



Compatibles

A TRUE SCIENCE

Customers don't just want a lower cost solution, they want lower

BY JANE SMITH

Just to be clear – by ‘compatibles’ we mean a catch-all term used for the laser and inkjet cartridges aftermarket. Still only representing 18–20% market share, but growing strongly, compatibles can be split into remanufactured product and new build product (albeit most product is remanufactured). And this applies to both inkjet and laser cartridges.

We reported a while ago that ‘compatibles’ was no longer a ‘dirty’ word and that consumer confidence was growing all the time. This has been mainly due to strong branding from people like Kores, Jet Tec, KMP, Q Imaging, Red Shark and Xerox (to name but a few), along with reliability and trial. With the cost of printing now a real concern consumers are prepared to trial the product based upon the prospect of saving up to 30% of their printing costs.

However, for this sector of the market to continue to grow, it is critical that product quality and reputation is maintained. Consumers are very fickle indeed and with the increased use of digital cameras and related technology it appears that now customers don’t just want a lower cost solution, they want lower costs without compromising on quality. With this challenge laid at the feet of the compatibles manufacturers we wondered how they could possibly achieve both. But, when you begin to realise the level of investment and technology behind the products being brought to market, you then see the real sophistication of the industry – it’s fascinating and has become a true science. Add to that a real emphasis on customer satisfaction and there appears no doubt that the sector is here to stay. We spoke to Kores, Jet Tec, KMP, Q Imaging, Red Shark and Xerox to find out more.

It’s the Original Equipment Manufacturers (OEMs) and their printer/machine development that drives product development in the compatibles sector. Everybody tries to get

products to market as quickly as possible to capitalise on the volumes available before the printer/machine is superseded by the next generation. This can take between 3 and 12 months depending upon the complexity of the product. The decision over which products to develop; remanufactured or new build, laser or inkjet, mono or colour, is very much down to how big the demand is likely to be (based upon MIF – machines in the field), how long it will take to develop and what the cost will be versus the return from sales volumes. In terms of the number of new products, Xerox told us that they are currently launching one new product every two months. However, they and others believe that this will increase as the colour market for machines grows. Nearly all laser toner products can now be remanufactured and there is already a move toward the colour laser market for compatibles.

For those still unsure of the difference between remanufacture and new build, let us explain. Where integrated technology is used, i.e. where the ink or toner are combined with the print head or drum, then remanufacture is the most sensible route for compatibles as there are expensive design patents and licenses to prevent new build alternatives. Where the technology is separate then new build alternatives can be cost effectively developed. Can you believe that some print heads have more than 200 patents! Now that does sound expensive.

As well as the difference in manufacture there are also differences in the way companies are structured and this is true for OEMs (and equally applies to other industries). Some choose to invest in the whole manufacturing process and own the production of all the raw materials while others choose to specialise in the assembly of the finished product and the marketing/branding and ‘buy in’ raw materials

and/or components. Those manufacturers choosing to invest in the whole process are also able to patent their own products (a growing trend), no longer choosing to directly copy the OEMs. Both business models are equally legitimate and ultimately do not affect the ‘end user experience’.

Taking laser toners first, whichever business model is in operation, the principles for the original design and subsequent remanufacture involve the same three elements:

- electro-photography
- powder technology
- assembly and manufacturing processes.

OPC drums are photo conductors and react to applied voltage and laser beam exposure to create a latent image in readiness for printing. Toner powders are the next element and these need to meet precise conditions such as particle size, melt temperature, flow properties, pigment density, pigment colour and static electrical charge. The assembly and remanufacturing process comes next but the investment in R & D, Benchmarking, Quality Assurance and Sales/Marketing are not to be underestimated.

The performance of a compatible cartridge needs to be determined at the development stage and this tends to be directly in line with the performance of the original. Extensive, standardised benchmark testing is carried out and measurements are taken of print density, character width, print key or fusion to specified substrates (this means how well the toner adheres to the paper or board), toner consumptions, toner transfer efficiency and page yield. After testing, the right combinations of toner powder and OPC drum then have to be put together to give the best match to these benchmark parameters.

In the remanufacturing process, methods for the effective dismantling of original cartridges have to be developed so that there is minimum wastage (the majority of cartridge designs provide obstacles to this that need to be >>

er costs without compromising on quality.



overcome). And then of course there's the method of re-assembly. On average over 80% of a laser toner cartridge (excluding the toner powder) is reused in cartridge remanufacture. For new build manufacturers the same benchmarking and raw material selection needs to take place but the component parts have not had to be dismantled and recycled.

Toner powder is a non hazardous but highly mobile substance that, if not handled carefully, can drift like smoke and contaminate large areas. Best practice in terms of handling such materials is of utmost importance. At Kores, for example, all cartridge dismantling and cleaning takes place in front of cleaning booths connected to a dust collection system. Typical air flows of 1000 cfm at each of these booths ensures that airborne toner powder is drawn into the collection system resulting in responsible waste collection and recycling. Whether laser or inkjet cartridges are being produced, waste handling and disposal is taken very seriously by everyone we spoke to. Xerox, for example manufacture under ISO14000, an environmental standard which measures the traced disposal of waste.

“100% of cartridges are print tested. All assembly workers are trained according to documented processes and we hold daily management meetings to maintain excellent quality”

**SIMON WADE,
PRODUCTION MANAGER,
KORES NORDIC (GB) LTD, TONER DEPT.**

Test, test and test again is what our compatible manufacturers do. Constantly checking to ensure that standards are maintained.

As with the toner powder, the performance of the ink is measured on multiple substrates, in terms of colour (which are matched to the OEMs using international standards) and flow. The flow dynamics of the liquid inks (rheology) are measured using highly accurate equipment such as a viscometer and tensiometer. This allows analysis of drop formation, flow properties and penetration of the ink into the substrate, all very important elements of inkjet printing technology (we told you this was all very clever!).

In the remanufacturing process for inkjet cartridges, cleaning is also a critical element. The nozzles are only 0.0002mm in diameter and so easily get blocked by paper dust and dry ink. Manufacturers such as Kores have developed non-aggressive chemical cleaning solutions in house that can remove these blockages and

clean the interiors of the cartridges to a nearly new quality. Effectiveness of the solution is ascertained by using a powerful 420x+ digital microscope.

Without exception, everyone we spoke to had highly sophisticated and well documented quality assurance procedures. Constant testing and monitoring of performance against the original OEM benchmarking is done rigorously to ensure that standards are maintained. Samples from production are taken daily. Tests include writing, functionality and electronic tests. From page yield to optical density, under all sorts of conditions including high/low temperatures, vibration tests, altitude and compression. As Xerox told us, “Boy, do we put our products through it!”, and they are not alone. Generally, raw materials are tested before use and remanufactured cartridges are thoroughly cleaned and visually inspected for defects and tested before use. Even destructive tests are done to check that everything has been assembled properly internally. Only well proven and audited suppliers are used. The consequences of not maintaining such high standards would be to go out of business. Our compatible manufacturers cannot afford to get their ‘science’ wrong and will reject a whole batch of product if necessary.

“QA is the most important area to Xerox, the quality of a Xerox product is paramount to the success of the Xerox range.”

**NIKKI LEACH, PRODUCT MANAGER, XEROX
OFFICE SUPPLIES**

Our look into the science behind the manufacture of compatibles has proven to be quite fascinating. While we always expect such high standards from the OEMs, we should also be impressed by these guys. In every case, they really are going the ‘extra mile’ to ensure that the products they bring to market are ‘spot on’. ■

In the world of inkjet cartridges it really isn't very much different. Intensive benchmarking remains of paramount importance as the original cartridge is considered the baseline in six key areas:

- **page yield**
- **colour**
- **print density**
- **intercolour interaction**
- **stability**
- **and dry time**

The compatible product must perform equal to, or better than, the original and provide a direct replacement in these six key areas.

We'd like to say a big thank you to those companies that allowed us into their organisations to bring you this fascinating view of their particular science; Kores, KMP, Jet Tec, Red Shark and Xerox.