The anilox roll is widely known as the heart of the flexographic press and Harper is very proud to announce continuing development of new anilox manufacturing technology. To someone on the outside looking in the past few years, the anilox roll may have seemed a dormant part of the flexographic industry. However, Harper has been very busy behind the scenes developing further advancements to take the manufacturing of anilox rolls to a new echelon.

The technology of manufacturing an anilox today is not the same as compared with five years ago. Customers are under more demand more consistency, repeatability and tighter tolerances. Everything is measured in the printing world including ink viscosity, dot gain, density, feeds, speeds, and waste. With that in mind, Harper has taken the same systematic approach in the manufacturing of anilox rolls.

The company has made major investments and committed a substantial amount of time and focus in order to scientifically measure every process of manufacturing an anilox roll. A major part of investments have come in the form of new technology, equipment, software development and instrument purchases to scientifically measure processes in a constant effort to maintain consistency.

In the ceramic coatings process, Echoplasma, the company has purchased a large number of state-of the-art thermal spray plasma systems. Some of which are replacements as part of the continuous improvement program and others are due to increased customer demands. Touch screen thermal spray units will be established within the next year.

**LONGEVITY ESSENTIAL**

The hardness of the company’s ceramic coating averages 1,200 Vickers and is operated in a range between 1,100 to 1,300. Some may ask why this is important and, from extensive experience, Harper has learned ceramic hardness above 1,300 Vickers changes the mechanical property and the ceramic becomes too hard and consequently, brittle. This could cause the coating to crack under pressures normally associated during regular press operation. By keeping the hardness of the ceramic coating within this range, the company is able to provide the customer with the hardest ceramic possible to ensure longevity, while at the same time allowing it to remain durable.

Maintaining a minimal amount of porosity is just as important as maintaining the correct hardness. Our porosity averages .5 percent with an upper limit of 1 percent. Keeping porosity to such a low level allows Harper to maintain consistency when engraving the line screen as well as to ensure a uniform volume across the roll face. The company also has one of the first employees in the flexographic industry to be a certified CTSO thermal spray specialist to help maintain these standards. For example, when engraving a 1,200-line anilox with 2.0 BCM if you have porosity (coating voids) that measures 25-30 microns across it becomes impossible to hold a consistent cell shape or volume because the opening of a 1,200 lpi cell is only 19 microns. It will be impossible to create the cell wall structure necessary to prevent the low percentage dot from being overloaded with too much ink.

As press speeds and line counts increase so has the importance of the surface finishes of our rolls prior to laser engraving. With superfinishing SOP, every anilox surface is measured using a non-contact surface finish instrument and the Roughness Average (RA) is recorded. RA measuring gauges are used to measure roughness after polishing and before laser. This is vital because roughness plays a critical role in determining how a real object will interact with its environment. Rough surfaces usually wear more quickly and have higher friction coefficients than smooth surfaces. Roughness is often a good predictor of a mechanical component’s performance and longevity since irregularities in its surface may form cracks or corrosion. To put this in perspective, ceramic imaged cylinders are not possible because ceramic by nature has too much porosity.

**SMOOTH SURFACE**

One way in which Harper controls consistency in the laser engraving machines is by giving operators the best possible surface to engrave. This allows the engraving machines to provide more consistent quality as well as maintain smooth cell
tops. In a printer’s world this could mean a lower roughness of the anilox surface, longer blade life, and reduced scoring.

Harper globally has also extended its XLT™ technology with nine new state-of-the-art versatile ALE Hercules laser engraving systems, five of which are 500 watt models. There are also plans to add another four lasers in the next 18 months. Harper’s 500 watt fiber optic engraver contains the latest laser technology available. As CO2 laser technology became obsolete in the anilox world, the new fiber optic technology became our standard. Low line screen engravings with extended or extreme volumes were at minimal a challenge when using CO2 technology.

However, with the 500 watt fiber optic technology we are not only able to achieve standard low line screens but have been able to expand our engraving charts beyond what was previously possible. Harper is able to now achieve a broader range of engravings with our XLT™, XVR™, and LaserKote product lines. We offer more extensive engraving ranges than any other anilox manufacturer.

Harper’s laser technology goes much deeper than just the wattage of the lasers. The cell profiles are much more defined, and tops of cell walls are much more crisp and smooth. Harper has pioneered and still strongly supports the 60 degree hex as the premier engraving geometry being offered to the industry.

It is not possible to make consistent engravings if you are unable to consistently measure the line screen and volumes. Harper was the first anilox company to embrace and use Interferometry, which the FFTA Flexo Quality Consortium (FQC) committee has listed as the most repeatable method to measure anilox volume at the 2011 Forum. Harper exclusively uses 3DQC’s from MicroDynamics. Every anilox we engrave is set up in the laser using 3DQC measurement verification prior to engraving and then checked across the anilox surface after engraving. Harper has also developed and incorporated an internal proprietary software package to work with the 3DQC. This proprietary tool allows us to maintain a consistently smooth surface after engraving, which will help rolls perform with less wear, scoring, and provide extended performance.

About the Author: Lee Kluttz, is vice president of operations at Harper Corporation of America. He is responsible for the daily operations of Harper Corporation in Green Bay, WI, and Charlotte, NC. Kluttz is the grandson of company founders, Ron and Katherine Harper. Kluttz is also the son of Harper President Margie Kluttz. He has worked in the business for 20 years, serving as an important part of the professional team.