Robuskin® Printer Manual

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1. Introduction

We would like to introduce Robuskin®, a synthetic paper which due to its smooth, stable, uniform surface combines the excellent print result expected of a high quality matt coated paper with the physical properties of modern plastic films.

Robuskin® allows for a choice of synthetic materials. Unlike most other synthetic papers, Robuskin® can be chosen on a variety of film substrates: polyethylene, polypropylene, polyolefin (XTP), polyvinylchloride and polyester. Additionally, Robuskin® is available in coated and uncoated versions.

Robuskin® coated versions have a special and unique coating, which enables the printer to use standard litho inks, with all their associated benefits. They are physically absorbed into the coating, and dry normally by evaporation. The Robuskin® ECO (uncoated) qualities, however, must be printed with film inks.

Robuskin® is a modern, universal, problem solver which is easy to work with and is friendly to the environment.

Robuskin® is extremely strong and is resistant to tearing, weather, cold and heat (dependent upon the base film chosen, from -60°C to +190°C), to water, including sea water, saliva and sweat, to grease and staining, and to many chemicals, including petrol and oil.

Robuskin® can be wiped clean and has many uses which range from applications in the harshest up to clean room conditions.

Robuskin® can be printed and finished just like ordinary paper, in continuous or sheet format, by offset, letterpress, flexo, gravure and silk screen printing techniques. Robuskin® should be stored in wrapping, like ordinary paper.

Robuskin® may also be digitally printed by thermal transfer, thermal sublimation or dot matrix systems. It is possible to type and to handwrite on Robuskin® using ball-point pens and lead pencils. Aqueous ink pens may also be used. Felt tip pens can be employed, but may require a short time to dry, to avoid smudging.

Hot fuse laser printable qualities are being continuously developed, but Robuskin® polyester or polyolefin (XTP) types are especially suited to this application. We will provide a list of compatible qualities and industrial laser printing systems on request. It is recommended to perform tests prior to ordering.

Robuskin® is extremely durable and offers the widest choice of qualities available today in synthetic papers to give excellent results every time. As with all good print and finishing practices, and for best results, a few simple guidelines detailed herein should be followed.

2. Storage and handling

Robuskin® should be stored and handled like paper. Reels should be stored vertically or suspended, whilst sheets should always be stored flat. Although synthetic materials are generally less susceptible to changes in temperature and humidity than paper, nevertheless, extremes in temperature, humidity and prolonged exposure of unwrapped material to sunlight, as well as impact damage, are to be avoided. Providing this is adhered to, both sides coated Robuskin® qualities (i.e. ”B”) have a normal shelf life of two years.

3. Recommendations before printing

Robuskin® should be acclimatised before printing, by transporting the unpacked material to the press room 24 hours prior to the print run. Stack heights should be limited to 15 cm, and sheets should be well aired by fanning, to ensure equilibrium of temperature and humidity throughout the stack, and across the individual sheets.

Guideline No. 1
Due to the nature of synthetic materials, it may be necessary to acclimatize Robuskin® for longer than would be expected for paper, to allow the middle of the ream or stack to adjust to press room conditions.

Ideal press room conditions are:
Humidity: 55-60%
Temperature: 18-23°C

Naturally, presses equipped with static elimination devices, and the use of appropriately placed humidifiers, will aid press performance.

Guideline No. 2
Maintenance of the ideal relative humidity on press will significantly aid performance, and reduce any static build-up that can occur in hot or dry conditions.

Temperature: 18-23°C

Robuskin® should be fanned, in order to ensure smooth feeding, and stack heights should not exceed 15 cm. If mechanical marks become a problem during feeding, then gauze may be placed over suckers, whilst keeping the pressure of wheels to a minimum or, alternatively, the suckers may be covered with a PE or PP tape.

Guideline No. 3
Stacks should be well fanned and not exceed 15 cm.

4. On press

4.1. Sheet-fed offset

Fount Solution
During wet offset printing, water should be kept to a minimum, and contain approximately 17% ethyl alcohol. The addition of alcohol reduces the surface tension of the water, and helps it to flow more evenly and easily on to the plate. Alcohol also accelerates the evaporation of water. Excess water will tend to lie on the surface of synthetics, being only partially absorbed by Robuskin® coated qualities, and will not be absorbed by ECO qualities. This may inhibit the transfer of inks and lead to emulsification of the ink. Resulting problems occur as the ink rollers feed back the emulsion into the ink pans, until the whole inking system has emulsified. Any drying agent utilised should always be added to the fount solution and not the inks, unless otherwise recommended by the manufacturer.

Guideline No. 4
Keep water to a minimum. Maintain a pH-level of 6.5 to 7.5 - do not allow it to drop below 5.5.

Printing Pressure
With the exception of polyester, due to their manufacturing process, synthetic materials are by nature stretchy and compressible. Therefore, printing pressure should be maintained as high as possible. A pressure which is approximately 10% higher than that normally used for paper, together with the use of compressible blankets, and with a 75-85 micron coated paper, will give the best results. Some Robuskin® materials, like other polyethylene-based materials, are susceptible to stretching on press (e.g. Robuskin® PE types). When printing to fine, close register, particularly if full solids are utilised, increasing the pressure still further on the first unit will eliminate any inherent stretch due to the nature of polyethylene materials.

Guideline No. 5
Keep printing pressure higher than for paper.

Set Off
Robuskin® has superior drying times to many synthetics, but dependant on the amount of ink applied, powder granulate in grain sizes from 20 µ to 45 µ of hydrophilic (not water soluble) starch may be used. For the coated versions of Robuskin®, similar quantities of spray powder to that used for coated papers are applicable. However, for the ECO qualities, dependent upon the amount of ink used, 25 to 50% more powder than would be used for coated paper is advisable, unless the print is to be over-varnished. During varnishing, use only 10 to 20% more powder than is used for coated paper.

To avoid set off, particularly for the ECO grades, it is also advisable to rack the sheets, without wedges, in stacks no higher than 15 cm. Air pressure and jogging should be kept to an absolute minimum, and impact or shocks should be avoided.

Guideline No. 6
If set off may be a problem, use a spray powder.

4.2. Rotary systems

Robuskin® is ideally suited to reel-fed systems and may be finished reel to reel, sheet, or fan fold. However, web tension should be kept to a minimum to avoid any possible distortion that could result in mis-register, induced by higher tension normally associated with paper. Robuskin® has been successfully printed in reel form on both sides using turn bars and perfecting systems, but please pay particular attention to the section related to drying, in addition to all other applicable sections above.

Guideline No. 7
In rotary systems, web tensions should be kept to a minimum, and certainly lower than would be expected for paper.

4.3. Screen systems

Robuskin® offers excellent results in screen systems when a fine mesh screen is used together with a light ink film. For coated qualities of Robuskin®, aqueous inks can be utilised, whereas for ECO grades, special film inks should be used. Particular attention should be paid to the section related to drying, in addition to all other applicable sections above.

Guideline No. 8
For the best results, use a fine mesh screen in conjunction with a light ink film.

4.4. Transport and handling

Robuskin® coated qualities printed with conventional inks may be treated in a similar manner as quality matt coated paper. Robuskin® ECO (uncoated) qualities, however, require special film inks, due to their non-absorbent surface. This does not dry by absorption and evaporation, but by oxidation (chemical reaction). Therefore, it is good practice at the delivery stage, as with a high quality matt paper, to treat the printed material with care. Sheets should drop lightly on to the stack, which means reducing fan speeds/air pressure. The sheets should not be forced or knocked into alignment, and jogging should be at a minimum, whilst stack heights should be limited to 15 cm.

Guideline No. 9
Deliver gently and limit stack heights to 15 cm.

4.5. Drying

Robuskin® coated qualities, when printed in four colours with conventional inks and using standard drying techniques, have been backed up within 1.5 hours. Robuskin® ECO qualities, being non-absorbent, will of course take longer to dry. Due to the nature of synthetic materials, drying units should be adjusted to take account of the heat sensitivity of the film substrate. The temperature of UV drying units, unless of the water-cooled type, should be reduced, whilst IR drying units must be turned off to avoid substrate distortion. Likewise, the temperature of warm air dryers should be adjusted to take account of the heat-sensitivity of the film. Therefore, when heat drying, in particular the PE or PP qualities, it is good practice to ensure that the sheet or web temperature after the drying unit is less than 35 °C. Also always remember that stack heights should be limited to a maximum of 15 cm when racking.

Guideline No. 10
With heat drying systems, adjust temperatures to take account of the heat sensitivity of the film. IR drying units must be turned off.
Limit stack heights to 15 cm.

5. Inks for offset printing

Robuskin® coated qualities are specifically engineered to accept usual paper and board inks, which, due to the special and unique coating, dry by absorption and evaporation, as with paper or board. Whilst all Robuskin® qualities may be printed with film inks or UV drying inks, the Robuskin® ECO qualities have to be printed with these types of inks, due to the fact they are uncoated, economical versions.

In selecting the print colour sequence, it is advisable to begin with the ink layer with the least amount of coverage. The amount of ink applied should be kept to a minimum required, in keeping with the desired print result and optimal drying time.

Any additives should only be added in line with ink manufacturers' recommendations, or, better still, be avoided all together.

Solvent inks
Solvent inks contain aromatic solvents, and should therefore be avoided if possible, as they may distort the surface of coated or uncoated Robuskin® and thus affect close register. However, if such inks must be used, then light ink coverage is advisable, and it is recommended to conduct trials, in order to gauge the suitability of such inks, as well as the level of ink coverage.

Film inks
Film inks dry by oxidation only, i.e. they are not absorbed. Therefore, it is normal that this type of ink will take longer to dry than conventional inks. Most oxidatively drying inks contain mineral oil. If the oil content is not limited to a maximum of 3%, it may give rise to distortion of the printed surface. Hence, it is better practice to utilise inks that contain vegetable oil instead of mineral oil. However, metallic and fluorescent inks always contain a high level of mineral oil; therefore, they should be used only with extreme care.

'Gas Ghosting' is a phenomenon applying to inks that dry by oxidation. The gases generated by the oxidation (chemical reaction) process can affect the reverse side of the printed sheet. If the sheets are then backed up, any affected areas will reveal a ghost image. To reduce the likelihood of this phenomenon, it is advisable to fan the racked sheets, in order to disperse the gases, and to back up as soon as the printed side is dry.

It is actually erroneous to refer to this phenomenon as 'gas ghosting', since, more correctly, it is yellowing through contact of the printed side on the unprinted side of the sheet above in the drying stack. Such partial contact yellowing may be severe or light, and is due to the release of volatiles in the inks, which are then trapped between the sheets. The yellowing may occur through the colour of the chemicals themselves, or due to the chemical change during drying. Contact yellowing is aided by unsuitable printing expedients (auxiliary chemicals), as well as by fast hard drying. Some types of inks are more liable to cause the effect of contact yellowing than others. Additionally, inks that are left 'fresh' on the rollers overnight are more likely to cause this phenomenon.

It is possible to minimise this phenomenon:

- Inks, produced by several of the manufacturers, which have a reduced likelihood of contact yellowing, should be used.
- Inks should be used without any auxiliaries or additives, and only with the manufacturer's recommended printing aids.
- Drying aids should not be used.
- Printed stacks should be kept to a minimum, racked, and well aired.
- Fanning the sheets will allow the volatile gases or chemicals to escape, thus reducing the likelihood of yellowing on the sheet above.
- Stacking printed sheets in very warm areas should be avoided.
- Several printed ink layers will lead automatically to a higher risk of contact yellowing.
- During processing, a reduction in the number and thickness of ink films in the underlying layers is desirable.
- The risk of contact yellowing increases strongly with the number of ink layers lying one on top of the other.
- When printing both sides of the sheet, the time interval between printing each side should be kept long enough for the first side to dry fully.
- The higher the proportion of oxidatively drying inks in the ink mix, the stronger the possibility of contact yellowing.

UV inks

UV inks offer the advantage of immediate drying, but the drying units must be adjusted to take account of the heat sensitivity of the film substrate, unless they are of the water-cooled variety. However, special care must be taken with these types of inks, where the ink/water balance on the uncoated qualities (PE and PP ECO) is more critical, and there is a risk of reduced ink key.

Light fast inks should, of course, be used for prolonged exposure outdoors. If this is required for up to two years, then, upon request, the weather resistance and durability of Robuskin® can be further improved by the addition of a UV stabiliser in the substrate.

6. Digital printing

Digital imaging is usually used for personalized short run requirements. It is clearly recognized that certain applications will require synthetic materials which are approved for these machines.

As already stated in the introduction chapter Robuskin® can be printed with a variety of digital printing systems. Whereas the operation on thermal transfer printers (wax, resin or hybrid ribbons), thermal sublimation printers and dot matrix printers is common for personalization, dry toner based laser printing is a standard application for Robuskin®.

MDV constantly performs printing trials with many leading manufacturers of industrial digital printing systems in order to keep Robuskin's ® features up with current technical developments.

Many digital printing machine manufacturers have put Robuskin® on their lists of recommended printing substrates. These overviews are available from them.

Upon request MDV is pleased to provide you with a compatibility list for dry toner based digital printing systems.

The big variety of toner based digital printing systems prevents a general processing recommendation. Good print results are mainly influenced by the type of toner, the applied voltage, the temperature and the exposure time in the printing unit.

MDV confirms suitability for digital printing only for industrial printing systems, excluding commercial desktop laser and inkjet printers.

Use recommended standard machine settings as for paper. Some printers allow to vary parameters individually. MDV can assist and give good advice. Call +49 6188 952 269.

To achieve good print results please obey the technical specifications of the system, its proper status, the adherence to maintenance intervals and the use of original toners and inks.

VIP – Variable Information Printing
Robuskin® is suitable for variable information printing, using both impact and non-impact techniques. Robuskin®, as a multi talent, is also printable with dot matrix, thermal transfer (wax, resin or hybrid ribbons) and thermal sublimation printers.

When overprinting thin PE Robuskin® types by impact systems, some impact distortion may show, due to the malleable nature of polyethylene.

For colour inkjet applications ask for MDV's range of Jetprint® qualities.

7. Print Finishing Techniques

Varnishing
Printing varnish or acrylic varnish should be applied in the same way as described above for printing inks.

The use of IR-curing varnishes is not recommended as infrared lamps have to be switched off to avoid distortion of the substrate. Should you however intend to use such varnish, please make sure that it is totally dry and not sticky any more to hamper blocking of the stacked sheets.

When using UV varnish – regardless of whether the drying unit is water cooled or not – the temperature in the drying section needs to be adjusted to take account the heat sensitivity of the film substrate.

Hot Foil Stamping
Trials have been successfully conducted with the Foils Division of API Group Plc. with excellent result. However, it must be remembered that due to the temperatures reached in flat bed systems (110°C), cylinder systems (130/140°C) and rotary systems (160/170°C), and due to the dwell times utilised in the hot foil stamping processes, the heat sensitivity of the type of Robuskin® has to be considered. Customers should satisfy themselves as to the acceptability of the desired image by conducting trials, prior to a commercial run.

Dieless Foil Stamping
This state of the art stamping technology, with its low set up and origination costs, clearly offers a cold stamping option with existing equipment, to those printers who previously may not have contemplated stamping.

Embossing
Embossing Robuskin® is not recommended.

Overlaminating

Robuskin® qualities are specifically engineered and made durable to be utilised, with correct ink combinations, without overlamination, in environments where paper would have to be overlaminated.

However, for those instances where overlamination is demanded, then the following should be noted:

- **Heat-seal Overlaminates**
  Typical operating temperatures for such materials can be up to 150°C. Therefore the heat sensitivity of Robuskin® synthetic substrates and the dwell time utilised should be considered, in order to minimise any distortion of the film, particularly with PE and PP qualities.

- **Self-Adhesive Overlaminates**
  For Robuskin® double-side coated qualities (”B” types), such overlaminating films should be selected with care regarding the adhesive, which should be aqueous-based and with good optical clarity.
  For Robuskin® one side coated qualities, the adhesive utilised for the coated side should be the same as for double-side coated qualities. For the uncoated side, it should be matched as per uncoated Robuskin®.
  For Robuskin® uncoated qualities, adhesives specifically recommended by the self-adhesive manufacturer and which take into account the polarity of the Robuskin® film type chosen should be selected.

In all instances where overlamination is required, it is recommended that customers satisfy themselves as to the suitability of the finished job by matching the various combinations of Robuskin® with inks and adhesive types to be used.

8. Finishing

Robuskin® can be converted on most commercial paper and board equipment using conventional techniques. All blades must be kept sharp to ensure a clean cut. Robuskin® can be cut, die cut, punched, drilled, perforated, folded, scored, glued and bound with ease, to give excellent results every time. As with all good print finishing techniques, a few simple guidelines should be followed.

Guillotining
Robuskin® can be guillotine cut, just like paper, provided that any air cushions are expelled from the maximally 15 cm stack. Press beam pressures should be kept to an absolute minimum. Knives/blades should be sharp and ground to an angle of 21°. If any slight edge-sticking occurs, this may be alleviated by 'knocking up' the sheets. In addition, the guillotine should be clean and free of residue debris from other jobs. Such debris, in hot and dry conditions, could be attracted to the newly cut Robuskin® and contaminate the print run.

Guideline No. 11
Expel air cushions from stack.
Stack height should be < 15 cm.
Clamp pressure should be minimal.
Sharp blade should be ground at an angle of 21°.
Guillotine should be clean and free of debris.

Die Cutting
Robuskin® can be die cut using sharp hard steel blades with rounded inner edges. Blades have to be carefully adjusted so that they 'kiss cut', by just touching the bottom plate. As synthetics are non-porous materials, unlike paper, they must be cleanly cut right through, as they do not 'burst', like paper. As Robuskin® PE types are liable to inherent stretch, die cutting using flat die systems is preferred to rotary die cutting systems. In rotary systems, the material should lie without any tension in the form, whenever possible. Dies of the high hardness variety, such as chrome-plated or high-frequency-treated steel, will give the best results. Blades must be sharp, with internal corners smoothly rounded, in order to avoid any nicks or sharp angles. Retention points should be small and as few as possible.

Guideline No. 12
Use sharp high hardness steel blades with rounded inner edges.
Adjust carefully to 'kiss cut'.
Retention points should be small and few.
Select flat dies for Robuskin® PE types, when possible.

Punching and Drilling
Robuskin® can be punched and drilled just like paper, provided that all air cushions are expelled from the stack. Stack heights should be kept below 2 cm if a rotating drill is used. Sharp hard drills or punches should be used, and if the drill is of the rotating type, then the dwell time should be kept to an absolute minimum, in order to prevent the sheets from 'welding' together. Square pegs do not fit into round holes, and square holes have sharp internal corners. Therefore, for most applications, including wire binding and sprocket drives, round holes are preferable.

Guideline No. 13
Expel air cushions from stack.
Sharp hard drills or punches should be used.
Limit dwell time and stack height to 2 cm for rotating drills.

Perforating
Robuskin® can be perforated in either direction with equal ease, as there is no grain direction. The first slot of the perforation, in order to ensure the material starts to tear across the perforation when required, should always be cut into the edge of the material, and not inset. Perforation slots should be long, and ties short, and they should be cut with sharp, short, hard teeth.

Guideline No. 14
First slot cut into edge of material.
Slots should be kept long, ties short.
Sharp, short, hard teeth to be used for cutting.

Folding and Scoring
Robuskin® can be folded and scored in either direction by equipment used for paper and board of a similar bulk. Pre-creasing on the inside on a channel matrix cylinder press system will improve folding. Hot wire folding techniques may also be utilised, provided temperatures and dwell time are limited, in order not to distort the film.

Guideline No. 15
Pre-creasing will improve folding.

Fan Folding
Robuskin® can be fan folded on continuous presses utilising spiral folding equipment. As in printing, the web tension should be kept to a minimum to avoid any possible distortion of the material.

Guideline No. 16
Spiral folding equipment should be used. Minimal web tension to be kept.

Gluing and Binding
Robuskin® ‘B’ (coated on both sides) can be glued easily by using suitable solvent-free adhesives. Robuskin® ‘E’ (coated on one side) and Robuskin®® ECO (uncoated) qualities must be glued utilising film glues. When perfect binding, it is recommended to abrade the spine, in order to improve the adhesive key. Drying times of glued synthetic materials are usually somewhat longer than for paper surfaces. All Robuskin® qualities are suitable for saddle stitching, section sewing, spiral and comb bindings, for which round holes are preferable.

Guideline No. 17
Gluing - Robuskin® ‘B’: solvent free adhesives.
Gluing - Robuskin® ‘E’ and ECO: film adhesives.
For perfect binding, abrade the spine.

9. Environment and Safety

Robuskin® is environmentally friendly.

Guideline Recycling
Providing that it is clean and properly sorted, used Robuskin® can be safely recycled. The Robuskin® coating is not significant to the recycling process.

Guideline Burning
Robuskin® polyolefin qualities are particularly suitable for incineration, the only by-products being water and carbon dioxide.
PVC qualities should be burned in ovens with special flues.

Guideline Composting
Robuskin® polyolefin qualities can be composted, as there is no build-up of toxic substances. However, especially where air and daylight are excluded, the biological degradation process requires a longer time.
Robuskin® is safe according to DIN EN 71/3, EU DIR 90/128/EC

Security
Robuskin® conforms to the European toys norm DIN EN 71/3 regarding heavy metals content. Most coated Robuskin® versions conform to the German legislation governing the regulations applying to material to be used in direct contact with food (Food Stuffs & Consumer Goods Act, Directive No. 80.30,1-3 (EC). Robuskin® PE ECO and PP ECO conform to EU legislation governing the use of materials in direct contact with food, Directive 90/128/EC.

10. The Robuskin® range

With Robuskin® there is a choice…

Base films for coated versions

PE	High density polyethylene
PP	Polypropylene
PP-K	Polypropylene compact
PP-F	Polypropylene foamed
XTP	Polyolefin
PET	Polyester
PVC-HO	Rigid polyvinylchloride with high opacity
PVC-LO	Rigid polyvinylchloride with low opacity

Coatings

E	one side coated
B	double side coated
S	water based coating
T, F	solvent based coating
CL	Coating for colour laser printing and offset

Base films for uncoated versions

PE ECO	High density polyethylene with paper-like surface (without function)
HDPE ECO	High density polyethylene

11. About MDV

MDV is a reliable partner for creative coating solutions supplying speciality white, coloured and fluorescent coloured face papers and films to self-adhesive manufacturers.
Robuskin® is a synthetic material for sheet-fed and narrow web reel printers. Fluorescent papers named Fluolux® XTR are an ideal solution for labels, Fluolux® Copy developed for laser printers and copiers. Jetprint® is MDV's product to be printed by inkjet printers.

MDV's portfolio is completed by security papers (e.g. stamp paper), metallic and digital imaging (including Xeikon, Xerox, Indigo) substrates for the labelling industry, as well as heat seal papers.

Let us solve your imaging problems through our top-coats.

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