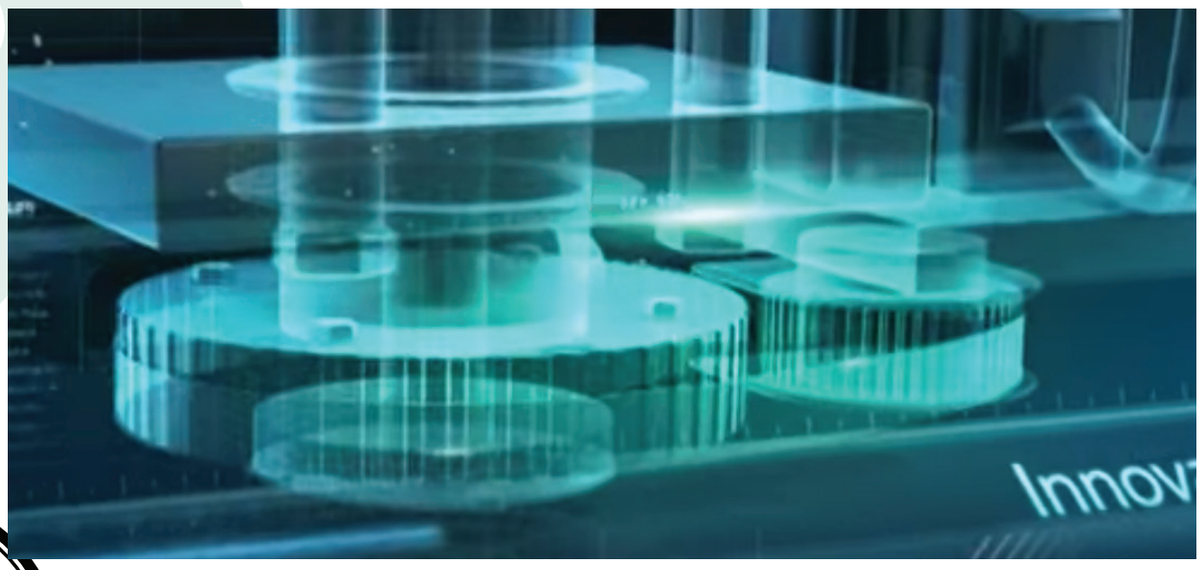
Highcon

Digital Cutting and Creasing

The Science Behind The Innovation

White Paper



CUT & CREASED DIGITALLY HIGHCON

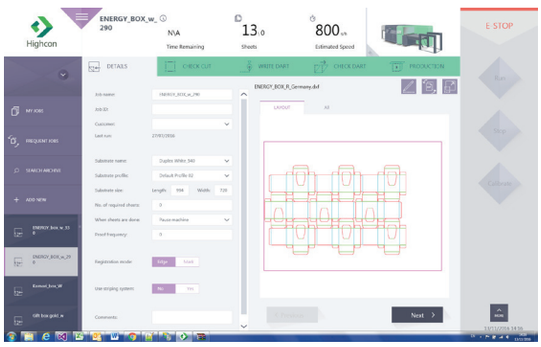
Highcon digital cutting and creasing technology combines the best of two worlds: the flexibility, precision and accuracy of modern digital technology together with the high quality of conventional die cutting and creasing which has become the industry expectation. In addition, and unlike traditional systems, the two processes of cutting and creasing are separated which enables each process to be finely tuned.

The benefits of digital cutting and creasing have a strong impact on all members of the supply chain; eliminating tooling production time, costs and complexities, enabling cost-effective production of any run-length. The additional benefits of the laser cutting include intricate designs, complex cutouts, adjustments to perforation patterns and nicks, and the ability to etch or score with the laser. All of these obviate the inherent design limitations of the conventional die-cutting process.

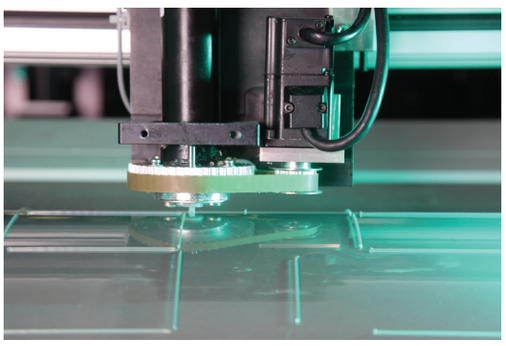
Since its introduction in 2009, Highcon has invested heavily in optimizing the quality of the digital cutting and creasing, in efforts to meet or exceed the capabilities and quality of 150 year old conventional methods. The R&D department boasts top flight scientists in the fields of physics, chemistry, materials and software who work together to continuously perfect the technology.

Creasing with Highcon DART Digital Adhesive Rules Technology

Creasing is carried out by the Highcon patented Digital Adhesive Rule Technology, (DART). The creasing data comes from a standard DXF file which is processed by the Highcon software and sent to the DART system on the machine. A writing head releases a special polymer onto a Highcon DART foil in the form of rules that once cured, will produce hard raised lines.



DXF file on operator's screen



Writing DART rules

In a production run, sheets pass from the feeder along the conveyor to the DART station. Underneath the DART upper drum on which the foil has been wrapped and written, is a second drum, covered with a unique blanket-like counter. As the sheets pass between the two drums, the crease is made. The combination of the DART technology and counter blanket, results in products that are ready to be automatically folded and glued.

Final Box

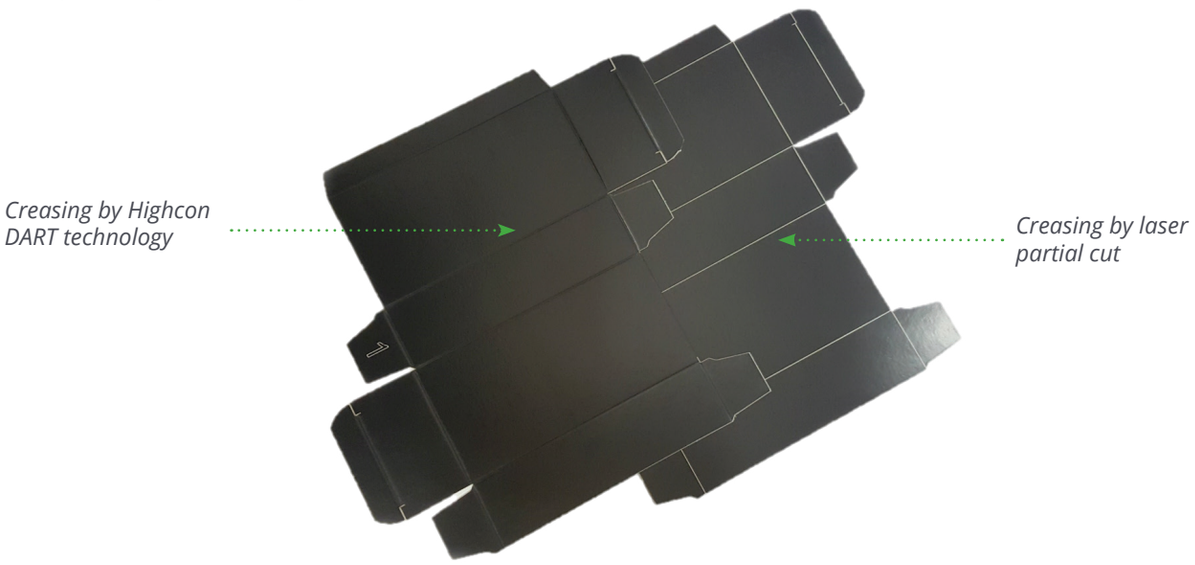
To learn more about how Highcon digital cutting and creasing works

Watch the DART Video: http://www.highcon.net/highcon-process/

Digitally Driven Mechanical Creasing

Unlike other laser die-cutting machines, which perform creasing by using a half-cut, the creases produced by the Highcon machines are mechanical, similar, but different to conventional creases produced by a die-cutting form. Half cuts do not meet industry requirements because they weaken the board rendering it unsuitable for continuation to folding-gluing and filling machines.

In addition, they also expose the bulk of the cardboard and damage the esthetics of the printing (see image below)



The crease produced by the Highcon machines is visually different to the conventional crease but functionally, it performs as well or better. The ultimate test is the ability of the creased board to pass on to an automatic folding-gluing or filling line. This is proven on a daily basis by dozens of Highcon customers and their end customers (brands) in various industries such as food, cosmetics, beverages and more.

To see digitally cut and creased products on a folding gluing line:

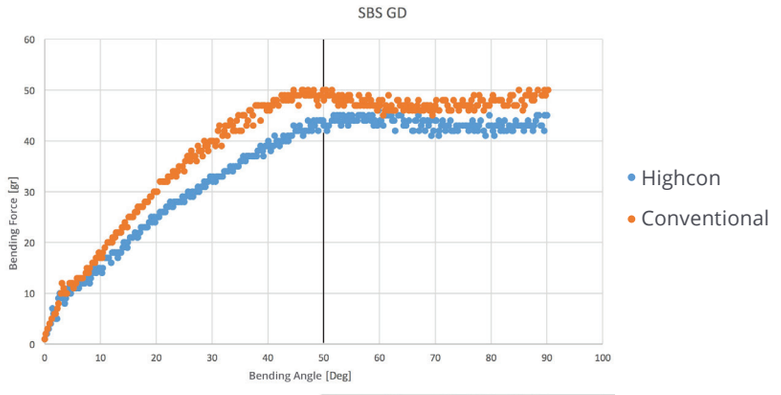
http://www.highcon.net/folding-gluing/

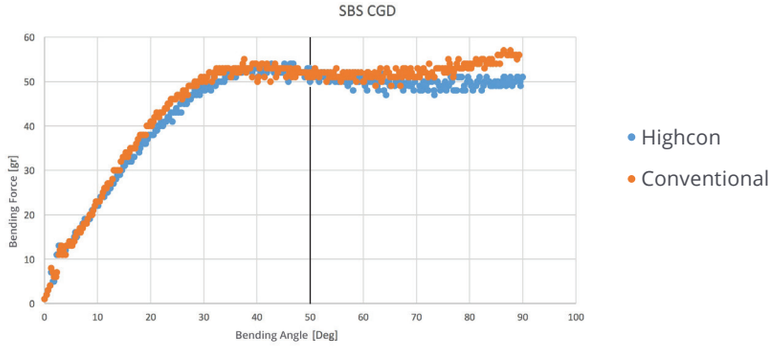
Lab test results, conducted by Highcon and Highcon customers, show that using the same substrate, Highcon DART technology produces creases that match in quality those of conventional. Packages produced on a Highcon machine are therefore compatible with the common industry standard, and can be processed in the same way as packages produced on an analog machine. In addition, Highcon produced creases are generally more consistent, and show less variation in different measurements compared to conventional ones.

The two images below show a comparison between the folding force of a conventional crease and a Highcon digital crease on the same substrate, in both cross-grain and grain direction.

The proximity of the two data curves demonstrates that the digital crease quality is equivalent to a conventional crease.

The research team at Highcon has tested the creases on the same measurement and characterization tools used by the industry's leading manufacturers to check folding force, erection force and spring force.





As evident from the results, digitally driven mechanical creasing delivers the accuracy and immediacy of digital together with the quality of conventional. The mechanical crease keeps paper memory without affecting the structure of the paper. Any deformation of the paper is the same as conventional.

The generally accepted standard in the packaging industry is 40-60% folding force but the folding force usually varies according to the different substrate used.

Cardboard Delamination Cross Section

Conventional Creasing Process

FBB

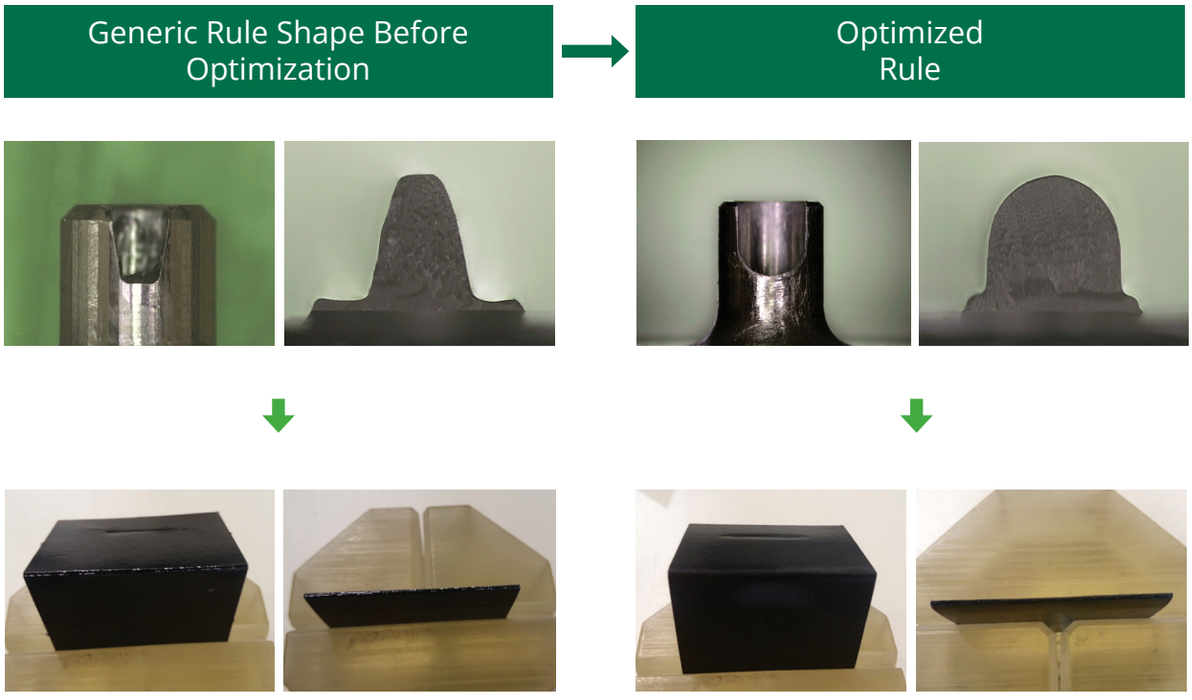
Digital Creasing Process

In addition to matching conventional standards, the Highcon technology has the added flexibility of being able to adapt the shape of the crease rule to suit a specific substrate or requirement. This is done by optimizing the shape of the DART resin extrusion nozzle tip and by digitally controlling different elements of the writing process, such as rule width and height.

For optimization of a specific job the depth and pressure of the rule (height of rule and gap between drums) can be adjusted.

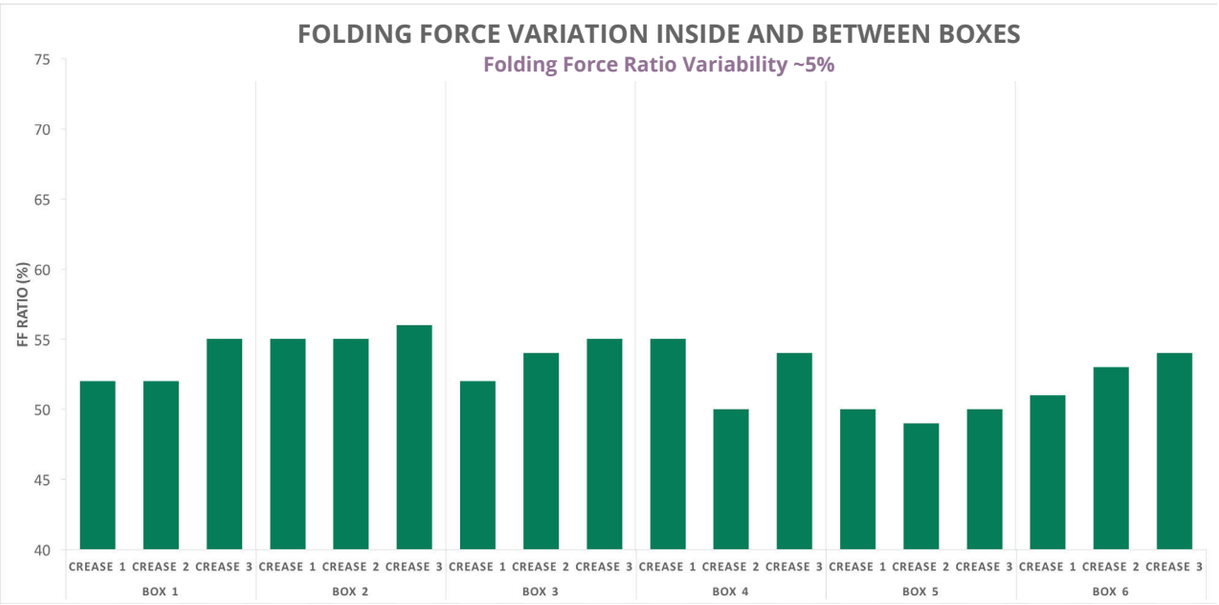
For specific applications – the rule shape and dimensions (height vs. width) can be adapted in general and, if necessary, by grain direction according to the application.

Optimization of Rule Shape



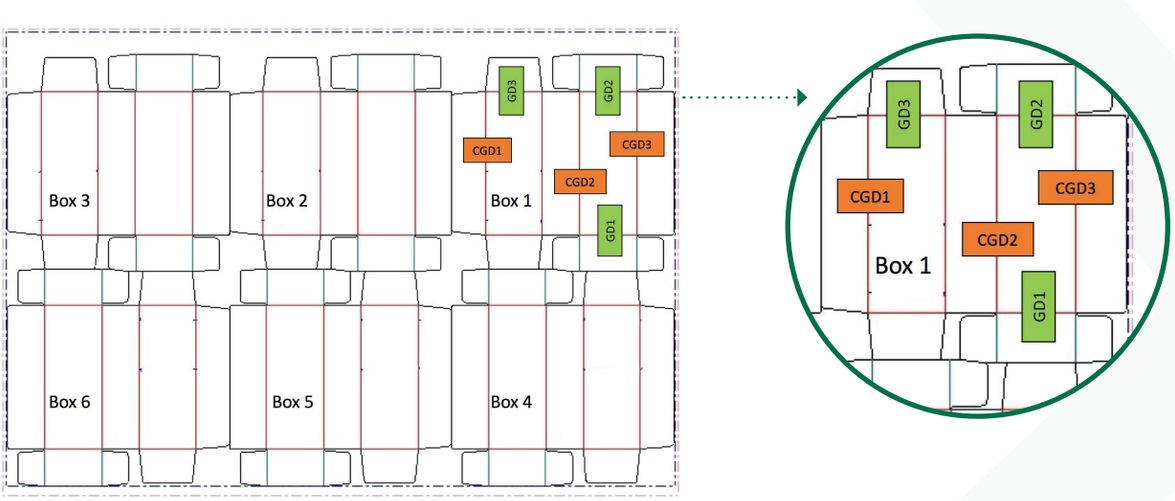
Furthermore, test results show that in general, boxes produced on a Highcon machine are more consistent in quality, with **less variation within the run**, allowing customers much **more predictability** and a better yield for single or repeat jobs.

One of the key benefits of a digital technology is the automation and inherent consistency of the process which removes all potential variables of operator error or human intervention in the setup process which can result in different results per production run, shift or operator. Instead the setup, process and quality control are automated, stored on the computer and, by definition, highly repeatable and require less operational skill. Once parameters are defined, they can be repeated by a different operator, at a different time and even on different Highcon machines.



This diagram, with the detail magnified on the right, demonstrates how automation ensures the inherent consistency of the folding force inside and between different boxes on a sheet.

For each of the 6 boxes 3 tests were performed (3 bars, crease 1, crease 2, crease 3). The variability of the folding force between boxes on the same sheet and within each box, was tested and the result of up to 5% variation demonstrates the accuracy of the test.



Further Advantages of Digital Technology

- Cut on crease – since there is no die-cutting form and the two processes are separated on the Highcon machines, there is no restriction to cutting on a crease.
- Nicks - in conventional dies the blade is damaged to create the nick, an irreversible process. On the Highcon machines the nicks are fully editable and can be changed even at the last minute to achieve optimal balance between the ease of blanking and the integrity of the sheet.
- For laminated or varnished boards, the lasers can be used to etch surface flaps in order to improve gluing, reducing complexities and costs in prior steps.
- Variable data cutting, as well as online editing capabilities, open a world of new applications and business opportunities that simply cannot be performed conventionally
- Last minute correction or design edits
- Design flexibility

To see how products digitally cut and creased on Highcon machines integrate seamlessly into a manufacturing supply chain:

http://www.highcon.net/osem/

“

For years people have been used to the word “no” when it comes to diecutting – the whole market has always had the word no in mind. And now, with the Highcon Euclid we’re changing that vision in the market. Yes you can! You tell me what you’re imagining and we will make it happen.

Ricardo Garcia, VP, Hera Printing Corp., Puerto Rico

Highcon

About Highcon

Founded in 2009 Highcon has developed a truly innovative digital cutting and creasing solution that is transforming the post-print market.

Highcon machines offer brand owners, retailers, advertising agencies and designers a faster, more efficient and more flexible process for creating packaging, promotional material, point of sale signage and more.

http://www.highcon.net/