PrintCity
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webline

SPECIAL REPORT N° 2

Value Added Printing of Newspapers

Executive summary

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This Webline™ Special Report focuses on Value Added Printing of Newspapers. VAPoN™ is a unique cross-industry project that combines, across the process chain, expertise from: Adphos-Eltosch, a leading UV dryer supplier; MEGTEC, the industry's leading heatset system manufacturer; Sun Chemical, who pioneered EB and UV inks; MAN Roland for presses; UPM for paper; and other experts. The project's goals are to share knowledge from a technical and economic analysis both to assist investment planning and identify opportunities for increased revenue and differentiation.

VAPoN is a newspaper product with a clearly visible difference to standard coldset that is recognised by readers and advertisers. It is capable of attracting higher revenues to the newspaper and/or adding to its differentiation.

The strong growth of interest in VAPoN is driven by three related challenges:

1. **Media and revenue competition-** Responses to the post-Internet media landscape?
2. **Change in industry structure-** Newspaper production as profit centres or commercial entities?
3. **Technology change-** What can be done now and in the future?

1: Media and revenue competition

Industry research indicates that future newspaper opportunities will come from continuous product enhancements. Half of these are related to Value Added Printing (*):

- Brand name leadership, improved design
- More flexibility, topicality, target group orientation
- Special interest supplements and magazines*
- Preprinted advertising inserts*
- More regional editions and distributed printing
- Cross-media promotion and services using the Internet
- Better readability*
- More and better colour*
- Upgraded paper*.

There is also an emerging school of thought that a newspaper will no longer be a single product but a series of electronic and printed versions targeted to different reader segments.

SUPPLEMENTS & ADVERTISING INSERTS

Preprinted advertising and editorial sections inserted into the newspaper jacket provide many publishers with their strongest growth. Preprinted advertising revenue of US daily and Sunday newspapers outstripped ROP (Run of Paper) advertising in 2001 and average annual growth is around 10-12% compared to 0-2% for ROP. A major problem for publishers is that they generally only retain 40-60% of insert revenue because most are produced by external printers. According to WAN's "Innovations in Newspapers 2005" the best defence that newspapers have is to bring their own print quality closer to the standards of commercial printers. Potential newspaper revenues related to VAPoN techniques include:

1. Increased share of insert revenue by producing more preprints inhouse.
2. Increased share of advertising from other carriers (direct mail or private distribution systems).
   Laws restricting junk mail are an opportunity for newspapers to increase share because advertising material is more acceptable when

bundled into the newspaper.

3. Bring inhouse outsourced magazine and supplement printing.

A significant proportion of preprinted advertising and editorial supplements can be produced on correctly equipped and operated newspaper presses. VAPoN's market application is in this area where the print output can be adequate for its selling purposes and there is strong pressure to minimise cost. However, jobs of high quality, on heavy papers, or with unusual folds will remain the domain of commercial heatset printing.

BROAD VAPoN PRODUCT RANGE

- Newspaper covers with high point-of-sale impact and without marking
- Sections for premium double-page and cover advertising
- Giant pull-out posters
- High impact ROP advertising pages
- ROP "inline" advertising supplements
- Editorial magazines and supplements.

EARLY ADOPTERS

Australia leads the world in producing differentiated newspaper products. The format, print process and paper grade of free suburban weekly papers in major cities are determined by the economic profile of the area in which they are distributed. Lower economic profiles receive coldset on newsprint, median areas hybrid heatset-coldset and the highest economic areas have complete heatset production on coated paper. Many regional newspapers are also hybrid heatset-coldset and this will be extended to at least one metropolitan daily in 2007.

KEY SUCCESS FACTOR

Probably the single most important success factor is an entrepreneurial business strategy with effective sales and marketing implementation. Delivering a technical solution to fit the business strategy is comparatively simple and predictable.

2: Industry structure

In the past two decades newspaper production structure has evolved into different streams:

- Vertically integrated production as profit centres
- Alliances with other publishers to run joint production facilities
- Outsourced production to a commercial company on a contract basis.

High capital investment in presses and mailrooms requires better capacity utilisation from additional production. Coldset printing on newsprint was a barrier to many newspaper printers and, consequently, during the 1990s there was a significant increase in presses equipped with dryers. The changing industry structure and new technologies have blurred the previously separated coldset and heatset operations and created a printing category called "selected", "light" or "semi" commercial.

Semi-commercial printing is a technique in use for over 30 years. It is defined by Ifra and PrintCity as "printing on a newspaper press equipped with a dryer". As its name implies it is used to print low to mid quality commercial work, inserts, magazines, directories and some newspaper products. VAPoN uses these techniques but focuses on their application to newspaper products and business opportunities. (Ifra has worked with PrintCity to test print VAPoN samples as part of an Ifra project to investigate the need for a specific standard for semi-commercial printing.)

3. Technologies

The search for a single panacea added value technology is inappropriate for a newspaper industry that is extremely variable at local, regional and national levels. The reality is that there are several options, each of which has strengths and weaknesses for potential success in a given market environment.

The relationship between paper and ink-drying systems determine the type of papers that can be printed, printing quality and total operating costs. The two types of ink systems available – oil-based or radiation – have different characteristics and performance in newspaper operations today.

SOME TECHNICAL CONCLUSIONS

This report's technical-economic evaluation shows that there is no single technology solution for all newspaper applications. Broad indications of current performance show that:

- Matt coated papers allow coldset printers to increase product quality without capital investment. The total cost of production is similar to printing heatset on SC paper, print gloss will be lower and the risk of marking higher.

VAPoN Study Benefits

The benefits delivered by this PrintCity VAPoN study include:

1 – Unique cross-industry shared research knowledge

2 – Analysis of technical – production – economic factors

3 – Assists informed investment planning & business growth

4 – Increased revenue opportunities & differentiation.

• Heatset remains the optimum process for high-speed applications with excellent quality, good runability and flexibility to print on any paper grade. It has the highest investment cost and can be difficult to retro fit but offers the lowest total printing cost – about 15% higher than coldset on the same paper grade. New 2 + 1 configurations provide a viable system for double-width users interested in printing ROP heatset — the first of these presses is now starting up at APN in Australia.
• UV may be an option for newspapers that do not have adequate space to install a heatset drying system. Although capital costs are lower, the total cost to print is 50-60% higher than heatset due to slower operating speeds and higher ink costs.
• Conventional UV is a choice for slow-speed single-width presses whose users do not want to make high capital investment and are prepared to pay higher production costs.
• The more efficient Inert UV offers a similar choice for double-width users and the first production pilot site will be at Herold in Austria in 2007 (involving four of the VAPoN project partners).

YOUR OPPORTUNITY TO PARTICIPATE

The survey is open for participation until November 30, 2006 and print samples can be obtained by contacting a representative from the project sponsors Adphos-Eltosch, MEGTEC, MAN Roland, Sun Chemical or UPM. All individual results are confidential and are managed by the University of Swansea. The results of the research will be sent to all participants if they provide an e-mail address.

• EB is theoretically well suited to double-width newspaper production but there are currently no newspaper installations.

The two most significant barriers to increased use of UV and EB systems are related to their ink chemistry. The current maximum speed of 7 m/s should progressively increase. However, their high ink costs are unlikely to reduce. The issue of long changeover times between oil-based and radiation inks is ideally addressed by using a printing tower dedicated to a single ink system.

VAPoN Value?

A key part of this project has been to initiate an industry discussion on the value of differentiated newspaper products. Improved quality must be related to what revenue or competitive advantage can be generated from them to build a business case for their deployment.

PrintCity's VAPoN team instigated an international quality and value assessment combined with a survey of trends. A series of seven editions of the same newspaper were printed on different papers by different print processes. These have been assessed by newspaper staff around the world to determine their perceived quality ranking and their potential revenue premiums. Responses have been sought from all of the participants in newspaper publishing – editorial, advertising, marketing and production – to see how different their perceptions are.

PRELIMINARY RESULTS

The survey data is being independently analysed by Dr Tim Claypole of WCPC, Swansea University. His initial conclusions are based on 70 responses received by September 12, 2006 and can be found on pages 21-23.

The test newspaper products with the highest perceived values were both printed heatset — on 54 gsm LWC and 52 gsm SC-B (ISO 67 paper brightness). In third place, the 48 gsm Matt C (VAC) ISO 80 printed coldset was rated better than Improved Newsprint printed heatset.
The objective of the assessment being to identify the range of increased advertising revenue and other business opportunities related to differentiated paper-print qualities.

In addition, participants identified the relative importance of a number of trends in their market over the next three years by ranking them from low through medium and high to very high. These show that:
• The most important development will be more 4-colour pages, which was rated by over 80% as high or very high.
• Improving ROP paper grade and/or print quality is seen as a high priority.
• Almost equally important is improved quality of front and back pages from either better paper, printing or higher gloss, and elimination of marking.
• Many respondents believe printing of magazines and advertising inserts to be important.
• Changing to a more compact format is a medium to high priority.
• The potential trend to newspapers becoming more like magazines is seen as low to moderate for 75%, with 25% identifying this as important.

VAPoN

TECHNICAL-CONSIDERATIONS

Paper-ink-drying systems

Heatset, Ultra Violet (UV) and Electron Beam (EB) are all mature technologies used by different segments of the printing and packaging industry. Until recently, only heatset has been widely used (in addition of course to coldset) in newspaper applications but UV is becoming increasingly popular for slow speed single-width newspaper presses in the US.

Semi-commercial and VAPoN printing qualities are determined by the interaction of three critical elements — the paper grade, the ink technology and its drying/curing system. These three elements also determine capital and operating costs.

Sustained production speed is a key criterion for most newspaper operations and the paper-ink combination normally determines the maximum production speed available from a given process technology. Whilst UV dryers are capable of running at 12 m/s and EB at 25 m/s, their ink characteristics restrict actual printing speeds to 5-7 m/s for coated paper and even less on newsprint. UV/EB inks are acrylic based with a short molecular structure and have relatively high slinging and misting that impede high printing speeds. A recently tested Inert UV system has achieved 10 m/s in tests but is yet to be proved in sustained production. EB inks have more potential to increase its maximum speed than conventional UV.

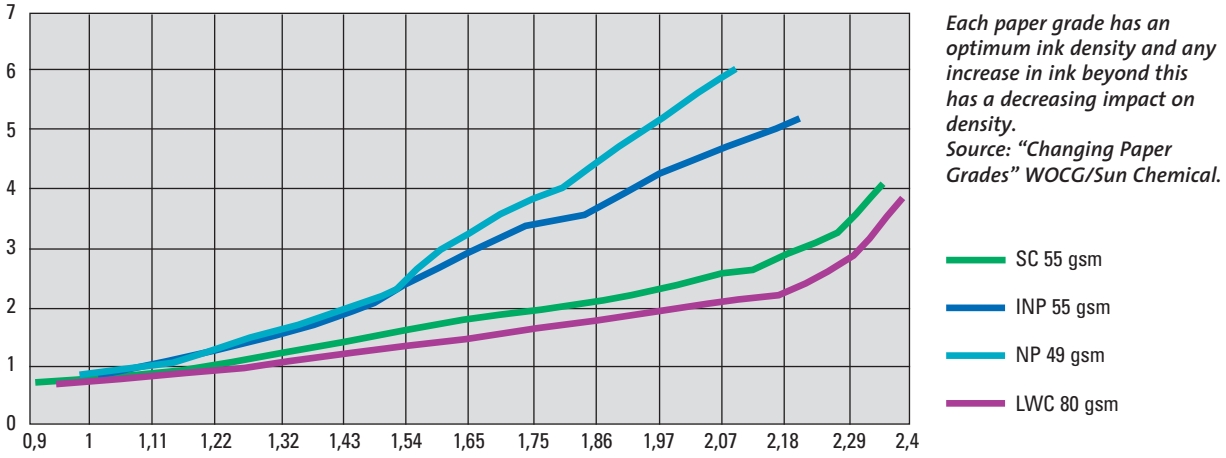
Oil-based coldset and heatset ink-drying systems provide the most reliable high speed performance today. These vegetable or mineral oil-based inks have a long molecular structure, pump easily and have low misting. Heatset provides unrestricted drying on all web offset paper grades at up to 18 m/s.

Paper

Paper is the single most important element that defines quality. Brightness and print gloss strongly influence the value attached to each grade. The range of paper grades that can be printed is determined by the ink-drying system used and only heatset or radiation ink-drying systems can print all grades of paper. Options for coldset production include Improved Newsprint with higher brightness. UPM Matt is the only mechanical coated grade designed for CSWO high quality 4-colour printing. It is a Mechanical Finished Coated also called Value Added Coldset (VAC).

Ink consumption & SID

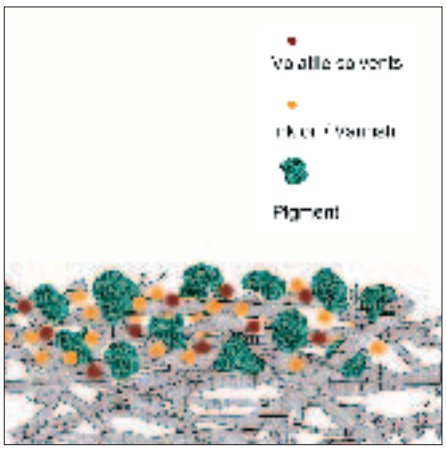
Ink densities on SC/LWC papers tend to be higher than coldset on newsprint and use more ink but higher grade papers tend to consume less ink, e.g. UPM indicates that coldset MFC should use 15-20% less ink than standard newsprint. Standard Ink Densities (SIDs) for coldset on newsprint are a compromise between visual appearance and adverse effects such as marking, rub off, set off and print through. The visual effect of density is logarithmic, which means there is a rapidly diminishing increase of density compared to the increase of ink weight on paper. However, the adverse properties versus ink weight on paper tend to be linear. Different papers have different levels of maximum SID, and even within a single grade, e.g. coldset, ink consumption on newsprint can vary over 20% between paper suppliers, mainly based on different fibre composition and surface properties. Therefore, be very cautious about the impact on ink consumption when changing paper grades and processes.

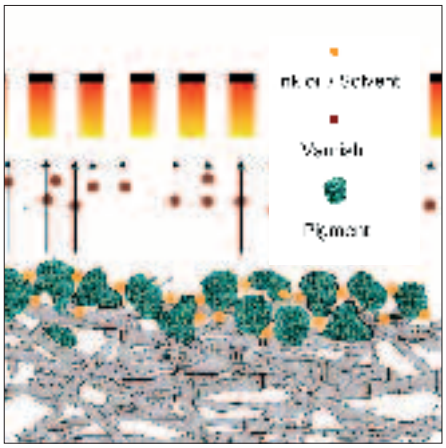


Each paper grade has an optimum ink density and any increase in ink beyond this has a decreasing impact on density.
Source: "Changing Paper Grades" WOCG/Sun Chemical.

Oil-based ink-drying systems

Conventional coldset ink





Conventional heatset ink

Coldset and heatset inks are mature, reliable and predictable for newspaper offset printing. They use variations of oil-based chemistry that are themselves mature, reliable and predictable. Heatset has been used on newspaper printing presses for 30 years and there are hundreds in use on single-width presses, although double-width press use has been more limited. Changing inks when switching between heatset and coldset printing is a productivity barrier. However, many printers permanently run heatset inks and simply turn down dryer heat on newsprint; another alternative (from Sun Chemical) is a single combination ink for heatset that also functions as an enhanced coldset ink on newsprint.

Value added coldset - VAC

A special MFC (machine finished coated) paper from UPM, UPM Matt C, for coldset printing that can produce excellent quality. It has the optical and surface enhancements of a coated grade and the absorption and performance characteristics of a normal coldset paper.

Infrared - IR

The "hot topic" of the mid-1990s that went cold very quickly. In practice IR only marginally improves coldset ink penetration to reduce smearing and set-off and has poor performance on coated paper even with very slow printing speeds. IR works most effectively with black and blue inks that absorb IR wavelengths but are very poor with lighter colours like magenta and yellow, which are the most critical 4-colour process inks. With viscous inks IR does help printing by warming the inks to give better penetration. Some users produce smear-free cover sections on newsprint or SC paper at 7m/s using modified heatset inks.

Heatset

Hot air drying is the most commonly used value added newspaper process because of its flexibility to print on all paper grades with improved ink gloss, less dot spread and reduced marking. Heatset is a mature, reliable and easy to operate process that is cost efficient and has been used on newspaper presses since the late 1960s. Hot air flotation dryers deliver unrestricted drying at speeds up to 18 m/s and can also be used at low temperature to assist coldset ink drying. Although these dryers are relatively bulky, practical installation solutions exist for most press environments, including press extensions. A horizontal web path is the most common configuration because there is a wide range of dryer web widths and lengths available with up-to-date technology. A vertical dryer mounted on a chill tower is available for slower speed single width presses. A range of oxidation technologies complies with clean air regulations and the integration of oxidisers with the dryer can significantly reduce total energy costs.

Several hundred single-width presses use hot air dryers but they have been more rarely used on double-width presses, but this is beginning to change. The trend to smaller formats and reduced web widths means that many double-width machines are only 30% wider than single-width and this simplifies fitting dryers. Recent innovative press configurations developed by MAN Roland now allow newspaper printers to combine single and double-width presses into a single production system. Heatset webs are run simultaneously on a single-width press directly into the double-width folder that integrates them with the coldset sections. This configuration allows unique advertising and editorial possibilities, including ROP heatset on coated paper for covers, sections and posters. Presses can be installed either as a folder-to-folder inline layout or installed in parallel with a 'bridge' with 90° turner bars to transfer the webs into the double-width folder. Both presses can be run separately and the heatset line can then be used for pre-printing and semi-commercial work. Switching between heatset and coldset inks is relatively easy but many users simply use heatset all of the time.

Radiation curing inks

These systems are based on acrylate chemistry and have short molecular chains — rather than the long molecular chains of oil-based coldset and heatset inks. Unfortunately, acrylates are a high cost ingredient in limited supply, which helps explain why they are 300-500% more expensive than oil-based inks and are unlikely to reduce in cost. Inks are cured (rather than dried) by UV rays or EB radiation that initiate chemical bonding. UV inks require photo-initiators to promote bonding. EB does not require photo-initiators but must use an inerting gas to produce an oxygen-free curing environment.

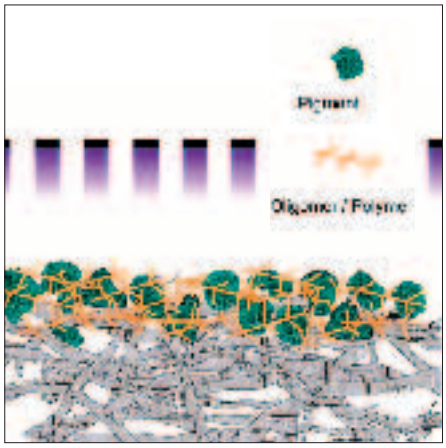
The advantages of radiation inks include printing on any substrate, no marking and little heat transferred to the paper.

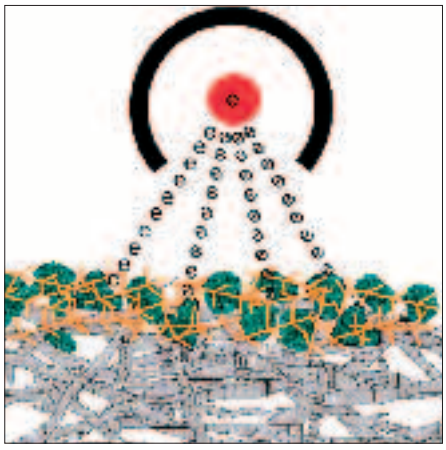
UV (and EB) ink formulations are lithographically robust but have significant issues related to their low molecular weight ink chemistry:

- The single largest UV/EB challenge is ink slinging that limits speed and also can cause web breaks. Current highest UV production speed is 7,5 m/sec for a narrow web business forms press, 5 m/s for sheetfed and single-width newspaper presses. It should be possible to lift this to 7,5 m/s web on good substrates like LWC but achieving this speed for newsprint will be much more difficult as the ink tack will give significant problems and inks will need adjustment to stop picking and web breaks. Misting is also a problem that is encouraged by the higher temperatures on UV ink rollers and makes a mess of the machine.
- UV/EB ink tack is much higher than conventional inks. Most current UV applications use several inter-unit lamps and the inks are mostly dry trapped. However, most newspapers use only end-of-press curing with wet-on-wet ink trapping, which means that picking may be a problem on newsprint.
- Black and dark colour curing is affected by absorption of the UV light by the pigment resulting in loss of cure, excessive use of photo-initiators, or increase in lamp power (not an EB issue).

Resolving these problems and increasing speed in the short term will be difficult. Using additives that are not restricted by food regulations (principal UV use) might allow marginal speed improvements for newspaper applications. Sun Chemical's assessment is that conventional UV inks will be unlikely to achieve typical newspaper press speeds of 12 m/s in the immediate future and any speed increases will be incremental.

UV curing ink

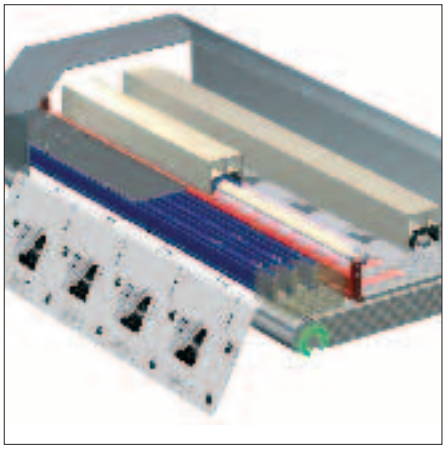




EB curing ink

UV systems

Conventional UV



The closed chamber UV concept replaces oxygen with an inert gas. Adphos-Eltosch uses three Eltex electron guns to break up the surface-air boundary layer to move oxygen away from the paper/ink surface. The result is a 35% reduction in power, more gloss and less wasted heat.

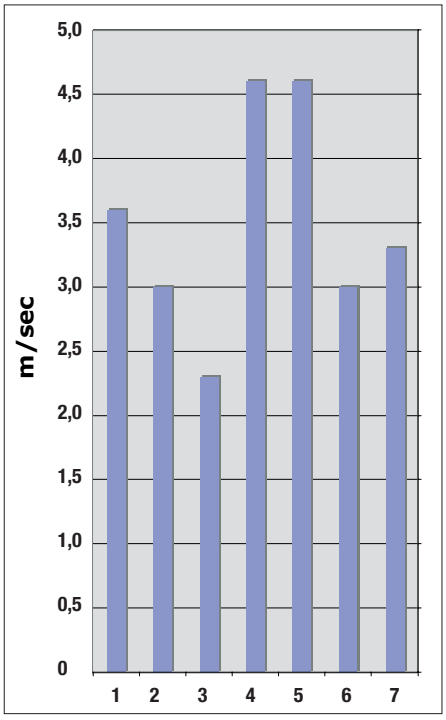
The curing process uses inks containing a photo-initiator that reacts to a specific set of wavelengths and intensity of UV light. The printed substrate is exposed to UV light that initiates a chemical reaction of the photo-initiators and other UV-reactive components to almost instantly cure the ink. When catalysed by the combination of UV light and photo-initiator, the ink binders immediately react to give a dry ink film.

About 60 000 UV drying systems are installed worldwide — about 30% are used for narrow web flexo, 30% narrow web offset, 20% sheetfed and 20% for other applications like screen printing and coating. There are a number of recent installations on single-width newspaper presses, mostly in the US. Systems are compact and require lamps for each side of the web — multiple lamp configurations can be in the web direction or across it. Capital costs are relatively low but ink costs are high and the nature of the ink tends to limit printing speed and operational efficiency.

Inert UV

A recent innovation from Adphos-Eltosch and Eltex improves production efficiency by using an inert gas and electronic ion generation to reduce the oxygen boundary layer close to the paper surface that inhibits curing. The prototype printed at up to 10 m/s on one side of the web of a double-width newspaper press. The system is claimed to reduce lamp energy by up to 35%, either reducing the number of lamps needed or increasing curing speed. In addition, heat transfer is reduced by 80%, there is less waste and ink gloss is improved compared to conventional UV. The EFD inerting system uses up to 90% less nitrogen than conventional systems. The first pilot production system will start-up in 2007 on a MAN Roland Colorman tower to be installed at Herold in Austria.

UV production speed on newspaper



None of the seven surveyed US printers have yet achieved 5 m/s printing speed. Presses running in combination mode print 5-35% UV and the balance conventional ink, with one press running only UV. Source Sun Chemical.

Hybrid UV inks

These combine some of the advantages of conventional and UV inks and are used by a few hundred sheetfed printers. However, they tend to be more expensive and are difficult to clean. Sun Chemical Hybrite was the original hybrid and it is a mix of free radical and conventional components. However, no UV hybrid ink yet exists for newspapers. If one is developed, it is most likely to be based primarily on UV ink technology supplemented with some conventional oil-based components.

UV on newspaper presses

There is currently a mini boom in the US for UV dryers on single-width single-development newspaper presses that have a maximum speed of up to 5 m/s to print mostly coated paper. A snapshot survey of seven of these installations shows that all of them print advertising inserts and other commercial work, whilst newspaper products account for about 20% of output. Average printing speeds range from 3 to 4,5 m/s. Most presses operate in a combination mode — switching from conventional to UV — and one operates 100% of the time in UV.

Trader Publishing Inc. is an example of the US trend to equip single-width, single-development presses with 4-high towers equipped with UV curing. Trader is converting to UV to eliminate costs associated with the heatset presses the publisher formerly used to produce its coated products. Their first UV tower has been running for over a year to produce coated covers for its own publications and inserts. Bob Shoup, group plant manager said (in Newspapers & Technology Dateline eNewsletter), "We're doing national covers with the tower and you can't tell the difference between those produced with UV curing and those printed heatset." Trader recently ordered three more UV equipped towers to extend presses in several locations.

Electron Beam (EB) radiation curing systems

Currently used for web offset and gravure printing of liquid cartons and plastics. Energy is transferred to the curing process from high power electron beam emitters to generate free-flowing electrons that initiate chemical bonding of the inks. This energy is sufficiently high to cure inks on both sides of the paper simultaneously and curing takes place in a compact space at up to 25 m/s. EB requires an inert gas (nitrogen or other) to replace the oxygen that inhibits the curing action — new technologies generate nitrogen more efficiently than in the past. The high electrical energy requires substantial shielding of the machine.

In 1995, an Ifra research project "Improving the print quality with dryers and better paper grades" made extensive tests with an EB dryer at the SID in Leipzig. Its conclusions were that:

"EB curing offers the greatest quality leap because all problems concerning smearing and set-off are solved and full use can be made of higher grades of paper. The feasibility study shows that the installation cost of EB is lower than for a hot air dryer, and that with theoretically higher web speeds EB is given preference over conventional UV curing. Problems are the costs of EB inks, their incompatibility with conventional inks and limited de-inkability."

All of these points are still largely valid even if there have been significant changes in all drying technologies. However, the Ifra-SID tests were on a press running at only 2,76 m/s, which did not show up the severe ink slinging and misting problems found at higher speeds that are responsible for limiting production speeds.

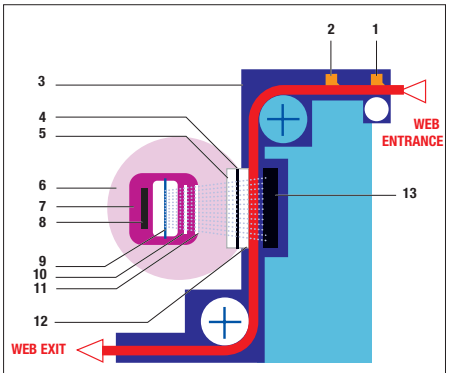
EB delivers 10 times the curing energy in comparison to UV (80 v 8 electron volts). High energy and absence of photo-initiators provides more flexibility in ink formulation to overcome slinging and misting, combined with potentially better curing efficiency than UV.

EB is theoretically the optimum newspaper drying process because it offers:

- Smear-free printing on all substrates.
- EB cold cures and the paper is not heated by more than 2-3°C making pre-printing and re-reeling a more practical possibility than UV. Rewinding of pre-printed ROP advertising pages was common until the 1980s (using gravure on an upgraded paper) and this approach may be valid for some publishers.
- Constant energy output — no degradation of curing intensity (unlike UV lamps).
- Ink drying is unrelated to colour hue (unlike UV).
- No pre-heating and infinitely variable control to changing press speeds.
- Both sides of the web are cured from a single unit in one side (unlike UV and hot air).
- EB uses less energy than either UV or heatset.
- No ozone is produced.
- Low maintenance with wear related only to cathode wires, window foils and o-rings. (ESI claim hourly spare parts cost of less than 1 Euro per operating hour.)

EB cannot currently alternate production with conventional inks (unlike UV or hot air). The EziCure new generation of low voltage, low cost EB generators from Energy Sciences Incorporated are compact, lighter and suitable for printing applications. Low voltage operation and new window technology optimise energy to the substrate with a highly accurate curing depth.

Compact new low voltage EB generators are theoretically the optimum newspaper drying process if the ink systems can be developed to run fast enough. Photo: Energy Sciences Incorporated



1 Entrance knife
2 Blanket
3 Selfshield wall
4 Foil
5 Window
6 Vacuum chamber
7 Terminal
8 Repeller
9 Filament
10 Extractor grid
11 Terminal grid
12 Window clamp
13 Selfshield beam collector

Filaments emit electrons that are accelerated by high voltage to pass through the window foil to strike the ink film on the substrate where the electrons initiate molecular changes to cure the ink. Source: Energy Sciences Incorporated.

Operating issues for UV and EB

Radiation ink systems require the use of specific consumable materials, some modification to the press and ancillary systems and some different operating procedures. These constraints are normal for the thousands of printers that are currently using these inks. Key factors include:

Dampening

A mild acid solution is recommended to remove ink from the non-image areas of the plate. However, if conventional and UV inks are alternated it is recommended to find a single solution working with both ink types because changing ink fountain solution at each job change is not practical. A key factor for successful printing is running with minimum dampening from start-up as the window between scumming and streaking is smaller than with conventional inks.

Inking unit temperature control

The distributor and ink fountain rollers of sheetfed presses are normally cooled to help stabilise the UV ink temperature to prevent scumming and these devices should also be considered for web offset.

Ink delivery systems

UV inks are difficult to pump because they are more thixotropic with less flow than oil-based. Excessive pump pressure generates heat and can lead to partial UV curing ("dark curing") in the pipes. Only positive displacement stainless steel pumps are recommended for radiation ink and the pump should be next to the press. Care must be taken that seals and glands are specified for UV/EB inks and pipes containing copper avoided because they can also initiate the curing process. UV products are not self-lubricating and ink pumps should use Teflon bearings. UV inks do not dry in the print unit but a duct agitator is highly recommended because of their high viscosity.

	Conventional oil-based 100% of production
Inks	Polar
Blankets & Roller covers	NBR (Polar)
Washing agents	Non-polar
	Combi or alternating Conventional/UV
Inks Blankets & Roller covers	Polar — Non-polar HNBR (combi)
Washing agents	Polar — Non-polar
	UV inks 100% of production
Inks	Non-polar
Blankets & Roller covers	EPDM (Non-polar)
Washing agents	Polar

Blankets, rollers and washing agents must be matched to the ink type used — different consumables are required in 100% UV operation to combination UV-conventional inks. Source: PrintCity UV Sheetfed UV Best Practice Guide/Reeves.

Ink storage

UV ink is more sensitive than conventional ink and "self curing" can occur if it is exposed to heat, sunlight, fluorescent light, oxidising materials.

Combination production

A fundamental operating issue is whether to run 100% in UV or to alternate between conventional and UV inks (combination production), which is common in sheetfed. Each of these operating modes requires a different set of specific roller coverings, blankets and washing solutions. Combination production requires thorough cleaning (blankets, ink fountain, inking and dampening rollers) at every ink change because any residual solvents from conventional inks and washes will inhibit curing of UV ink. Automatic ink cleaning systems do not work well with UV and hand cleaning is time consuming and increases costs. Because of the high viscosity of UV inks and the possibility of dark curing, twin rail systems do not work efficiently and hand cleaning-out of ducts is required (a more efficient alternative is exchangeable ink ducts). In addition, different washing solutions are required for oil-based and UV inks. This means that an automated washing system can only be used for one ink type and the other hand washed; alternatively a second washing solution delivery system can be fitted. In comparison, heatset to coldset ink changeover is comparatively simple, but EB cannot currently be used in alternating production.

Rollers & Blankets

Roller covers and blanket faces are compound materials that interact with the different chemical substances and fluids they transport. Therefore, they must be compatible with the ink type, coating and cleaning agents used – if not the blankets and rollers will swell causing a rapid decline in quality and will need replacing. Roller coverings, blankets and washes are different for 100% UV printing and combination production. EPDM roller coverings should be

used if UV/EB ink is used 100% of the time. HNBR should be used if printing alternates between UV and conventional inks. Caution, there are numerous mixed mode compounds available but they are mostly for sheetfed presses. It is essential to use compounds designed especially for web offset presses to run at high nip passing frequencies, comparable to fast running commercial heatset presses. These compounds are available from Böttcher and do not require a start up period with conventional inks. Current experience indicates more frequent washing and a shorter life for blankets used in UV production.

Wash-up solutions

Must be specifically formulated for the ink, roller compound and blanket covering, otherwise there is a high risk of degradation of the surfaces.

More cleaning

Small quantities of solvents, blanket washes, oil, grease and conventional inks will contaminate UV inks and, therefore, cleaning must be meticulous. UV inks tend to mist and it is essential to clean lamps regularly, otherwise their curing efficiency declines. The printing unit and its surroundings will also require frequent cleaning as spilt UV ink always remains wet and is a safety hazard on walkways.

Dot gain (TVI)

UV has a higher gain than conventional inks but this is compensated by a one-off adjustment of plate setter calibration curves.

Plates

Not all plate types can be used with radiation inks — check with the plate supplier.

UV ozone extraction

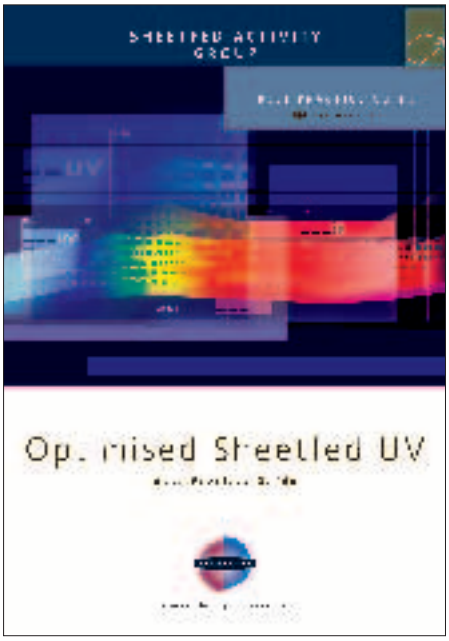
There is a legal obligation to remove the low levels of ozone from the workplace. The UV lamps are fitted with extraction systems that must be maintained correctly. Ozone is easy to detect and routine monitoring is recommended. Radiation curing inks contain no VOCs and are not yet subject to environmental air pollution control, although some US cities are beginning to require ozone permits and a catalytic unit may be required to break down the ozone in the future. (EB does not generate ozone).

Other extraction

Ink misting should be avoided or at least minimised since it can affect health, cleanliness and hygiene. High-speed presses should be fitted with mist extraction. Further reductions can be achieved by good press maintenance in roller, plate, and blanket cylinder pressures, press temperature control, effective exhaust and general ventilation. Inerting systems for EB and UV require extraction to avoid gases leaking into the workplace.

UV lamps

Operating output gradually declines over a lifetime that is generally around 1 000 to 1 500 hours. The energy of UV lamps is 60% infrared radiation, 25% UV radiation and about 15% visible light. The lamp surface temperature is around 800°C requiring adequate cooling and extraction of excess heat away from the machine. UV power supply oscillation requires an adequate energy supply. High speeds requires significantly higher power consumption and there is a risk of a barring effect from pulsing that may require the use of special lamp driver systems.



PrintCity's "Optimised Sheetfed UV" is the most complete generic best practice guide available and much of its content is relative to web offset. It is available from project team members Adphos-Eltosch, MAN Roland, Reeves, Sappi, Sun Chemical, UPM and Westland — four of whom are the primary contributors to this VAPoN Special Report.

Health & Safety

Protective clothing and defined procedures must be used in the workplace. Energy curing products can be handled in a similar way to oil-based and water-based products provided high standards of hygiene and working practices are in place. Care must be taken to avoid unnecessary contact with UV products. Eye irritation can be caused by repeated or prolonged exposure to uncured UV products when handled incorrectly. Always read and follow the supplier's health and safety instructions carefully.

UV products are formulated from materials who's properties are well understood from detailed scientific studies over many years. There is a minor risk that uncured UV ingredients can cause skin irritation which in extreme cases can cause sensitisation. However, there are several thousand UV systems operating worldwide for many years without any apparent major issues to date. Correct ink handling procedures in the printing plant prevent UV sensitisation or dermatitis from oil-based inks.

VAPoN Comparative Process Performance

This overview allows the relative strengths and weaknesses of different criteria for each process to be compared. The maximum speeds are for sustained production today. However the new Inert UV system and ink development should lift production speeds for radiation inks in the future, but it is unlikely that they will match heatset speeds in the mid term. However for slow speed single width machines UV speeds today are already adequate. Experience from US newspaper printers indicates that UV gloss is lower than heatset on the same paper; this is contradictory to some claims that it is higher. This is a point that requires verification.

	Coldset "standard"	Value Added Coldset (VAC)	IR (Infra Red)
Substrates types			
Newsprint, Standard & Improved	Yes	Yes	Yes
SC (Super Calendered)	No	No	Slow speed only
Coated	No	No	Slow speed only
Ink type	Oil-based	Oil-based	Oil-based
Ink drying/setting by:			
— Evaporation	<5%	<5%	<10%
— Substrate absorption	90%	90%	80%
— Chemical reaction/curing	<5%	<5%	<5%
Wet-on-wet ink trapping	Yes	Yes	Yes
Special cleaning solutions	No	No	No
Special roller coverings	No	No	No
Special blankets	No	No	No
Automated ink delivery system & pumping	Yes	Yes	Yes
Drying/setting method	No drying assistance	N/A	Heat transfer from lamps
Dryer cooling	N/A	N/A	Cooling of lamps
Chill rollers after drying	N/A	N/A	No
Cooling around printing units	N/A	N/A	Ventilation and air movement
Air emission control required	N/A	N/A	No
Energy source for drying	N/A	N/A	Electricity
Comparative power consumption	N/A	N/A	Low
Drying consumables	N/A	N/A	Lamps 1-2000 hours
Position of dryer	N/A	N/A	After last print unit
Space required for dryer	N/A	N/A	Small
Reproduction quality			
Screen ruling lpi	100	110	110
TAC (Total Area Coverage)	240	240-260	240-260
Ink gloss	Low	Low	Low
Paper mosture level after drying	Stable	Stable	Low moisture loss
Smearing/marking	Yes	Yes	Small improvement
Set off	Yes	Yes	Small improvement
Paper discolouration	No	No	No
Current max. production speed — Coated paper	N/A	15 m/s (Mat coated)	5 m/s
Current max. production speed — Newsprint	15 m/s	N/A	8 m/s
Safety & Environmental			
Subject to air compliance regulations	No	No	No
Specific operator safety procedures	No	No	No
Ink slinging & misting	Minor	Minor	Minor
Waste ink disposal	Hazardous waste	Hazardous waste	Hazardous waste
Recycling of printed paper	OK	OK	OK
Operational issues			
Swtiching between ink types	N/A	N/A	Relatively easy
Ink-water balance	Stable	Stable	Stable
Temperature control of printing units	No	No	No

VAPoN test printing was carried out at DELO in Slovenia on MAN Roland Colorman and Uniset presses. Andy Williams (centre background) from Ifra supervised the tests as part of standardisation research for semi-commercial printing parameters.
The MAN Roland Uniset was used for heatset production. Photo PrintCity.

	Hot Air	UV (Ultra Violet)	EB (Electron Beam)
	Yes	Yes, but picking a problem	Yes, but picking a problem
	Yes	Yes	Yes
	Yes	Yes	Yes
	Oil-based	Polymer-based (monomers,	Polymer-based (monomers,
		oligomers, photo-initiators)	oligomers) NO photo-initiators
	90%	0%	0%
	5%	0%	0%
	5%	100% (radiation cross-linking)	100% (radiation cross-linking)
	Yes	Yes	Yes
	No	Yes	Yes
	No	Yes	Yes
	No	Yes	Yes
	Yes	Difficult, special pumps & pipes	Difficult, special pumps & pipes
	Hot air evaporation	Heat transfer from lamps	Electron generator
	Fresh air intake	Cooling of lamps/exhaust air	Inert gas
	Essential	Not normally needed	Not normally needed
	No	Possibly	No
	Oxidiser required for VOCs	Yes, to control Ozone	No
	Gas & ink solvents	Electricity	Electricity
	Moderate	Moderate-High	Moderate
	None	Lamps 1-2000 hours/Inert gas*	Reflectors & Inert gas
	After last print unit	After last unit / Inter-unit preferred	After last print unit
	Large	Moderate	Moderate
	133	133	133
	280-300	280-300	280-300
	Highest	Moderate-High	Moderate-High
	High moisture loss	Minimal moisture loss	No moisture loss
	No	No	No
	No	No	No
	No	Minor risk	Minor risk
	18 m/s	5-7 m/s	5-7 m/s
	18 m/s	3-5 m/s	3-5 m/s
	Yes, VOCs needs oxidiser	Yes, ozone exhaust	No
	No	Yes, & shielding of lamps	Yes, & shielding of emitter
	Some	High, requires mist extraction	High, requires mist extraction
	Hazardous waste	Hazardous waste	Hazardous waste
	OK	Only problem if excessive quantity	Only problem if excessive quantity
	Relatively easy	Difficult	Not possible
	Stable	Critical - maintain minimal damping	Critical - maintain minimal damping
	Desirable	Recommended	Recommended

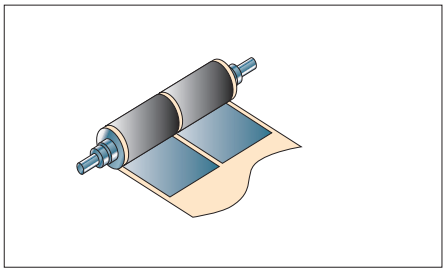
VAPoN & Semi-commercial printing

Semi-commercial printing is a technique in use for over 30 years. It is defined by Ifra and PrintCity as "printing on a newspaper press equipped with a dryer". As its name implies, it is used to print low- to mid-quality commercial work, to produce magazines, directories and some newspaper products. VAPoN uses these semi-commercial techniques but focuses on their application to newspaper related products and business opportunities from ROP as well as insert applications.

PrintCity worked with Ifra to develop and supervise test printing of VAPoN samples. This is part of an Ifra project to review the needs for a specific standard for semi-commercial printing.

VAPoN

ECONOMICS IMPLICATIONS



2:1 Single-width single development

MAN Roland Cromoman

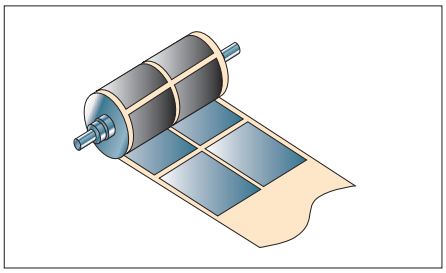
• Cut-off 630 mm • Web width 940 mm

Pages per revolution:

• 16 pages 1/2 Berliner*

• 4 pages Broadsheet

** Requires 2nd longitudinal fold*



2:2 Single-width double development

MAN Roland Uniset

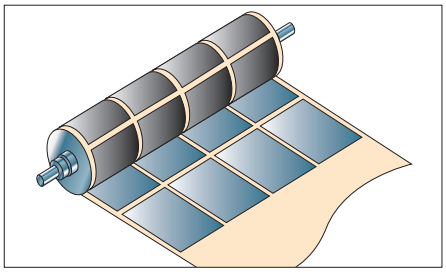
• Cut off 630 mm • Web width 940 mm

Pages per revolution:

• 32 pages 1/2 Berliner*

• 8 pages Broadsheet

** Requires 2nd longitudinal fold*



4:2 Double-width double development

MAN Roland Colorman

• Cut-off 470 mm • Web width 1260 mm

Pages per revolution:

• 32 pages 1/2 Berliner

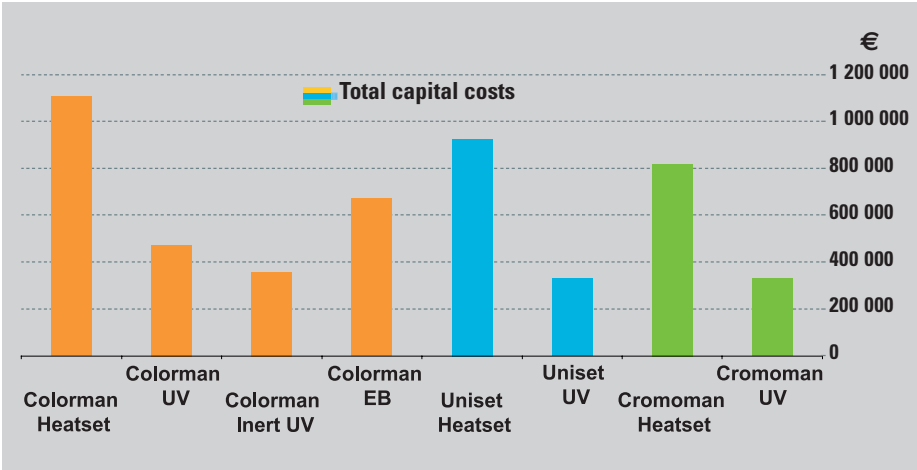
• 16 pages Broadsheet

The key question when considering alternate technologies is what are their total lifetime economic implications? Too often this information is only partially available and not comparable. For this reason, the PrintCity VAPoN project team commissioned economic modelling from Eurografica, who have developed a comprehensive modelling methodology over 15 years. To ensure that the results are both complete and comparative, the project team defined comprehensive data and assumptions. The following calculations should offer valuable clues to the development of costs by using/investing in a drying system. The shown values could not replace an individual technical-economic analysis, which is recommended prior to any investment decision. Every printing operation is different!

Presses

Three representative newspaper press formats were selected for economic modelling to cover the broad spectrum of newspaper printing. The web widths and cut-offs selected allow all of them to produce the same size Half Berliner Format (235 x 315 mm). The cost scenario is the addition of a 4-high 8-couple tower as an extension to an existing press. Total installed investment costs include the tower and paster with capacity for coated roll weights.

Drying systems

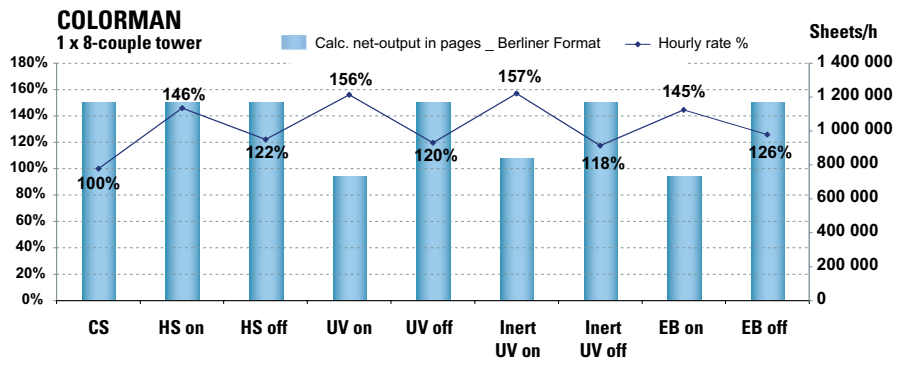


Observations

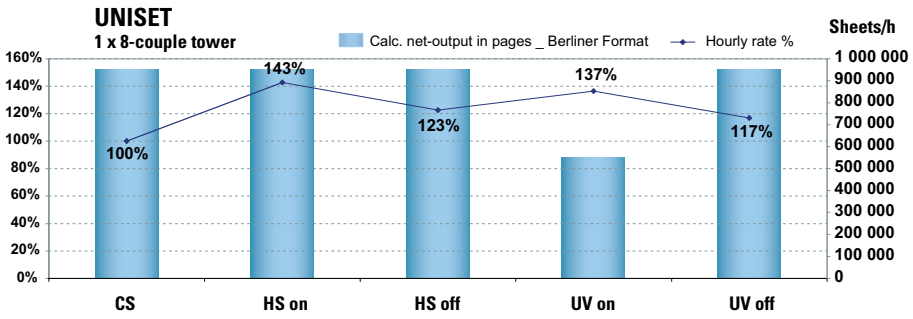
The capital costs of drying systems includes installation and all equipment required for each ink-drying process including extraction, oxidation, chill rolls, inert gas, piping, superstructure, etc. Heatset has the highest installed investment cost. Inert UV is less than conventional UV because it requires fewer lamps for the same speed. EB is between the two, although it has an almost unrestricted speed in comparison to UV. However, radiation curing ink systems currently have speed limitations of around 7 m/s.

Hourly operating rate & output

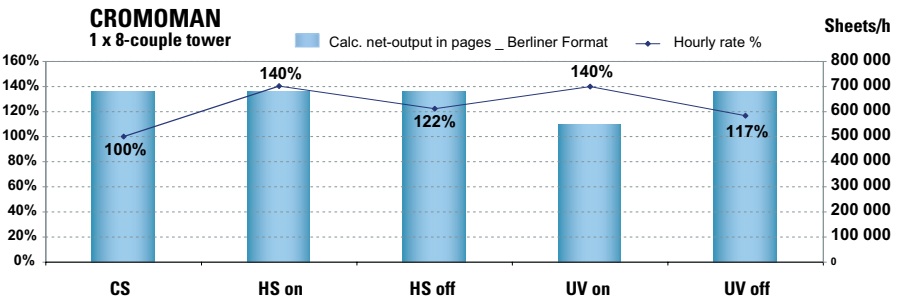
Double-width (Colorman) 3-shift operating rates



Single-width double development (Uniset) 3-shift operating rates



Single-width single development (Cromoman) 3 -shift operating rates



Operating hours are based on 3 shifts with a yearly total capacity of 5307 hours.

Hourly rates include: Labour (1 printer and 1 assistant) at German rates.

Indirect production costs include different consumables for each process such as blankets and rollers; German costs for gas, water and electricity; service and maintenance; and an allowance for administration and sales. Capital costs include depreciation and interest. The costs of factory space (for the drying system) are not included as this is highly variable and has no impact on process comparison.

Two rates have been calculated for dryer "ON" and "OFF". The 2 cases ("ON" and "OFF") for each dryer are necessary, because investing in a drying system will increase the hourly rate for coldset products ("OFF"). Both cases are based on higher capital costs caused by the drying system. The dryer "ON" rate is higher because of the energy and consumables required. The coldset tower without dryer (1st Colorman press in the chart beside) is the 100% base hourly rate against which other process variations are compared.

The heatset dryer has an integrated oxidizer that significantly reduces gas costs by using the energy from evaporated ink solvents.

Observations:

These charts show that the hourly rates for the double-width Colorman with dryer "ON" are very similar for heatset and EB and the two UV installations are around 8% higher. For single-width presses the heatset and UV rates are very similar.

The significant difference is in the hourly production output (sheets/h) where all of the radiation curing equipped machines have a much lower output than heatset and coldset. However, this difference is smaller on the slow speed single width machines — this is the type of press where most UV units are currently installed.

Total production costs

Ink coverage

Representative SID values have been calculated by Sun Chemical for the purpose of economic modelling: Coldset on newsprint 0,95–1,0 gsm; heatset on newsprint 1,0-1,1 gsm; and radiation curing inks 1,2 gsm (see also page 5).

Operating scenarios

The variable operating conditions are 100% coldset production, 70/30% (coldset/with dryer), 50/50% (coldset/with dryer) and 100% with dryer. Coldset on newsprint is the 100% base cost against which other process variations are compared.

Printing speed

Coldset and heatset run at maximum press speed; EB and UV conventional at 7 m/s; and Inert UV 8 m/s. The "OFF"-case has the maximum press speed because it is not limited by the dryer.

Ink changeover

Although the hourly rate is not influenced by this factor it does have an impact on production costs as it can be particularly time consuming when moving from conventional to UV inks and vice versa, but less so from coldset to heatset. The scenario used is one ink change in each direction five days a week. Changeable ink fountains are used for the Colorman and Uniset only.

The total cost to produce a representative print job reflects the differences in make ready, operating speed and changeover times on different inks and paper grades. This is the key calculation to compare all cost elements. The sample print job is a 16 pages (235 x 315 mm) product, 100.000 copies, printed on each press type with different drying systems on six types of paper using appropriate inks.

Total cost to print 50% Coldset/50% with dryer

Press/Process Paper	45 g sm NP	45 g sm ULWC	52 g sm INP	52 g sm VAC	54 g sm SC-B	54 gsm LWC
4:2 Coldset	100%	—	123%	137%	—	—
4:2 Heatset	114%	154%	137%	—	137%	158%
4:2 UV	167%	—	191%	—	188%	210%
4:2 Inert UV	—	—	—	—	—	—
4:2 EB	163%	—	187%	—	184%	206%
2:2 Coldset	100%	—	123%	135%	—	—
2:2 Heatset	112%	152%	135%	—	135%	156%
2:2 UV	162%	—	186%	—	183%	205%
2:1 Coldset	100%	—	123%	137%	—	—
2:1 Heatset	117%	157%	141%	—	140%	161%
2:1 UV	164%	—	188%	—	185%	207%

This chart represents the total production cost of the defined production comparison, assuming 50% coldset / 50% with dryer, with the 'coldset' production costs as the 100% baseline. Source Eurografica

Observations:

Three factors increase costs from printing with radiation curing:

1- Higher ink prices;

2- Additional time to clean the press when changing ink types;

3- Limited production speed in comparison to heatset and coldset — this factor becomes minor with the slower 2:1 single-width presses.

The additional cost to print heatset instead of coldset on INP is only 16%, whereas UV and EB are 70-75% more expensive.

Total cost to print 70% Coldset/30% with dryer

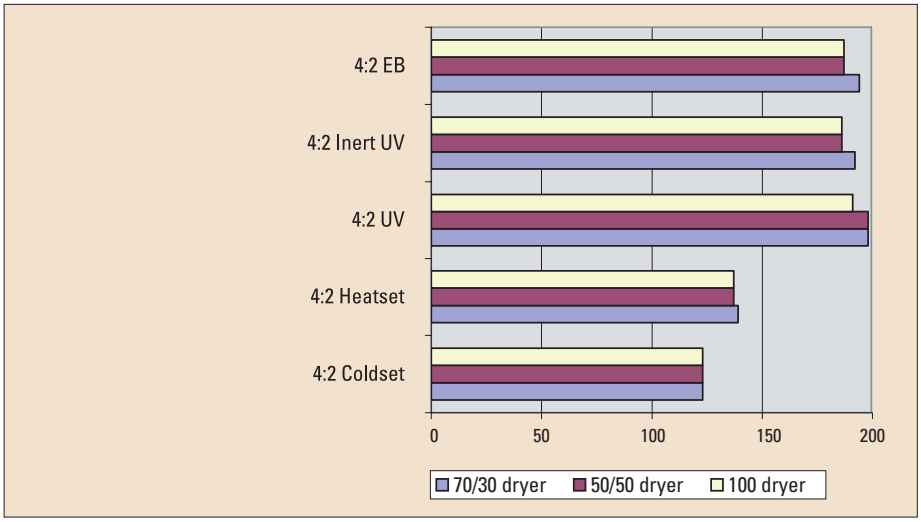
Press/Process Paper	45 g sm NP	45 g sm ULWC	52 g sm INP	52 g sm VAC	54 g sm SC-B	54 gsm LWC
4:2 Coldset	100%	—	123%	137%	—	—
4:2 Heatset	116%	156%	139%	—	139%	160%
4:2 UV	175%	—	198%	—	195%	217%
4:2 Inert UV	—	—	—	—	—	—
4:2 EB	170%	—	194%	—	191%	213%
2:2 Coldset	100%	—	123%	135%	—	—
2:2 Heatset	113%	153%	137%	—	136%	157%
2:2 UV	168%	—	191%	—	188%	211%
2:1 Coldset	100%	—	123%	137%	—	—
2:1 Heatset	122%	162%	145%	—	145%	166%
2:1 UV	175%	—	199%	—	196%	218%

This chart represents the total production cost of the defined production comparison, assuming 70% coldset / 30% with dryer, with the 'coldset' production costs as the 100% baseline. Source Eurografica

Observations:

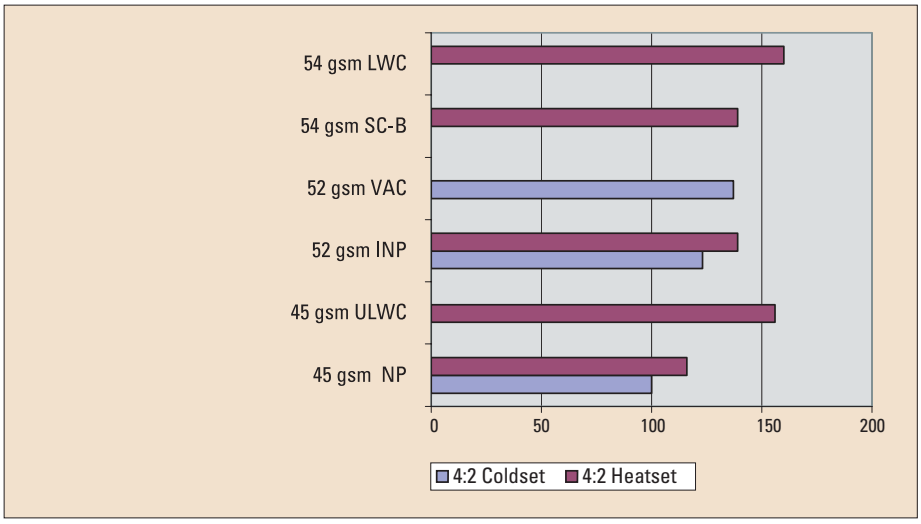
Reduced utilisation of the dryer will marginally increase total cost of production.

Total operating hours process mix



This chart shows the impact on production costs for a double-width press printing on 52 gsm INP for three different proportions of annual capacity with the dryer "on" at 30, 50 and 100%. There is only a slight reduction in total production costs as dryer use increases.

Production costs on different paper grades



Observations:

The yield of 45 gsm ULWC is the same as newsprint in this example. However, because it is a more expensive paper to produce per tonne than 54 gsm LWC, the total production costs are almost identical. Therefore the ULWC only makes sense if it can reduce logistics costs, particularly if postal services are used to deliver subscriber copies.

Three products have an almost identical price — coldset VAC (matt coated), heatset on Improved News (INP) and heatset SC.

Semi-commercial press equipment

Most newspaper presses for semi-commercial production can be equipped to optimise their quality, productivity and flexibility, including:

- Press units equipped with a three roller film-type damping unit and an inking unit with three plate rollers and oscillator cooling.
- Higher weight capacity pasters and roll handling equipment, as coated paper is 40% heavier than newsprint.
- Good web tension control is now simpler with shaftless drive technology and is further facilitated by controlled infeed and web alignment units.
- Register and cut-off controls should be standard. Closed-loop colour control has a rapid ROI on press units used 24 hours a day.
- Folders can be upgraded with quarter-fold, third fold, double parallel and perforating devices to obtain good quality signatures at high speeds. Plough formers to produce double-gatefolds are an option for some applications.
- Inline stitching/glueing and trimming provide a finished product of higher perceived quality.

VAPoN
COMPARATIVE PROCESS EVALUATION

There is no single solution for all newspaper applications. Coldset VAC and heatset are the mature high speed, high quality benchmarks. Conventional UV has a place for slow speed presses and inert UV has promise for some double-width applications, whilst EB appears to have a high unexploited potential.

Print quality

Significant improvement in print quality on any paper comes from using either heatset or UV/EB drying. The experience of Infrared (IR) installations in this respect is poor. Dot spread is higher with radiation inks. For printers wanting to stay with coldset, VAC paper offers a significant improvement. Experience from US newspaper printers indicates that UV gloss is lower than heatset on the same paper — this is contradictory to some claims and is a point that requires verification.

Runability & constraints

There is a clear reduction in runability and increased constraints with UV or EB systems. A major constraint is significant ink slinging and misting that currently limits printing speed. Another constraint is the time and difficulty of changing between UV and oil-based inks. Most ink rails, pumps and washing systems have difficulty with the very high UV ink viscosity and reduced flow characteristics. Inking systems must be completely clean at ink changeover because even a minor oil-based ink residue will contaminate UV ink. Rollers and blankets must be compatible for UV/EB ink – if not they will deform causing a rapid decline in quality and will need early replacement. Many of these constraints can be minimised if a printing tower is exclusively dedicated to 100% UV production. Process complexity is not seen as a significant

barrier, demonstrated by hundreds of printers converting from coldset to heatset web or from conventional to UV sheetfed. Some training is essential but this is not excessive. Housekeeping is much more important with radiation systems to ensure no ink contamination and that UV lamps are always clean.

Printing speed

Conventional heatset and coldset ink-drying systems provide the most reliable high speed performance today and will almost certainly improve this position by 2010. UV Inert systems have only been run under test conditions until now at 10 m/s, which implies a production speed of around 8 m/s that may be capable of improvement. UV printing on newsprint will require improved inks to overcome picking problems. EB ink has theoretically more potential to increase its maximum speed than conventional UV.

	2006	2010
Ink-drying systems max. production speed	m/s	m/s
UV conventional	5-7	7-9
EB	5-7	8-10
UV Inert	6-8	8-10
Coldset	12	15
Heatset	18	20

Source: Sun Chemical

Capital costs

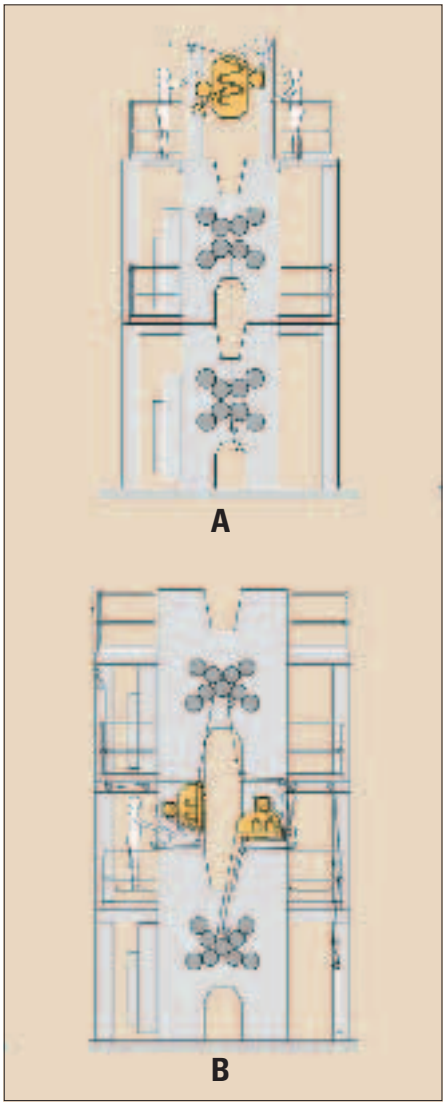
Simply comparing the costs of alternative dryers is misleading because they are only one part of a system. UV dryers require a transformer and a complex electrical power supply, ozone and ink mist extraction systems, and cooling of lamps and shutters. Heatset requires chill rolls and oxidizers. Installation costs can have a significant impact on capital costs.

Running costs

The two most significant factors are ink costs and dryer energy consumption. UV requires electricity (240 W/cm) and regular lamp replacement (1000-1500 hours), some systems require nitrogen inert gas. Heatset printing requires electricity for fans and gas for drying. However, dryer gas consumption has fallen considerably because integrated oxidisers now recycle the energy from ink solvent incineration. Heatset is only 14-16% more expensive than coldset on the same paper. Ink is the key running cost factor.

Heatset dryers with integrated oxidizers have the highest energy efficiency. Conventional UV has the highest energy consumption; inert UV is more efficient and EB has the lowest electricity consumption.

The most expensive ingredient in conventional ink is the pigment — which is the cheapest component of radiation inks. UV/EB inks cost 300-500% more than oil-based inks and costs are unlikely to fall due to the limited availability of the raw materials and their refinery capacity. Theoretically, UV may use marginally less ink than heatset for comparable densities, but this has not yet been proven. The significantly higher UV/EB running costs and slower speed mean that their total comparative printing costs are 40-50% higher than heatset.



A

B

Installation

Installation constraints can be the "joker" factor when comparing processes if the single most important issue is to retrofit a drying system on to an existing coldset press with restricted space. Here compact UV and EB systems have obvious advantages.

Almost all installations of any dryer on high speed single- and double-width presses will tend to be on a platform at 90° to the web exit from the top of a 4-high tower. Most heatset (and EB) will require either an air turn or grater roller to guide the web into the dryer. If there is 1,5-2 m free space on top of the print tower then one UV unit can be installed to dry one side of the web before it is turned with the other dryer positioned separately.

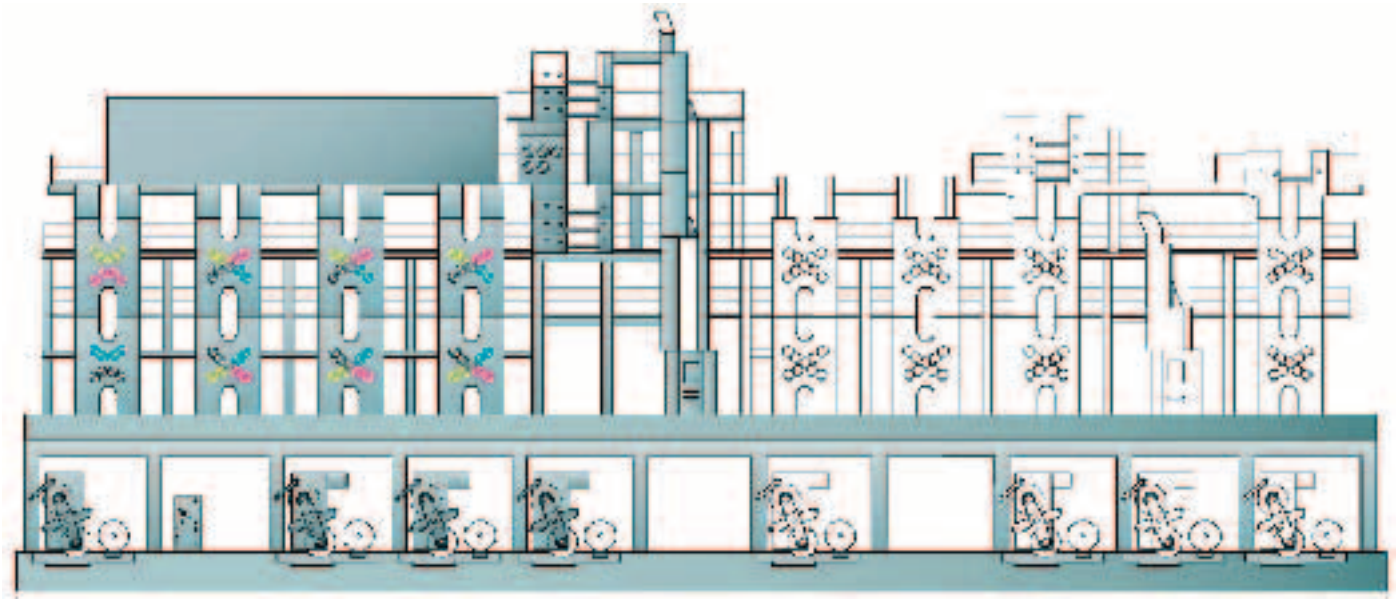
Dryer for 1260 mm web width	Length/m	Width/m	Heigh/m	Weight/t
Heatset	11,0	2,5	2,5	35,0
Standard UV	2,0	1,6	1,5	2,0
Inert UV	1,5	1,6	1,4	1,5
EB	1,5	2,3	1,5	3,0

All radiation curing systems are light and compact when compared to a heatset dryer.

Presses running at 12 m/s only use horizontal heatset dryers because a vertical dryer and chill rolls would be higher than the press tower and systems with integrated oxidizers are only available as horizontal models. Single-width, single-circumference presses have lower installation challenges for UV, EB and heatset — where compact vertical dryers and chill rolls are commonly used.

A *Possible UV installation for a double-width press.*

B *A UV installation on a satellite press requires enough space between the upper and lower satellites to fit inter-deck UV units to separately dry each side of the web. However, heat build-up in the tower will require adequate cooling and heat extraction. Source MAN Roland.*



Horizontal heatset dryer mounted on a platform is the most common configuration for high speed single- and double-width presses. Source MAN Roland.

VAPoN
VALUE & TRENDS ASSESSMENT

A key part of this project has been to initiate an industry discussion on the value of differentiated newspaper products. Improved quality must be related to what revenue or competitive advantage can be generated from them to build a business case for their deployment.

To assist this inquiry, PrintCity's VAPoN team instigated an international quality and value assessment combined with a survey of trends. A series of seven editions of the same newspaper were printed on different papers by different print processes including coldset and heatset. These are being assessed by newspaper staff around the world to determine their perceived quality ranking and their potential revenue premiums. This approach provides all newspapers with an objective start to assess how VAPoN concepts can be useful to their businesses.

The assessment is open to all newspapers to participate until November 30, 2006 and the final results will be published shortly afterwards.

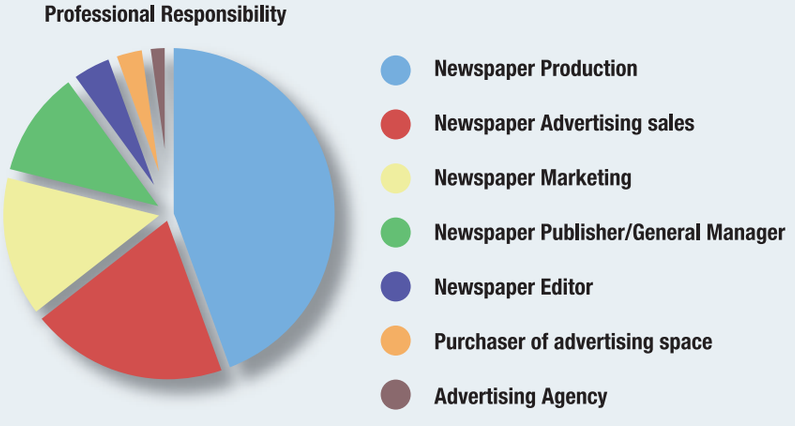
Respondents	
Belgium	1
Germany	3
Holland	1
Hungary	7
India	24
Italy	6
Sweden	1
Switzerland	5
UK	3
Finland	17
USA	2
Total	**70**

Preliminary results

The survey data is being independently analysed by Dr Tim Claypole of WCPC, Swansea University. His initial conclusions are based on 70 responses received by September 12. He points out that one third of these responses come from India, which may bias the results, and observations need to be viewed in this light — the final analysis will include geographic and sector breakdowns to more fully evaluate trends. A wide range of values is to be expected because of the diversity of each newspaper's media and competitive environment. However, even at this stage several underlying trends can be identified.

Who has responded?

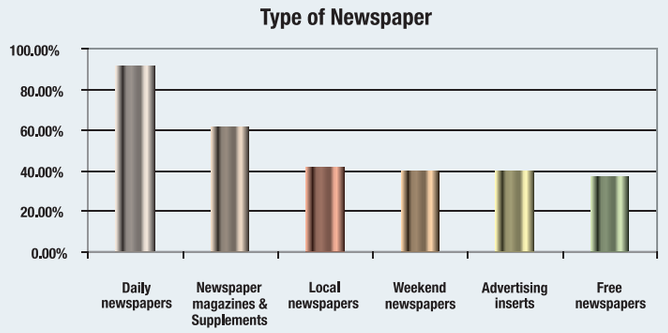
Responses have been sought from all of the participants in newspaper publishing – editorial, advertising, marketing and production – to see how different their perceptions are. Of the respondents so far, 43% are from production and the balance from a wide range of responsibilities.



PrintCity, in association with Ifra, has produced a sample 8-page newspaper on seven combinations of paper and printing processes. Newspapers around the world are assessing the perceived value differences between these editions. Measurable test forms were also part of the print trials and are being used by Ifra to help define technical standards for semi-commercial printing.

Photo: Delo.

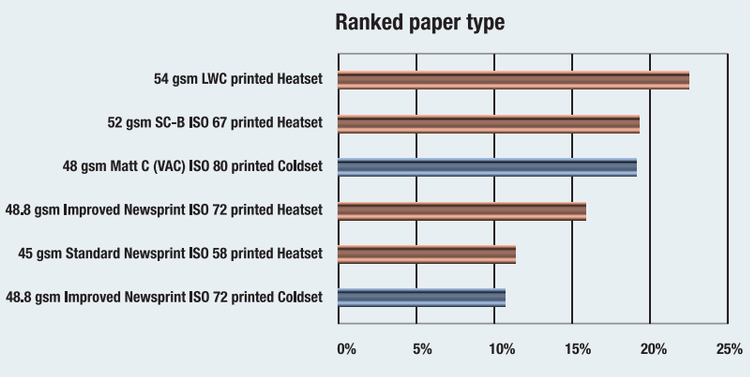
The type of publications produced by the respondents' companies are predominantly daily newspapers, although most also produce other types of publications



Quality ranking

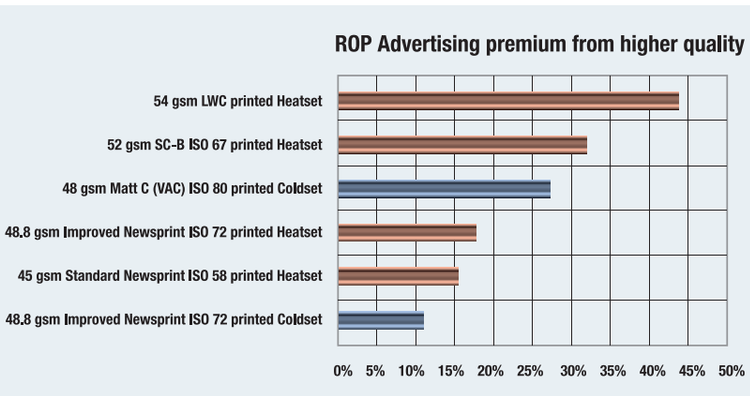
Respondents were asked to rank the printed samples in ascending order of quality, starting with the base reference printed coldset on standard newsprint (samples were ranked by awarding seven as the top score, even if only one paper was ranked higher than the base reference paper).

The two newspaper products with the highest perceived values were both printed heatset: on 54 gsm LWC and 52 gsm SC-B (ISO 67 paper brightness). In third place, the 48 gsm Matt C (VAC) ISO 80 printed coldset was rated better than Improved Newsprint printed heatset.



Value assessment

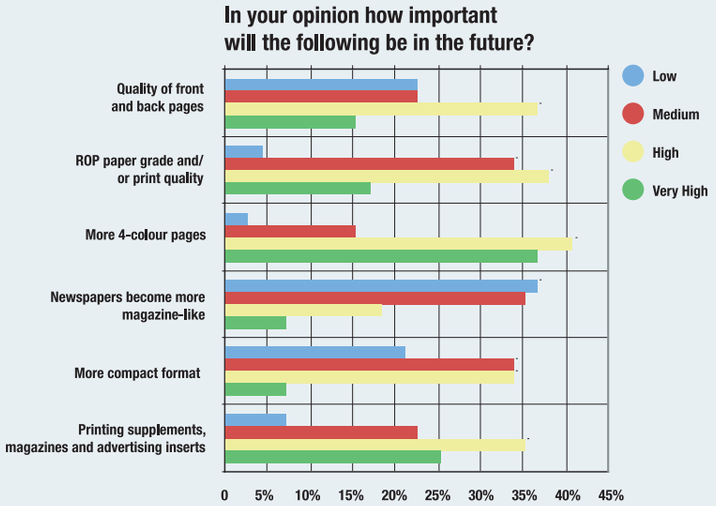
Respondents were asked to assess what percentage sales premium for ROP (Run of Paper) advertising could be obtainable for the different qualities of newspaper samples, with Newsprint printed coldset as the reference price point.

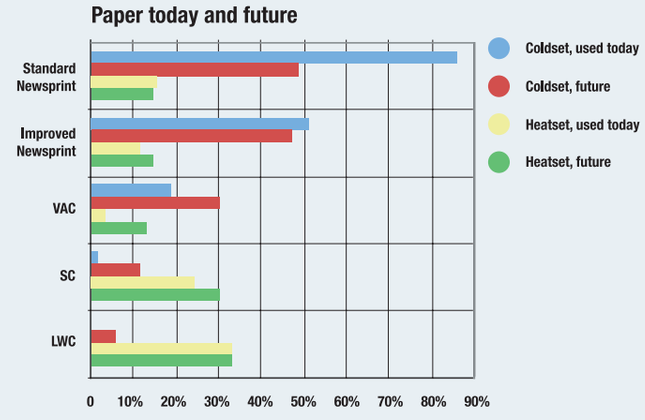


Newspaper trends

Respondents were asked to rank the importance, from low through medium and high to very high, of certain trends forecast in their market over the next three years.

- The most important development will be more 4-colour pages, which was rated by over 80% as high or very high by over 80%.
- Improving ROP paper grade and/or print quality is seen as a high priority.
- Almost equally important is improved quality of front and back pages from either better paper, printing or higher gloss, and elimination of marking.
- Many respondents believe printing of magazines and advertising inserts to be important.
- Changing to a more compact format is a medium to high priority.
- The potential trend to newspapers becoming more like magazines is seen as low to moderate for 75%, with 25% identifying this as important.





The analysis shows the percentage of total respondents for each type of paper and process. There is a marked division between coldset and heatset.

The coldset printers see standard and improved newsprint as their main paper grades for both now and the future although some may consider value added newsprint. Heatset printers predominantly use SC and LWC grades, although some also use standard and improved newsprint grades as well.

VAPoN assessment participants include:

Company	*Country*
Agfa Gevaert N.V.	Belgium
Suomen Lehtiyhtymä Oy	Finland
Kustannus Oy Aamulehti	Finland
Sanomapaino; Sanomala Oy	Finland
Turun Sanomat Oy	Finland
ppi Media GmbH	Germany
Pressedruck Augsburg	Germany
SHZ Schleswig-Holsteinischer Zeitungsverlag GmbH	Germany
PCM Grafische Bedrijven BV	Holland
Ringier Kiado Kft.	Hungary
Lapcom Kft.	Hungary
PLT Nyomdai Központ Bt.	Hungary
Lokmat Newspapers PVT.LTD	India
The Hindu	India
Il Sole 24 Ore	Italy
Athesis	Italy
Poligrafici Editoriale	Italy
CSQ	Italy
V-TAB Västerås	Sweden
Ringier Print Zofingen AG	Switzerland
Tamedia AG	Switzerland
NZZ	Switzerland
Druckzentrum Espace Media	Switzerland
Trinity Mirror Group	UK
Digital Dots	UK
News International Newspapers Ltd	UK
The Milwaukee Journal Sentinel	USA
New York Times	USA

PrintCity VAPoN Activity Group

The PrintCity strategic alliance is focussed on Technologies & Expertise, Value of Print and Networking. Members combine their technologies and expertise in working partnerships and projects that enable their customers to add value to their businesses. The results are communicated through special reports, seminars, trade fairs, printed materials and the Internet. PrintCity also promotes the Value of Print as a media and networking within the whole industry to stimulate worldwide co-operation among all partners.

PrintCity's primary role is to forge links across the value chain to achieve goals that one company alone, however large, cannot accomplish. PrintCity's "connection of competence" focuses on cross-industry projects, like VAPoN, that bring together companies' diverse expertise to answer some of the industry's challenges. Participation in these projects is not limited to member companies and frequently also involves other specialist suppliers, institutions, brand owners, printers and converters.

Adphos Eltosch www.eltosch.de - **MAN Roland Druckmaschinen AG** www.man-roland.com - **MEGTEC Systems SAS** www.megtec.com - **Sun Chemical Corporation** www.sunchemical.com - **UPM-Kymmene Corporation** www.upm-kymmene.com

Selected bibliography and recommended reading

"How to avoid surprises when changing paper grades," Web Offset Champion Group: 2001.
"Hybrid Houses" Newspapers & Technology, 2006
"Inserting impacts more than just the mailroom" Ifra Newspaper Techniques 4/2002
"Investment in Press and Mailroom" Ifra Special Report 3.34
"Innovations in Newspapers" Innovation International Media Consulting Group/WAN 2005
"Market study on inserts" Zeitungs Marketing Gesellschaft, 2001.
"Newspaper Advertising of ROP, inserts and coupons" Newspaper Association of America, 2001
"Shaping the future of the newspaper" World Association of Newspapers, 2002.
"Outlook and trends for the future of Newspapers" GAMIS/PIA & Kubas Consultants, 2000
"US Newspaper Publishing" PricewaterhouseCoopers, 2001
"UV Sheetfed Printing & Coating Best Practices Guide" PrintCity 2004

IFRA special reports:

"Better usability of newspaper presses" (3.6 & 3.10)
"The efficiency of register control systems in newspaper printing" (3.23)
"Better news ink or better newsprint to reach less set-off and rub-off?" (3.24)
"Reasons for smearing, set-off and rub-off of offset inks on newsprint" (3.26)
"Improving the print quality with dryers and better paper grades" (3.27)
"How to run coated paper in a newspaper press"
"Dryers to improve newspaper colour quality, flexibility and capacity utilisation" (IFRA conference Düsseldorf, June 1997)

Previous editions of Webline are available in English and German versions on www.printcity.de
Production: Design and page make-up: ID Industry Paris. Cover printing: Heatset by Schoder, Gersthofen on a MAN Roland OCTOMAN using Sun Chemical inks on 60 gsm LWC glossy paper. Text printing: Coldset by The Guardian, London on a MAN Roland COLORMAN using Sun Chemical inks and UPM Matt paper.