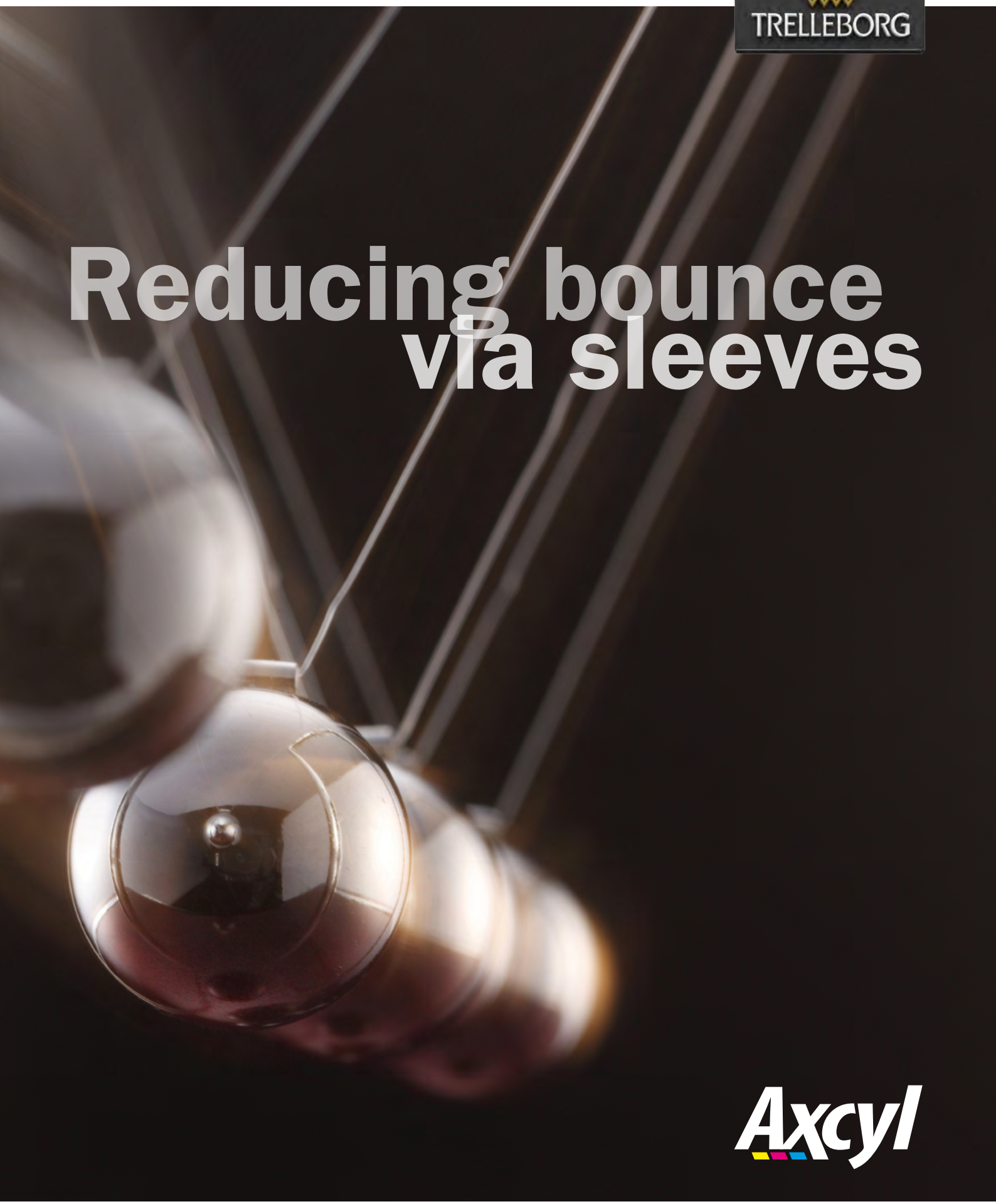


Reducing bounce via sleeves

Paper Bag

Flexible packaging

Tag and label

Folding carton

Print Liner

Corrugated

Paper cup

Carrier bag

Beverage carton

Multi-wall bag

Envelope
off-set coating

The flexo industry has changed enormously in recent years, with developments in pre-press, anilox rollers, digital plate technology and sleeve-dedicated presses leading to the process being used in areas of print that would have once been unthinkable, including newspapers, folding cartons, labels and flexible packaging. The introduction of faster presses has also played an important role in this success.

However, despite all of the advances, printers continue to face the challenge of poor reproduction caused by vibration generated in the flexo nip, often called ‘bounce’, which can have a significant detrimental effect on ink transfer. In an effort to highlight what printers can do to overcome this common issue, Trelleborg instructed a major printing research organisation to trial a selection of entry-level and high-end flexo sleeves at its state-of-the-art facilities in Germany.

THE FLEXO SLEEVE MARKET

The development of sleeves, which enable photopolymer plates for subsequent jobs to be mounted off-line, has been vital in allowing flexo printers achieve quick changeovers, meeting the need to handle design alterations effectively as well as short runs. Sleeves also provide an economical and practical way of being able to print different repeat lengths from the same press shaft and of storing plates for repeat orders.

The average flexo press requires between 150 – 300 sleeves and bridges. Sleeves are not produced by press manufacturers, who leave this to specialist suppliers of which there is a growing number worldwide, most of them offering lower-end, entry level ranges.

The global flexo sleeve market is estimated to be worth around Euro 100 million annually and is currently growing between 4 to 5 per cent per year. Some of this expansion is the result of flexo taking market share from other printing processes such as gravure and offset, as well as there being a rising popularity of the process in areas such as Asia.

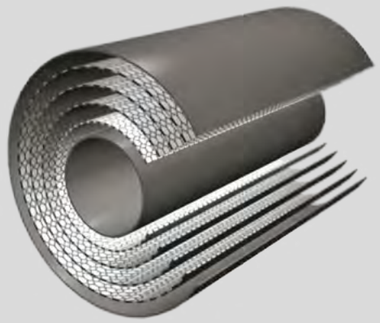
SLEEVE OPTIONS

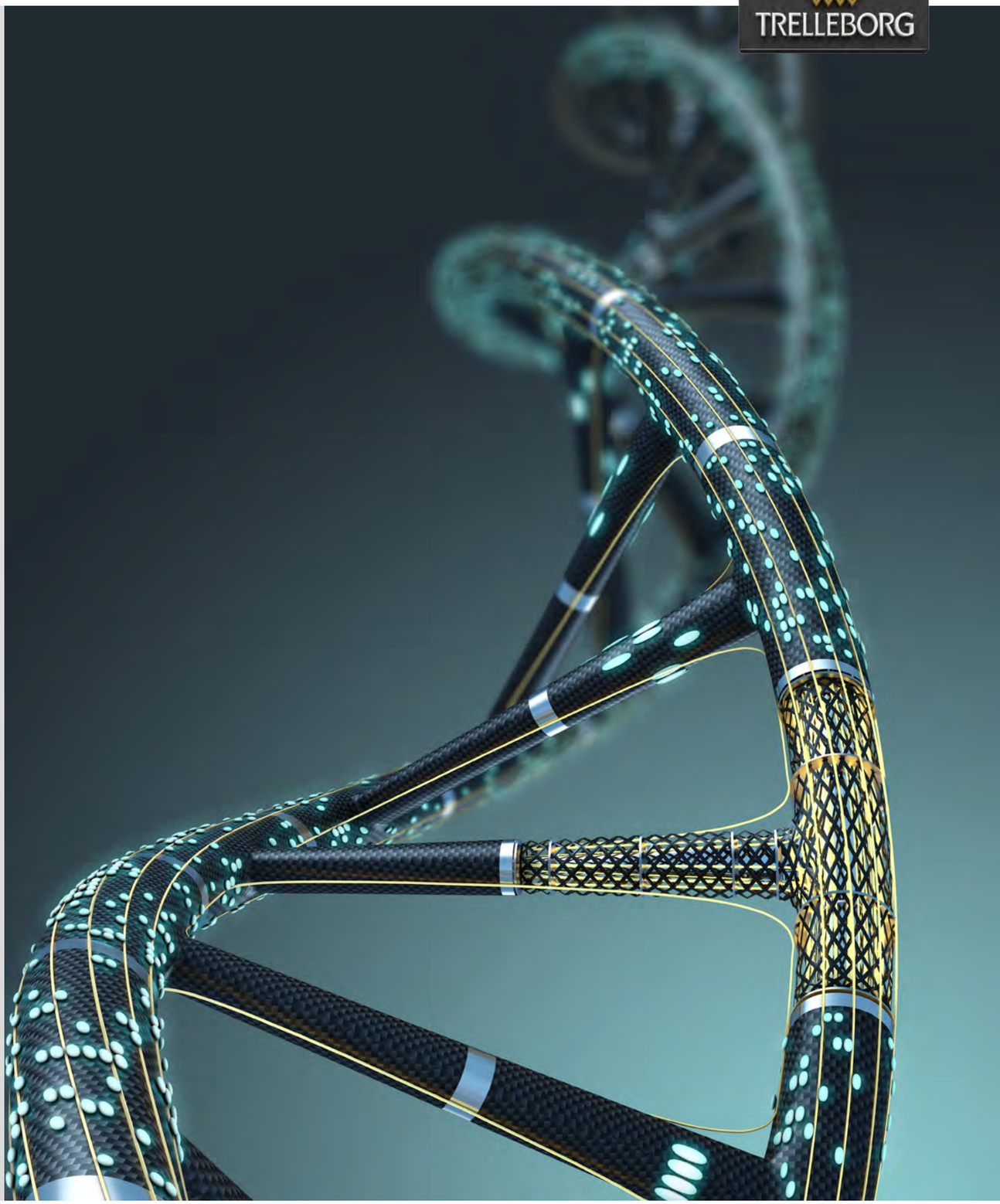
Except for corrugated post-print applications, sleeves are used on all forms of flexo presses, with some 95 per cent consisting of sleeves designed to allow pre-mounting of plates using adhesive tape (as opposed to sleeves where the image is exposed in-the-round).

Sleeves are generally built with a ‘sandwich structure’ concept that incorporates two key elements - the mounting layer and the repeat build-up layer. The former expands under a pressure of six bar, which is generated by air holes along the press shaft. This enables the sleeve to be easily mounted and removed from the press shaft. The build-up layer enables several repeat lengths to be obtained from one single inner diameter.

Sleeves are made out of a variety of materials, so their properties differ greatly. The majority fall into the cheaper end of the cost spectrum, often using glass fibre or polyurethane foam based products for the repeat build-up layer and deformable polyurethane foams for the mounting layer. These sleeves are generally light but unstable over long periods of time, due in part because of their tendency to absorb moisture/solvents during sleeve cleaning and storage. In addition, polyurethane foams can be very elastic, with limited vibration filtration properties.

To obtain sleeves with good stability the printer needs to select products at the higher end of the market. Trelleborg’s Axcyl sleeves have a mounting layer that is composed of a specially formulated polymer designed to reduce vibration coming from the impression nip. The build-up layer is made of epoxy resin with a honeycomb structure, which provides light weight, high stability and rigidity. This results in low dot gain and the ability to print jobs at speeds where the level of press vibration would otherwise adversely affect print quality.





SLEEVE BOUNCE

Press bounce can be caused by several factors, including the repeat length of the job being printed, the condition of the flexo press, the printing plate and the adhesive tape used to fix the plate. The graphics being reproduced can also have a major effect on the final printed quality as some designs are significantly more affected by the condition than others. Operators often try to overcome the problem of bounce by amending the plate and/or tape hardness, by staggering the design when possible and finally by reducing press speed, which obviously eliminates many of the attractions offered by the flexo process.

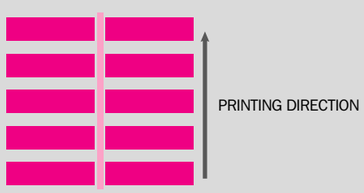
THE TEST

The aim of the trial was to benchmark bounce behaviour of the six selected flexo sleeves, split between entry level and high-end versions, in a ‘snap-shot’ trial at low and high press speeds. The trials conducted by the research organisation were concerned purely with examining sleeve bounce caused by vibration, and how this affected the point of transfer of ink between the plate and the substrate.

A great deal of time was spent in creating a design that would be extremely prone to the effects of bounce. The result was a particularly ‘tough’ job for a flexo press, showing five 100 mm solid bars and one 710 mm screened/tint strip in the direction of print. Such an image would display dramatically the presence of any bounce.

The eight-color flexo press used for the trials was carefully set up so that the only variable during the tests would be the flexo sleeves. The research was conducted over one day and the highly experienced staff handled both the testing of the sleeves and the analysis of the results. The job was printed in magenta ink as this color provided one of the most easy to be read by the equipment used. Optical density measurements were taken at two pre-determined speeds. The following criteria were set:

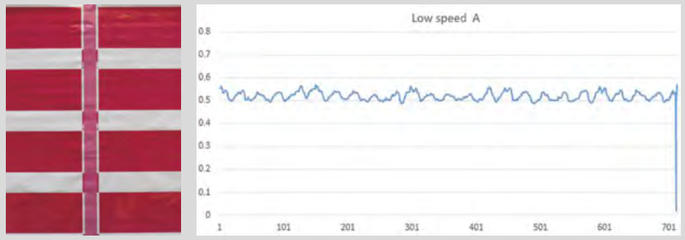
- Three high-end sleeves were tested
- Three entry-level sleeves were tested
- Continuous optical density measurements at 150 metre/min and 350 metres/min
- Readings taken at 1 mm intervals
- The same hard plates were used in every instance – Digital ACE 1.14
- The same hard adhesive was used in every instance – Lohman 5.4



THE RESULTS

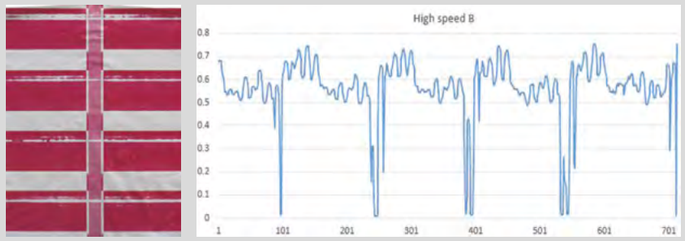
Measuring continuous optical density (OD) of any trial point allows ‘hard data’ to be gathered of the OD. One method of quantifying bounce is to calculate the OD standard deviation i.e. quantification of OD variability. The printed samples with the worst print quality had the highest standard deviation. By plotting the standard deviation of each trial point, it was possible to compare objectively the bounce behaviour of the different sleeve technologies tested.

Sample 1



This print sample displays the effects of limited bounce, which is reflected by the corresponding OD measurements, taken along the 30% screen strip.

Sample 2



The print sample displays the effects of heavy bounce, reflected by the corresponding OD measurements, taken along the 30% screen strip.

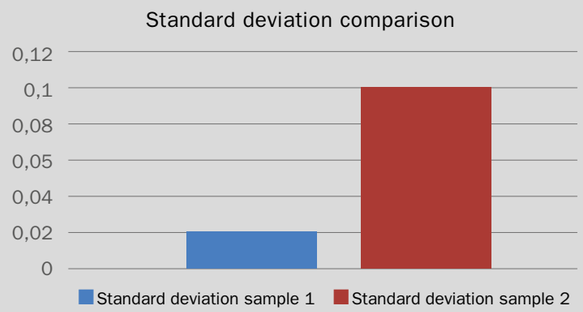


Fig 1. Comparison of OD standard deviation of samples 1 and 2.

With a higher standard deviation, sample 2 shows a greater level of bounce than sample 1.

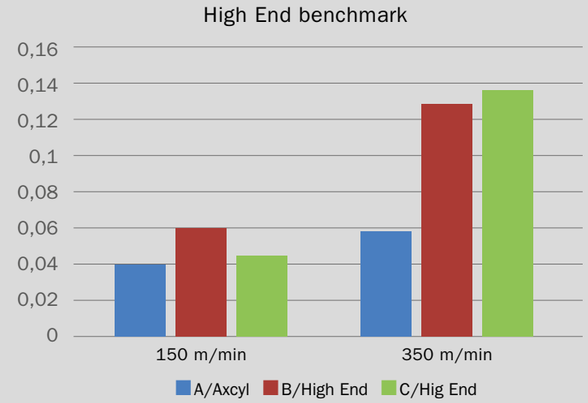


Fig 2. Comparison of high end sleeve technologies from 3 suppliers.

Vibration increases with speed, as demonstrated by the higher standard deviation.

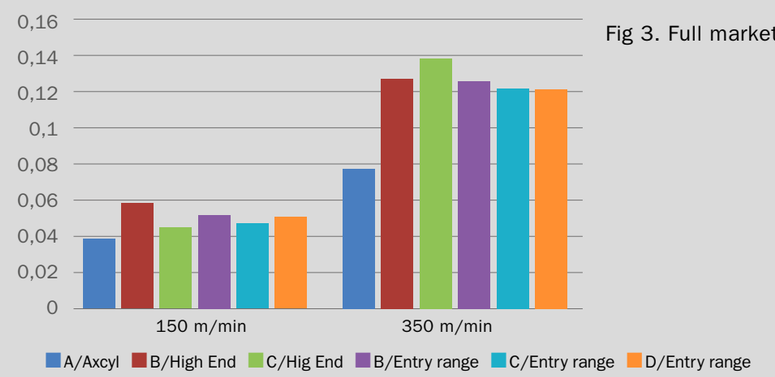


Fig 3. Full market comparison.

There are no big differences between high end and entry-level sleeves in term of bounce behaviour. The differences between the sleeves are more related to the product environment.

AXCYL PERFORMS BEST, IN PARTICULAR AT HIGH SPEEDS.

CONCLUSION

The difference in price between the cheapest and most expensive versions of the same sleeve geometry is about 20 per cent. Printers can make considerable savings if they buy wisely. However, this does not mean simply purchasing the cheapest models. Good anti vibration properties in a sleeve are vital if printers are to achieve the maximum production speeds of their flexo press and combine this with high-quality reproduction.

Trelleborg's Axcyl sleeves came out ahead of all of the sleeves tested for bounce caused by vibration, in particular at high speeds. The entry-level sleeves performed surprisingly well, but their construction means that they will not maintain stability over a long period and will therefore need replacing.

Printers need to take into account all of the sleeve's properties if they intend to purchase in the most cost effective way. In addition to anti-vibration properties they should consider:

- Most sleeve damage occurs during handling so any 'protection features' need to be examined carefully e.g. shock-absorbing features on the face, the incorporation of a cutting guide to prevent excessive knife cuts etc.
- Are sleeve ends sealed effectively? If not, they are likely to absorb moisture/solvents, particularly if used in automatic sleeve cleaning systems, and the result will invariably be sleeve deformation and poor register.
- Are the sleeve's pre-cut registration slots properly reinforced? When this is not the case operators often find that pre-register, as defined by the sleeve slot, does not remain accurate.

Accelerating performance in a sustainable way

TPS-AXCYL 03/2017

TRELLEBORG

Trelleborg Printing Solutions is an operating unit within Trelleborg Coated Systems, part of the Trelleborg Group.
With over 50-year experience in the printing industry, it offers first class solutions for the printing industry worldwide.
Vulcan, Rollin and Printec are its leading brands of offset printing blankets for the newspapers, magazines and catalogues, business forms, metal decorating and packaging markets while Axcyl is the premium brand of mounting sleeves for flexographic printers.
All Trelleborg's innovative solutions accelerate performance for customers in a sustainable way.

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