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This Content is printed on MDV robuskin® PET Laser, 125 µ, white, opak.

Introduction

Welcome to Robuskin®, a synthetic paper which due to it's 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® means a choice of synthetic materials. Unlike most other synthetic papers Robuskin® can be chosen on a variety of film substrates, Polyethylene, Polypropylene, 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, as 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, to weather, to cold and heat (dependant 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 applications ranging from being used in the harshest to clean room environments.

Robuskin® can be printed and finished just like ordinary paper, in continuous or sheet format, by Offset, Letterpress, Flexo, Gravure and Silk Screen. Robuskin® should be stored wrapped like ordinary paper.

Robuskin® may also be overprinted by Thermal Transfer, Dot Matrix, Mono Inkjet, Cold Fuse Laser systems or Typewriter. Handwriting by ball-point pen and leaded pencils is possible on Robuskin®. Pens, using aqueous inks, 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 types are especially suited to this application.

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 practice, and for best results, a few simple guidelines detailed herein should be followed.

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.

General Print Requirements
reel and sheet fed materials.

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 cms., and sheets should be well aired by fanning to ensure equilibrium of temperature and humidity throughout the stack and across the sheet.

Guideline No. 1
Due to the nature of synthetic materials it may be necessary to acclimatise 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

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.

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

Robuskin® should be fanned in order to ensure smooth **feeding,** and stack heights should not exceed 15 cms. 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 cms.

On Press.

Fount Solution. During wet offset printing, water should be kept to a minimum, and contain approximately 17% of 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 on Robuskin® coated qualities, and will not be absorbed by the ECO qualities. This may inhibit the transfer of inks and lead to emulsification of the ink, and the resulting problems with the ink rollers feeding back the emulsion into the ink pans until the whole inking system is 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 pH of 6,5 to 7,5 - do not allow to drop below 5,5.

Printing Pressure. With the exception of Polyester, synthetic materials due to their manufacturing process, are by nature, stretchy and compressible, therefore, printing pressure should be maintained as high as possible. A pressure about 10% higher than normal for paper, together with the use of compressible blankets, and overpacking the dress-up 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

(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 stretch which is inherent 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 to 45 µ of starch which is Hydrophilic (not water soluble) 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, dependant 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 used for coated paper.

In avoiding set off, particularly for the ECO grades, it is also advisable to rack the sheets, without wedges, in stacks no higher than 15 cms. 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.

Rotary Systems. Robuskin® is ideally suited to reel fed systems and may be finished reel to reel, to sheet, or to 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 foregoing applicable sections.

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

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

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

Delivery/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-absorbant surface, which does not dry by absorption and evaporation, but by oxidation (chemical change). 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 cms.

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

Drying. Robuskin® coated qualities, when printed four colour with conventional inks, using standard drying techniques, have been backed up within one and a half hours. Robuskin® ECO qualities being non-absorbant 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., and always

remember when racking, that stack heights should be limited to a maximum of 15 cms.

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 cms.

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

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.

Special attention should be paid to the following :

Solvent Inks contain aromatic solvents, and therefore, if possible, should be avoided as they may distort the surface of Robuskin®, coated or uncoated, and thus affect close register. However if such inks must be used, then a 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 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 of inks which dry by oxidation. The gases generated by the oxidation (chemical change) 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 liklehood 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 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 (auxilliary 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 liklehood of contact yellowing, should be used.

- Inks should be used without any auxilliaries 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 liklehood of yellowing to 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 do offer the advantage of immediate drying, but the drying units, unless of the water cooled variety, must be adjusted to take account of the heat sensitivity of the film substrate. However, special care must be taken with these types of inks, where the ink/water balance on the uncoated qualities (PE & 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.

Varnish. Apply varnish, machine or acrylic, in the same way as recommended herein for inks.

It is inadvisable to use Infra Red litho varnish since the drying lamps must be turned off to avoid distortion of the film substrate. However, if it must be used, then ensure that the print is fully dry and not just matt/soft, as this could re-wet the varnish and cause blocking.

If a UV varnish is used then the drying units, unless of the water cooled variety, must be adjusted to take account of the heat sensitivity of the film substrate.

INK AND VARNISH SUPPLIERS

Robuskin® coated versions, have a special and unique coating, which enables the printer to use standard litho inks with all their associated benefits, as they are physically absorbed into the coating, and dry normally by evaporation.

Whilst all Robuskin® qualities may be printed with film inks or UV drying inks, the Robuskin® ECO qualities, due to the fact they are uncoated economy versions, must be printed with these types of inks.

The following lists are in no way exhaustive, and your Ink/Varnish supplier will also be able to give recommendations.

K + E Druckfarben
Vertriebsgesellshaft mbH
70469 Stuttgart
Tel.: +49(0)1805/22 82 82
Fax: +49(01805/22 82 83

Zeller+Gmelin Druckfarben
GmbH & Co.
73054 Eislingen
Tel: +49(0)7161/ 80 20
Fax: +49(0)7161/ 802 200

Gebr. Schmidt GmbH
Druckfarbenfabrik
60489 Frankfurt
Tel.: +49(0)69/78 02 – 282
Fax: +49(0)69/78 02 – 305

Reference EU 8195

Siegwerk
Farbenfabrik Keller
53721 Siegburg
Tel.: +49(0)2241/30 40
Fax: +59(0)2241/30 42 30

Reference
Litho Set BE C/M/Y/B
Anti Skin
50-140144-2
50-340144-0
50-840144-0
50-940144-4

New Print Technologies.

Digital imaging is fast becoming popular for short run requirements using Indigo or Xeikon engined printing units. It is clearly recognized that certain applications will require synthetic materials which are approved for these machines. It is therefore, useful, to advise, that at the time of writing, some field trials have already taken place, and the approval process has begun with both manufacturers.

Indigo

Robuskin® coated qualities of PPK, PET and PVC - 'E' (one side coated) and 'B' (both sides coated) without the need to be further treated with the Sapphire treatment, have shown excellent results. Trials are continuing to prove the Robuskin® coating by following the recognized test procedures. These test procedures developed by Indigo, are designed for individual printers to satisfy themselves as to the suitability of various print media, including Robuskin® coated qualities. As press temperatures may reach 70 °C plus, Robuskin® PE types may stretch and mis-register.

Xeikon

Because of the toner fusing temperatures, being 130 °C and 190 °C, only Robuskin® Polyester qualities are developed and suited to withstand these temperatures. Trials in both Monoplex and Duoplex machines have proved successful with PET 'E' and 'B' qualities.

Naturally, at this early stage in the approval process, it is advisable that print trials be conducted before a commercial run, in order to satisfy individual requirements. It is further recommended, that such trials be conducted towards the end of the blanket life (Indigo) and drum life (Xeikon).

Overprinting (Variable Information Printing).

Robuskin® is suitable for variable information printing, using both impact and non-impact techniques. The coated side of Robuskin® will accept ordinary handwriting, as well as typewriting by most systems, and overprinting by machines normally used for paper and board. Robuskin®, as a multitalent, also accepts Dot Matrix, Thermal Transfer (wax, resin or hybrid ribbons), cold fuse laser, and some flash fusion laser (requires individual testing). Excellent bar code printing results on coated qualities have been obtained with wax and wax/resin hybrid ribbons, as would be expected with a ”paper-like” surface. On the ECO types all ribbons give excellent results in keeping with an uncoated film surface. For Hot Fuse Laser, Robuskin® Polyester qualities have been developed with the ability to withstand the high fusing temperatures. Robuskin® may also be overprinted by mono ink jet systems of the solvent type, however for colour ink jet applications ask for MDV’s range of Jetprint® qualities.

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

In addition, it is also possible to order Direct Economy Thermal versions of Robuskin® (Thermoskin).

Where overprinting is a requirement, please always ascertain the system to be used for the variable information print, in order that we may advise the most suitable Robuskin® type.

Print Finishing Techniques.

Hot Foil Stamping. Trials have been succesfully conducted with the Foils Division of API Group plc. to excellent result. However it must be remembered, that due to the temperatures, 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, account has to be taken of the heat sensitivity of the Robuskin® quality selected. Customers should therefore, satisfy themselves, prior to a commercial run, by trials, as to the acceptability of the desired image.

Recommended Foils:	Whiley	Astor
Robuskin® PE coated and uncoated)	LS & LR	537, 576, 577
Robuskin® PE ECO Coloured	LS	577
Robuskin® (coated and uncoated)		537, 576, 577
Robuskin® PVC (coated)	LS & LR	537, 576, 577
Robuskin® PET (coated)		576

Dieless Foil Stamping. Clearly this new state of the art foiling technology, with it's low set up and origination costs, offers with existing equipment, a cold foiling option to those printers, who previously may not have contemplated foiling and is ideally suited to Robuskin®. Please contact the following for more information:

Whiley Foils Ltd.,
Firth Road,
Houston Indutrial Estate,
Livingstone,
West Lothian, EH54 5DJ,
Scotland.
Tel +44 1506 438 611
Fax +44 1506 438262

API Foils Division
Astor Road,
Eccles New Road,
Salford,
Manchester M5 2DA,
England.
Tel +44 161 789 8131
Fax +44 161 787 8348

Embossing. Trials at the time of going to Press had not yet been conducted. They will be carried out in due course and a replacement issued for this page.

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:

Heatseal Overlaminates.
Typical operating temperatures for such materials can be up to 150°C, therefore, clearly recognition should be taken of the heat sensitivity of Robuskin® synthetic substrates, and the dwell time utilised, in order to minimise any distortion of the film that will occur, particularly with PE & PP qualities.

Self Adhesive Overlaminates.
For Robuskin® both sides 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 two 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, 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.

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 and 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 stack, which should not exceed a height of 15 cms. 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. 1
Expel Air Cushions from Stack.
Stack Height < 15 cms.
Clamp Pressure Minimal.
Sharp Blade Ground 21°.
Guillotine 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, unlike paper, are non porous materials, they must be cleanly cut right through, because they will not ‘burst’ like paper. As Robuskin® PE types are liable to inherent stretch, die-cutting is preferred using flat die systems against 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. 2
Sharp high hardness steel blades with rounded inner edges.
Adjust carefully to ‘kiss cut’.
Retention points small & 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 cms 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. 3

Expel air cushions from stack.
Sharp hard drills or punches.
Limit dwell time and stack height to 2 cms. 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. 4
First slot cut into edge of Material.
Slots long and Ties short.
Sharp short hard teeth.

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. 5
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 to the material.

Guideline No. 6
Spiral Folding Equipment.
Minimal Web Tension.

Glueing and Binding. Robuskin® 'B' (coated both sides) can be glued easily by using suitable solvent free adhesives. Robuskin® 'E' (coated one side) and Robuskin® ECO (uncoated) qualities must be glued utilising Film Glues. When perfect binding, in order to improve the adhesive key, it is recommended to abrade the spine. 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 type bindings, where round holes are preferable.

Guideline No. 7

Glueing - Robuskin® 'B' solvent free adhesives.
- Robuskin® 'E' and ECO film adhesives.

Perfect binding abrade the spine.
Round holes when spiral or comb binding.

Environment and Safety.
Robuskin® is environment friendly:

Guideline	Providing that it is clean and properly sorted, used
Recycling	Robuskin® can be safely recycled. The Robuskin® coating is not significant to the recycling process.
Guideline	Robuskin® Polyolefine qualities are particularly suitable
Burning	for incineration, the only by-products being water and carbon dioxide. PVC qualities should be burned in ovens with special flues.
Guideline	Robuskin® Polyolefine qualities can be composted as there is
Composting	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:	DIN EN 71/3
	EU DIR 90/128/EC

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 use of materials in direct contact with food - Directive 90/128/EC.

Robuskin® is a choice

PE	**HDPE (High Density Polyethylene)**
PPK	**Polypropylene Compact (Normal Density)**
PPF	**Polypropylene Cellular (Low Density)**
PET	**Polyester**
PVC	**Rigid PVC Opaque**
PVC-LH	**Rigid PVC Semi Opaque**

MDV

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