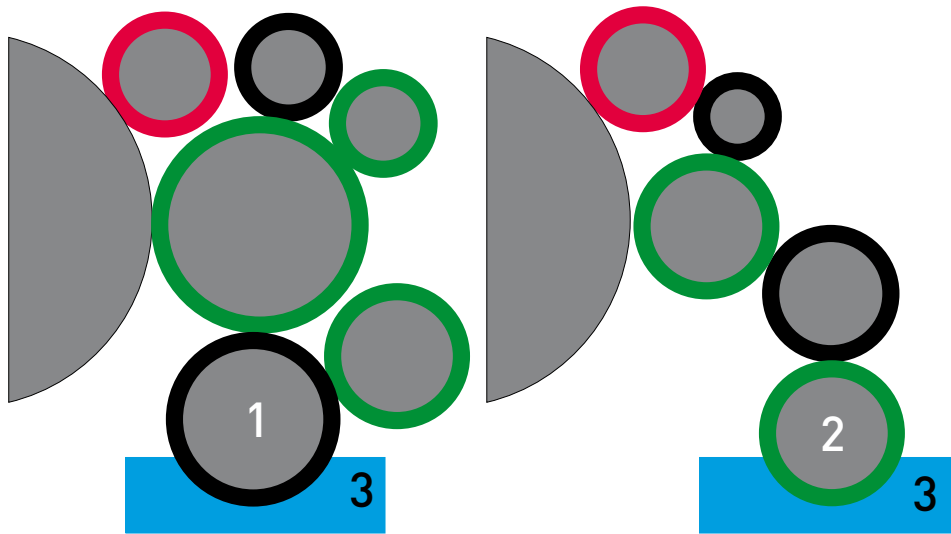
made between IPA-free (0 % IPA) and IPA-reduced (0–5 % IPA) printing.

Ceramic rollers – the standard for years

For years manroland has been using ceramic rollers in its dampening units as standard while these are a special accessory with other manufacturers. Ceramic rollers as damping rollers (“pan rollers”) are particularly suitable for IPA-free and IPA-reduced printing. Frequently dampening solution additives for IPA-free and IPA-reduced printing attack rubber materials chemically – the pan roller is especially critical in this respect. The inert ceramic surface of the manroland dampening units does not have this problem. Accordingly all that is necessary when changing over manroland presses to alcohol-free printing is for the rubber rollers to be adjusted in respect of their dampening solution conveying behavior.

Stable production thanks to modified rubber rollers

The rubber rollers as optimized for alcohol-free and alcohol-reduced printing stand center-stage in manroland’s press equipment package. The modified surface of these specially developed rollers makes it possible for the dampening solution film to be easily and uniformly built up on the plate surface. A stable ink-water balance establishes itself rapidly in spite of the absence of alcohol by reason of the specially harmonized roller properties. The harmonized system of rollers and dampening solution enables a production run with the dampening unit operating at a constantly moderate speed.



Schematic graph of two dampening unit systems. Left: the ceramic fountain roller (1) at dampening solution fountain (3). Right: rubber roller (2) at dampening solution fountain (3).

In addition these rollers are characterized by high resistance to washing agents and dampening solutions under the most different operating conditions. The application-specific selection of rollers is fully supported by the printcom roller range so that alternating, hybrid or dedicated and UV operation is also possible with suitable rollers.

More constant preparation of the dampening solution with SelectDampening dampening solution cooling devices

For IPA-free and IPA-reduced printing manroland offers its SelectDampening systems. These units integrate a special measuring, metering and filtering system for these applications. The high-quality manner in which the dampening solution cooling devices are fitted out serves to keep the dampening

solution parameters relevant for printing constant. In this way an important step in the work of achieving a stable printing process is performed – regardless of whether printing is carried out with or without IPA.

Conductivity measurement evaluates the quality and uniformity of the dampening solution

The conductivity represents an important parameter for assessing the water quality. It is measured in the fresh water, downstream of the additive metering device, and in the dampening solution tank. After compensation for temperature, the conductivity value is proportional to the ion content and the mobility of this. This measurement is carried out in the SelectDampening dampening solution systems in a temperature-compen-

sated manner whereby the measurements are insensitive to contamination thanks to the non-contact measurement system. The measurement of conductivity aids in assessing the quality and constancy of the dampening solution. An increase in the conductivity enables severe contamination of the dampening solution to be concluded. The physical and chemical properties of the dampening solution will then have changed and in this situation it is to be recommended that the dampening solution has to be changed. The absolute value of the conductivity of the dampening solution is not so significant. Instead the value as measured must always be evaluated in combination with the conductivity of the mixed water and of the fresh, untreated water as fed in. For this reason the measurement of concentration is carried out three times, namely in the fresh water, in the prepared dampening solution and in the dampening solution tank.

pH-value significant for process stability

The pH-value serves as the indicator as to whether the dampening solution is acidic or alkaline. Maintenance of close tolerance limits for this parameter represents an important prerequisite for a stable process. A chemical reaction comes about between the acidic dampening solution and the generally alkaline surface of the paper. Accordingly, the buffering capacity of the dampening solution must be adequately dimensioned since otherwise its pH-value will increase. The printing plates then do not run clean and the inks will absorb more dampening solution. In addition salts can form which lead to disrupting, hydrophobic deposits on rollers and printing plate.

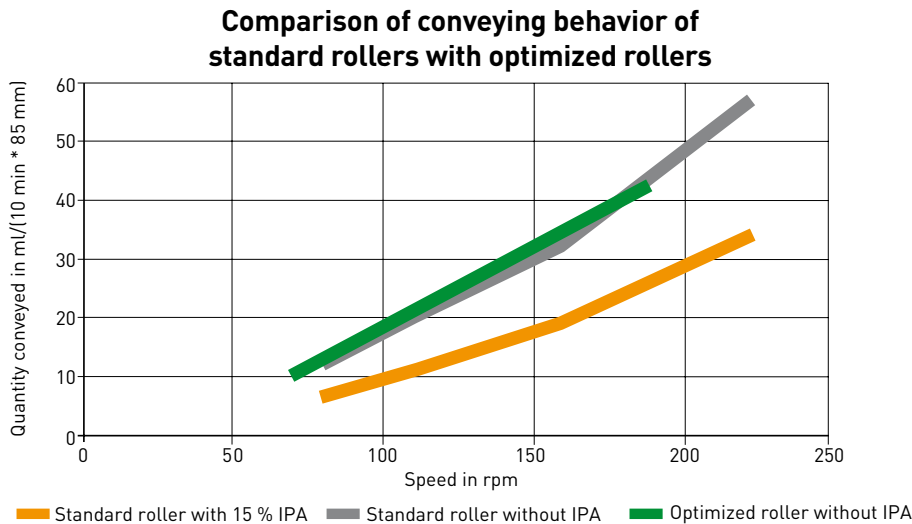


Fig.: Measurement of the conveying behavior of dampening unit rollers – standard rollers operated with and without IPA as well as the conveying behavior of the rollers specially developed for IPA-free operations being operated without IPA. (Source: Westland, Melle)

Trend display permits observation over an extended period of time

The user will not always have the time to observe the current values for IPA content, pH-value, temperature and conductivities. As a rule he will only read the values when production problems occur. However a single, isolated value is not very significant; but the course of the values over time is much more important. Accordingly, with the manroland system a trend display shows the course of all the relevant values whereby the operator can set the time to be considered up to a period of six weeks.

For a stable system the conductivity of fresh water and mixed water should remain constant. If this is not the case, the fresh water source (water works, osmosis, increasing the hardness) and the additive metering (damp-

ening solution additive tank and batch or metering function) should be checked.

Water quality has a higher significance in IPA-free printing

The fact that the quality of the water is constant and suitable is of high significance in IPA-free and IPA-reduced printing. If the water hardness is too low or too high, then this will have an immediate effect on the print result: the printing unit starts to smear and scum and fine screens and reverse types close.

The first step is to have a water analysis carried out in which water samples are taken at different times and sent to a laboratory for analysis. As a result of the fact that the water quality varies in many supply areas,

sample taking should be repeated at intervals of a few weeks.

Constant water quality can be achieved with a reverse osmosis system followed by increasing the hardness of the water. However the high expenditure for this is not always necessary. Many print shops obtain water of a stable quality so that simple water preparation methods suffice for them.

IPA – recording and regulating its concentration

Where the addition of alcohol is not dispensed with completely, measurement of the reduced alcohol concentration is of great significance. The conventional method based on measuring the specific gravity does not satisfy the requirements in practice. Accordingly modern measuring devices making use of IR light sources and sensors are components of the SelectDampening dampening solution cooling devices for IPA-reduced printing.

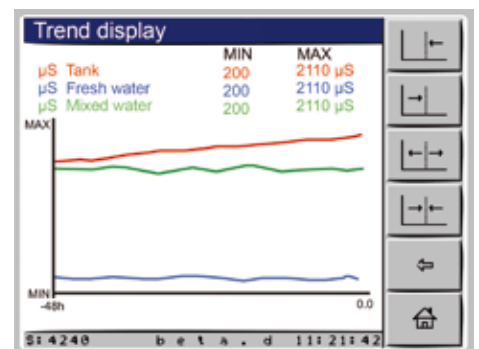


Fig.: Conductivity development in the “trend value display” on the dampening solution cooling device: conductivity development of fresh water (blue), mixed water (green) and process water (red).

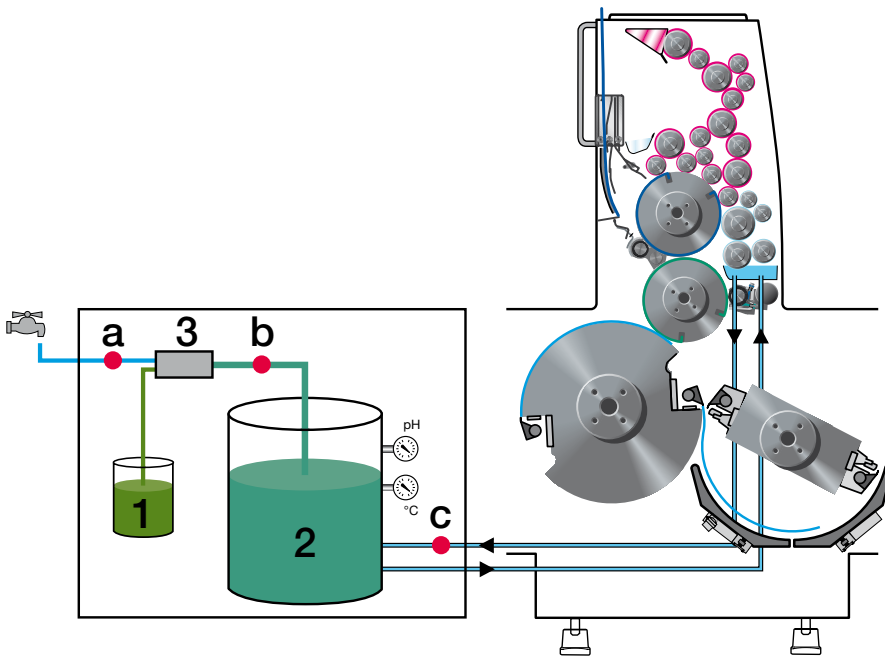


Fig.: Conductivity measurement (a) in the fresh water intake, (b) after the metering in of the additive and (c) in the dampening solution tank.

The devices have an adequate degree of precision of the order of a few tenths of percent, automatic calibrating of the zero-point and intelligent regulating of the IPA content in accordance with the volume of dampening solution in circulation in the particular printing press.

Dampening solution additives

IPA-free and IPA-reduced printing are not possible without the use of suitable dampening solution additives. These must be specially designed for this case of application. manroland offers suitable dampening solution additives with its printcom product range. These increase the wetting properties, stabilize the pH-value and chemical proper-

ties of the dampening solution and combat the formation of micro-organisms.

Inking unit temperature control and inking unit blowing device for stable production runs

Constant production run conditions are supported by controlling the temperature of the inking unit. The absence of the cooling effect brought about by the evaporation of the volatile IPA can be compensated for with an inking unit temperature control device. When a temperature-control device is used, the tolerance in respect of the dampening solution, which is already somewhat reduced with IPA-free printing, is not further limited by disrupting variations in temperature. The printing process stabilizes. The inking roller

blowing device removes dampening solution from the inking unit. Excess dampening solution can influence the viscosity and the splitting of the inks. The inking and production run are demonstrably stabilized by this device. Its use is especially recommended with dampening-solution-sensitive inks.

An air-conditioned pressroom means not only pleasant working conditions for the printers but also makes an important contribution to stabilizing the printing process.

Handling and operating of the printing presses help to maintain the optimized process conditions

The application-specific optimization of the roller materials can only render its full contribution when the inking and dampening units are set correctly – i. e. not special settings are required but the roller contact must be reliably set in accordance with the operating instructions. Continuous adjustment of the roller settings will not lead to the desired objective. If corrections are required, the reason for these being necessary



Fig.: Inking roller blowing device.

must be clarified and the faulty process parameters corrected. Reliable functioning of the dampening solution circulation and of the printing unit will only be maintained when cleaning and care is carried out regularly using the approved agents; printcom offers a selection of tested agents. manroland has made use of its many years of experience with IPA-free and IPA-reduced printing in its equipment packages. These include suitable printcom roller equipment, **Select-Dampening** dampening solution cooling devices and certified printcom dampening solution additives. The **SelectInktemp** inking unit temperature control devices and inking roller blowing devices are recommended for IPA-free and IPA-reduced production runs. With printing presses furnished in the above manner the optimum conditions are created which with a motivated team make possible environment-friendly printing without IPA. Alternatively manroland is providing waterless offset printing without IPA.

By: Rainer Gebhardt, New Technology
 E-Mail: rainer.gebhardt@manroland.com
 Thomas Walther, New Technology
 E-Mail: thomas.walther@manroland.com

Fig.: Example of IPA reduction in a print shop with 25 printing units of series ROLAND 700. Through the measures described in this article it has been possible to achieve in a step-by-step manner a reduction in the mean consumption of IPA in the print shop. With each commissioning of a new press, the average was significantly reduced (1997, 1999, 2000, 2004, 2006, 2008); as early as 1997, a change-over to ceramic-clad fountain rollers was made. In addition, the use of IR measuring techniques for recording the IPA concentration as introduced in 2001 on the machines operated with reduced levels of IPA brought a significant improvement. In 2004, the first machine operating without alcohol went into operation.

(Data source: Eggen)

Conductivity as a function of the dampening solution additive concentration and the IPA content

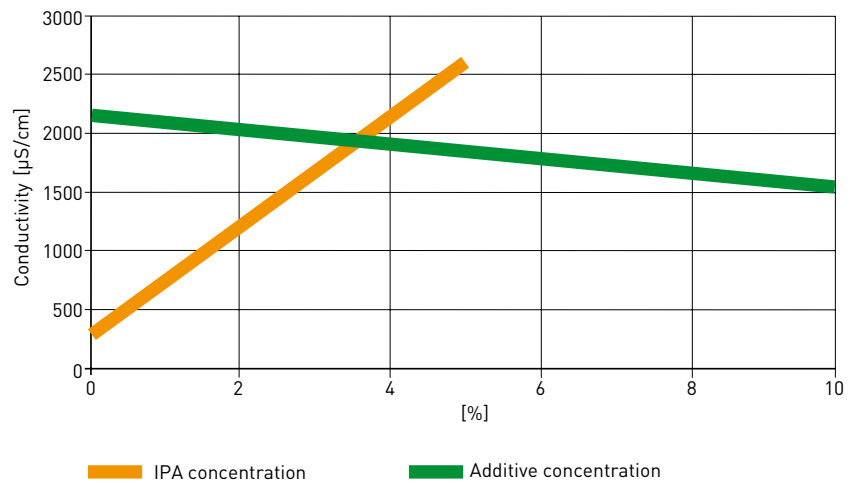
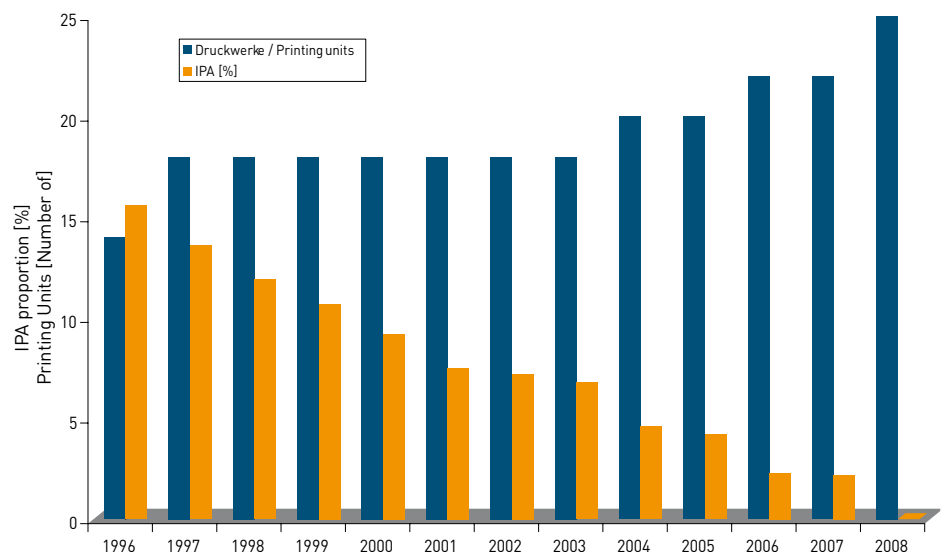


Fig.: Conductivity as a function of the dampening solution additive concentration and the IPA content; it is a matter here of an additive commonly used in the market; the mean increase in conductivity against the concentration is shown.

IPA reduction in sheetfed printing



Reducing the impact of powder

As a result of the continually increasing mechanical and aerodynamic requirements of sheet travel in modern, high-speed sheetfed offset presses, the tasks and consequent complexity of powder spraying are affected by immense constant developments and stresses acting on the sheet before it reaches the delivery. An important aspect of this is powder spraying with maximally reduced usage of powder.

The powder in this process serves as a “spacer” between the individual sheets in the delivery pile, preventing set-off and smearing of the freshly printed ink. In addition, the spray powder acts as a sliding agent, thereby facilitating exact pile formation. Moreover, these “spacers” support the oxidative drying process.

Under environmental aspects, all these effects achievable with spray powder are basically to be regarded as positive because powder spraying avoids ecologically critical waste by set-off of fresh ink or trouble due to poor pile formation.

This *task* applies independent of:

- operating condition of the press
- operating mode of the press
- sheet format
- specific weight of the printing substrate
- print image, etc.

Most spray powders consist of starch or calcium carbonates. Both substances are not hazardous according to legislation on chemicals, nor are they of any relevance regarding the greenhouse effect. Spray powders are regarded as general dust. They are subject to the limit

values of legislation on safety at work. The basis for this are the workplace guiding values of the EU as well as principles for testing and certifying print and paper processing machinery, emission testing for offset presses according to the document: Testing Principles Print and Paper Processing GS-DP-01.

The following *limit values* are to be observed:

- concentration of dust $< 1.0 \text{ mg/m}^3$
- concentration of ammonia $< 14 \text{ mg/m}^3$
- concentration of ozone (with use of UV dryer) limit value for ozone according to TRGS 900, state 2004*):
 $1.0 \text{ ml/m}^3 \text{ (ppm)} = 0.2 \text{ mg/m}^3$
- limit value for certification:
 $\leq 0.01 \text{ ml/m}^3 \text{ (ppm)} = 0.02 \text{ mg/m}^3$

The respective values in manroland presses fall short of these limits, clearly and demonstrably.

Soiling of the press by whirled-up spray powder is another disadvantage connected with the use of spray powder. The whirling is caused by, among other reasons, blowers and dryers, delivery system and air extraction in the area of the delivery. The whirled-up powder settles on the chains and other elements of the delivery. This necessitates a great deal of cleaning and maintenance work. Also, whirled-up spray powder can be transported into the pressroom by blowers.

Sustainable ecologic acting calls for reducing impact on the environment to the least-possible extent. manroland therefore offers a

set of measures in press engineering that are designed to further reduce any negative effects of dust, small as they may be already. But the user can also contribute to this by choosing suitable spray powders.

Action packages for powder reduction

Actions for powder reduction concern the choice of a suitable powder spray device, powder extraction and cleaning for removal of excess powder.

A. Powder spraying with ROLAND SelectPowderSystem

Latest technology of the SelectPowderSystem product line ensures low environmental impact through closely targeted and effective powder spraying of the press sheets. The spray powder devices of the ROLAND 700 press series are an example of this supermodern technique. A special nozzle pipe enables minimized use of powder because of its specifically suited design. The carrier air required for powder transport is pressure-reduced in that the air content escapes laterally at the spray nozzle. As a result, the sprayed powder arrives on the printing substrate largely without pressure impact. The air diverted at the spray nozzle forms an air curtain that screens the powder jet against undesirable air circulations. Undesirable scattering of spray powder is largely avoided, more powder settles on the substrate. Sheet guide is stabilized due to the reduced pressure of impact. The risk of smearing/setting-off in the area of the powder jet is noticeably reduced. A suitable spray powder device can contribute to efficient use of the powder and to ecologically proper production through well-aimed powder ap-

plication, avoidance of undesirable carry-over of powder and reduced load on the sheet in the area of the spray powder device.

Essential ecological advantages

- Doubled the number of nozzles: ensures a clearly more uniform application of powder because of the smaller area to be powdered by the individual nozzle.
- The particular design of the nozzles makes for better concentration of the powder/air jets. Turbulences of air in the delivery, caused by gripper bars, for example, can therefore be passed through better. The system can be replaced without tools because it features a bayonet lock (twist&click technique).
- Loss of powder is reduced because the application of the powder is more exact. As a result powder consumption drops enormously, and with it the soiling by powder in the press and around its delivery.
- The low rate of powder consumption enables cost savings (emissions).

B. Powder extraction with ROLAND SelectPowderExtraction

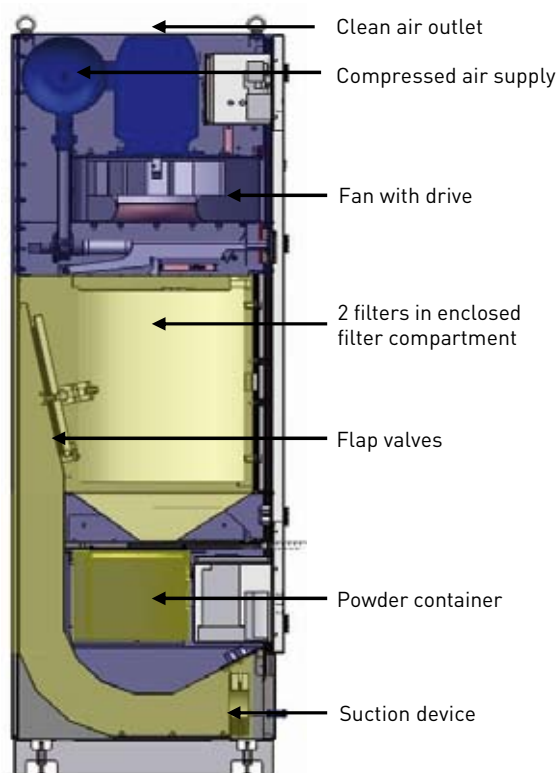
The new, highly effective system of powder and odor extraction with a total of six extraction points in aerodynamically optimized positions substantially improves the operator's working environment. Emissions are effectively extracted and cleaned with a filter system using optimized oval filters. The spray powder does not burden the press environment and the ambient atmosphere but is efficiently extracted by the SelectPowderExtraction system.

Three extraction points are installed in the

delivery (two beside the pile and one before it), preventing powder escape from the delivery. Three more extraction points, downstream, significantly reduce powder feed-back into the pile and dryer area. The powder- and odor-loaded air is sucked in at the integrated extraction points and conducted via hoses to the powder extraction cabinet, where the powder is separated from the air. The separated powder drops into a

conductive collecting bag. As soon as the bag is filled (the level is fully automatically indicated at the control console), it is disposed of in the same easy and virtually dust-free manner used for dust bags in a conventional household vacuum cleaner.

The cleaned air is conducted back into the pressroom or – if it is additionally polluted with dangerous substances from the drying process, e.g. with ammonia – into the open.



Filtering principle and major points of extraction.

The SelectPowderExtraction offers total integration of the powder collecting points in the delivery, which provides important advantages for the user/operator and features in operation (unique benefit in comparison with other powder extraction devices – state-of-the-art).

Essential ecological advantages:

- Protection of the press operator is ensured 100 percent (BGDP standard satisfied, own equipment safety mark planned)
- Powder loading in the press is reduced (especially in pile and dryer areas)
- Use for extraction of odorous vapors like ammonia in IR thermo-air final drying or of ozone with odor formation in UV final drying
- Air guiding concept with modern filter technology for long service life, efficiency of filtering and consistent performance through good self-cleaning function (diverting plastic filters with a filter area of 36 m²)
- High air throughput of 2,800 m³/h
- High efficiency of at least 90 % at low installed performance of 4 kW;
- Low sound intensity level of about 75 dB;
- High safety standard because safety regulations for powder extraction with regard to powder explosion are state-of-the-art. ATEX regulations have been taken into account; therefore BGDP approval obtained.
- Operator not exposed to dust during bag change
- Operation, maintenance and service friendliness of design features

C. Contact-free cleaning of delivery grippers

Contact-free cleaning of the delivery gripper systems by aerodynamic effects prolongs the life cycle of the grippers and makes consumables like brushes unnecessary. During their return movement, the delivery grippers pass a plate with narrow-tolerance openings. The resultant air whirl-ups remove powder settled on the grippers, and the powder is immediately extracted.

Alternative: doing without powdering in favor of coating

Many print products today receive protective coating in order to avoid set-off from the sheets and enable quick progress to post-press work. If aqueous coatings are used, powder spraying can be done without completely or reduced to a very small amount.

The swing-type ROLAND InlineCoater smart system is ideally suited for this method of coating application. Within a short time, the printing unit equipped with the ROLAND InlineCoater smart can be converted from coating to printing mode and vice versa. Obviously, the saving in spraying powder has to be gained by a higher use of resources (coating, energy for drying). But the protective coating enables saving of paper waste, resulting in a clear ecological plus for this type of application.

Constant progress in development

manroland is constantly engaged in reducing impact on the environment and improving working conditions at its presses. Therefore inform yourself about action packages for spray powder reduction before invest-

ment. Some components of these packages you can also purchase for existing presses via printservices retrofit packages.

By: Karlheinz Mohn, Delivery/Air Glide
E-mail: karlheinz.mohn@manroland.com
Matthias Rapp, SelectSystems
E-mail: matthias.rapp@manroland.com
Felix Ehardt, SelectSystems
E-mail: felix.ehardt@manroland.com

Lower consumption

XXL presses are more cost-efficient. The Pressedruck Media Group in Augsburg, one of Germany's leading information providers, has a 24-page COLORMAN, XXL with nine eight-couple towers in 9-cylinder satellite design in its modern printing center. This company uses new process technologies to reduce energy consumption which in turn lowers greenhouse gas emissions. Consumption is centrally monitored and logged which confirms the positive effects that modern XXL technology has on newspaper production.

Since the COLORMAN, XXL was installed, power consumption has dropped by 15 percent with the same production capacity. Compared with production on 16-page presses, the specific power consumption per square meter of printed paper has been reduced by around one-third. This is because with each cylinder revolution the press produces eight newspaper pages more than a 16-page press but the power con-



The COLORMAN, XXL at Pressedruck Augsburg saves power in newspaper printing.

sumption does not rise proportionally to the higher output. Combined with an innovative groundwater cooling system, power consumption of the XXL configuration is 110,000 kWh less which means some 80 tonnes less carbon dioxide emissions each year.

Power consumption down by one-third

Larger-format commercial weboffset presses offer the same effect. When production is placed on 64-page presses instead of 16-page presses, power consumption can be reduced by around one-third. Besides that, the consumption of compressed air and gas per printed page is lower as well.

Reducing friction-related energy waste

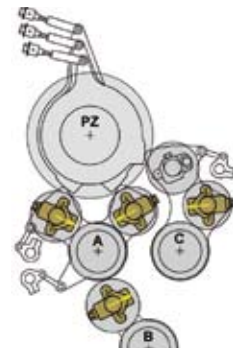
Besides energy savings through reduced consumption as such, friction in printing units wastes energy unnecessarily and this should be addressed as well.

Direct drive minimizes friction

The introduction of direct drive for commercial and newspaper web presses eliminated mechanical friction-related energy waste through drives and bearings. This reduced power consumption by 5 %. These days water-cooled motors are standard for the main drives of the printing towers and folders. This assists recovery of energy that can be reused for heating systems.

Less friction with IROLOC

Constant printing widths of printing rollers make an important contribution to energy savings and also have a positive effect on even transfer of ink and dampening solution to the printing plate. The automatic printing width regulation provided by IROLOC roller locks is based on a proven mechanical solution and almost entirely eliminates the need for frequent readjustment and maintenance. Spring systems that only need to be set once provide the high reliability and durability required. The printing width remains constant under dynamic operating conditions which are characterized by thermal expansion and the influence of consumables. IROLOC increases the lifetime of rollers by up to 20 %.



Automatic printing width regulation on a mechanical basis.



IROLOC minimizes friction-related energy waste.

Lower air conditioning costs

The DriveSys S switch gear concept has a minimum of switching electronics and an effective water cooling system which reduces costs for pressroom air conditioning. The heat from the control cabinets does not affect pressroom temperature but is carried off and used for other purposes.

Minimized drive power loss

The standard versions of the 9-cylinder satellite newspaper presses use only four instead of a possible five motors per H-type printing unit. The satellite is driven via a clutch to a printing tower motor. As a result all four motors normally work in drive mode. If a fifth motor is used for the satellite it must mostly be braked due to the cylinder rolling ratios. But a braked motor generates heat which must be carried off and so this drive concept helps to save energy.

Drying with minimal energy consumption

At NP Druck, the printing company of the Niederösterreichisches Pressehaus in St. Pölten, Austria, a 48-page LITHOMAN is running which needs hardly any gas for the drying process. This is made possible by modern, integrated heat recovery afterburning systems. The energy generated by the drying of solvents in printing inks is recovered and used as energy for afterburning systems. The heat generated by afterburning is then fed back to the dryer which reduces gas consumption. Integrated RTO afterburning systems enable high energy savings with 97 percent heat exchange efficiency. The more energy is released in afterburning of the processed solvents, the less additional energy is

required. In numerous applications, the device does not need any additional energy because, being an autarchic system, it utilizes only the energy of the solvents.

Reducing waste

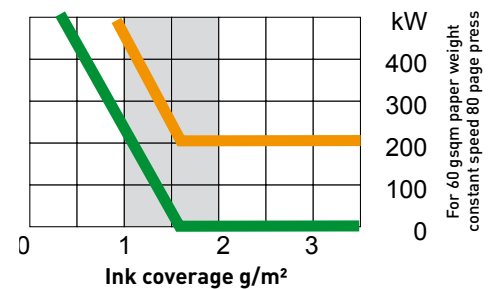
Innovative, fully-automated start-up sequences for newspaper and commercial web presses ensure the lowest waste rates and thus make the most effective possible utilization of substrates.

QuickStart for web presses

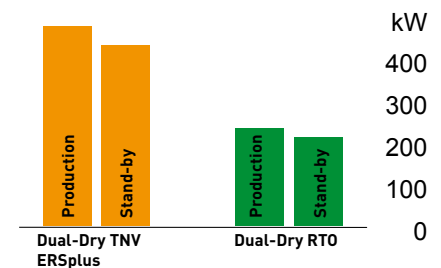
With the patented QuickStart pre-inking system, saleable copies can be produced after only a few cylinder revolutions, even with small area coverages. And even when conditions are extreme, start-up waste rates are amazingly low. How is this done? After the inking units are washed up, pre-inking takes place automatically as the press accelerates. The amount of ink needed depends on the total surface area of all rollers, the desired density, and the substrate. This new pre-inking system was developed because the target ink density for image areas with a low area coverage is achieved more slowly when RIP data is used for setting the inking zones. But the target ink density for demanding ad subjects in the quality the advertiser wants should be achieved quickly. The major benefit of this new pre-inking system is greatly reduced start-up waste, and QuickStart reduces it even further. For example, the Kieler Nachrichten produces newspapers with only 75 start-up waste copies.

By: Ralf Henze, Sales Support Webfed
E-mail: ralf.henze@manroland.com

Gas consumption production*



Average gas consumption**



** For typical mixed production conditions as observed by MEGTEC gas consumption statistical measurement

Emission balance of this brochure

Print run	30.000 (German and English)
Pages	32
Final size	DIN A4
Sheet size	46 x 65 cm
Paper	RePrint dull-coated illustration printing 130 gsm
Manufacturer	Schneidersöhne Deutschland GmbH & Co. KG
Printed sheets	130.000
Waste rate (8%)	10.000
Total weight	4.7 t
Color	4/4 CMYK
Printing forms	64 (16 x 4 Printing forms)
Total area (paper)	80,000 m ²
Area coverage (color)	30 %

Parameter

Average electricity power Germany: 0.520 kg CO ₂ per kWh	
Average aluminum production Germany: 17.64 kg CO ₂ per kg Aluminium	
Average truck activity Germany: 1 kg CO ₂ per km	Transport route Offenbach – Düsseldorf: 250 km
Printing ink: 0.3 kg CO ₂ per kg color	

Printing press

Printing speed: 13,000 sheets/h, production run 10 h

	eff. power consumption [kW]	Total [kWh]	CO ₂ [kg]
Drive	35	350	182
Air supply	39	390	203
Dampening solution and ink unit temperature control	13	130	68
Total	87	870	553

Printing goods and additives

	Amount	Total [kg]	CO ₂ [kg]
Printing formes (Aluminum)	64 pcs. à 325 g	20.8	367
Printing ink (conventional)	1 gsm	80	24

Paper

RePrint 130 gsm [Recy. & FSC]	Printing run [4,7 tonnes]	per tonne of paper
CO ₂ [fossil]	2,044.5 kg CO ₂	435 kg CO ₂
Energy consumption 509 kWh/t	1,245.5 kg CO ₂	265 kg CO ₂
	3,290.0 kg CO₂	700 kg CO₂

	[kg CO ₂]	[%]
Printing press	553.0	12.0
Paper	3,290.0	74.0
Aluminium printing form	367.0	7.5
Printing ink	24.0	0.5
Transport	250.0	6.0
Total	4,484.0	100



Comparison to standard illustration printing paper

135 gsm	per tonne of paper
CO ₂ [fossil]	888 kg CO ₂
Energy consumption 766 kWh/t	399 kg CO ₂
	1,287 kg CO₂

Comparison

Brochure	0.143 kg CO ₂ /issue
Internet [per person in germany]	0.655 kg CO ₂ /day
Car [8l/100 km]	19.20 kg CO ₂ /100 km

Result 4.5 t CO₂

Emissions generated by IPA and washing agents are not included due to missing market data collection. This brochure is climate neutral and has been printed on FSC-certified paper.

Imprint

Issue No. 1, First Volume

Publisher: manroland AG
Corporate Marketing & Communications
P. O. Box 10 12 64
63012 Offenbach
Germany

Eva Doppler (R.f.C.u.G.P.L.),
Head of Communications
www.manroland.com

Project Management: Vincent Krafft, SelectSystems
Phone: +49(0)69 83 05 - 35 41
E-mail: vincent.krafft@manroland.com

Authors in this issue: Matthias Rapp, SelectSystems
E-mail: matthias.rapp@manroland.com

Felix Ehrtmann, SelectSystems
E-mail: felix.ehrtmann@manroland.com

Vincent Krafft, SelectSystems
E-mail: vincent.krafft@manroland.com

Thomas Walther, New Technology
E-mail: thomas.walther@manroland.com

Rainer Gebhardt, New Technology
E-mail: rainer.gebhardt@manroland.com

Karlheinz Mohn, Delivery/Air Glide
E-mail: karlheinz.mohn@manroland.com

Ralf Henze, Sales Support Webfed
E-mail: ralf.henze@manroland.com

Layout: Büro Backer, Augsburg, Germany

Illustrations: Page 5, 6 Ökopol GmbH
Page 8 Kaeser Kompressoren

All process names, trade names, trade descriptions, etc. mentioned in this issue may also be registered brands or trademarks, even if they are not specifically identified, and as such are subject to statutory provisions.

Unless otherwise stated, manroland holds all rights for photos, plans and graphics.
Reprinting is allowed with the editor's permission. Please send us a copy of any reprints.

**Production/
Postpress:** Stritzinger GmbH
Druck + Daten
Daimlerstraße 3
63303 Dreieich
Germany

Printed on: Six-color ROLAND 700 HiPrint

Paper: RePrint dull-coated illustration printing
FCS-certified 130 gsm
Produced of 50 % recycled fibers
Schneidersöhne Deutschland GmbH & Co. KG



Print run: 2 x 15.000 copies (German/English)

Nominal charge: 5 €

Printed in Germany (05/2008)
© 2008 manroland AG
ISSN 1866-7740

