



## The closer you look, the more you see

### *Seeing little things bigger helps us understand what's going on at a microscopic level*

By Rex Woodville-Price

Optical devices with powerful magnification allow us to study details that are not readily discernible with the naked eye. This type of visual enhancement can be very useful in gaining a more in-depth understanding of a process like adhesion. As magnification increases, the field of view decreases, in other words, as we zoom in, we see less of the object but in greater detail.

To the right are a series of digital images of a glue line in which we incrementally increase the magnification. We begin with a loupe, which magnifies the image nine times. With it we can accurately measure the glue line width.

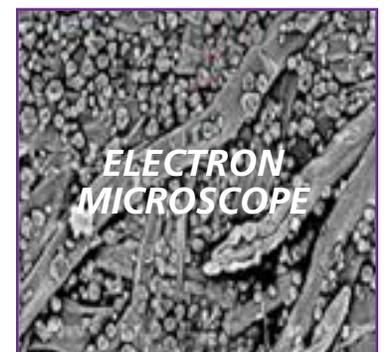
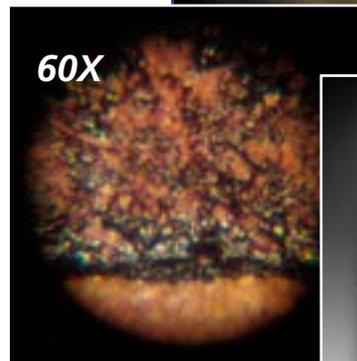
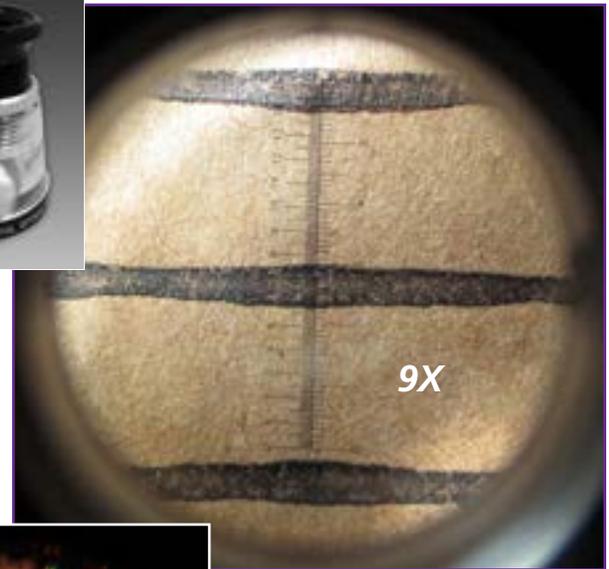
Using a hand-held microscope at sixty times magnification, we see the irregularities in the edge of the glue line and the thicker shoulder becomes more apparent.

With a digital microscope multiplying the image two hundred times, the individual paper fibers become visible and we get an idea of the distribution of the adhesive around them.

Observing with an electron microscope, we can see the individual starch granules amidst the paper fibers.

**T**he utility of magnified images goes beyond understanding bond characteristics in depth. Using magnification can also be helpful in finding the root cause of many problems in the plant. Some examples:

- Looking at printing on boxes to diagnose the causes of printing defects such as dot gain, moire or just old fashioned out of register
- Examining corrugating rolls for wear, pitting, or chrome loss
- Looking at wear patterns on slitter blades to assess the effects of repeated sharpening by the grindstone and abrasive polishing by the paper
- Analyzing fractures on cracked metal components to determine the reason for the failure. Certain telltale patterns in the break can point to fatigue vs. impact as the cause



# Digital imaging in the plant

*Modern image technology makes it easy to use pictures to show what words can only describe*

By Freddy Ramsey

Improvements in digital imaging technology have made digital microscopes and cameras rugged and compact enough for routine use in the plant. Some of the newer cell phones can make great photographs. Software allows us to enhance these photographs by zooming in or cropping out unnecessary parts and adjusting tone, contrast, and color for clarity. We can add text or numbers, even draw arrows or circles on these pictures to call attention to specific details.

Including pictures of a corrugator problem in a report makes it much easier for people to understand the problem and its location on the machine.

Today we have available a variety of tools to capture digital images. At one end of the spectrum, we could use a digital microscope, connected to a laptop to create a photographic record of wear on a slitter blade. At the other end would be to use a cell phone to snap a picture of a loose bolt and then email it to the maintenance department so they can easily find and tighten it.

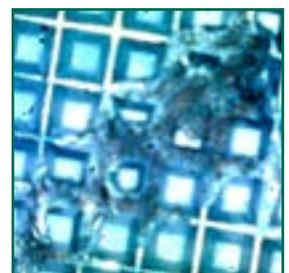
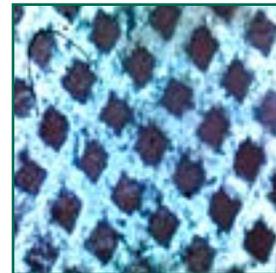
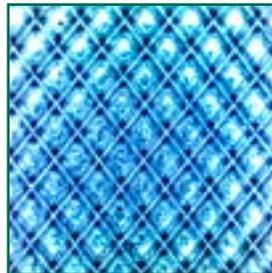
Being alert to the possibilities these tools offer will make us more efficient and productive.



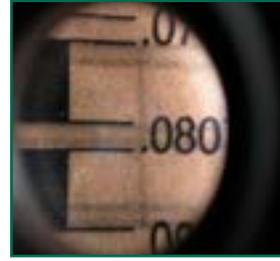
*Photographs can be used to document certain machine conditions. A picture of a set of steam traps with inlet and outlet temperatures can show they are working properly.*



Pictures from a digital microscope will help make better-informed decisions on when the rolls need to be cleaned versus when they need to be changed. A detailed picture can also illustrate damage on a glue roll or metering roll. A close look at the cells will reveal if residue is gelled adhesive or calcium deposit. Cells on a new roll look sharp and crisp, as the roll wears the outer walls of the cells appear wider. Pictures taken on regular basis can serve to document the life of the roll, comparing photos from previous rolls will aid in trying to predict the life of current rolls. Magnified pictures are even more important in the converting department, since flexo rolls have finer cells.



**M**agnified pictures of glue lines facilitate measuring glue line widths accurately when used in conjunction with a measuring device. This will help determine if the application rate is too heavy for industrial board or not enough for MRA/WRA adhesive. Analyzing the uniformity of glue lines will also help diagnose problems with contact pressure, adhesive transfer or even viscosity issues.



**A** bad Johnson joint on a single facer can be shown spewing steam out of the vessel, thus allowing maintenance to prepare adequately to fix the leak. Pictures of bearings expelling metal shavings versus a blown race, will help maintenance determine the urgency of a repair and avoid unwanted downtime.

**W**hen working on a technical issue such as warp, before and after pictures may be used to determine the results of the project and prove the goal was achieved. Pictures may also be used to show where a reading was taken.



*At the TAPPI show in September*

Left to right: Bill Kahn, Ed Guzman, Fred Rekola, Larry Smith, Amanda Putnam, Bill Gerard, Elaine Marker, Jim Carbone, Pete Snyder, Joe Giovanni, and Nate DeRoin

- Digital imaging in the plant
- A closer look In this issue:

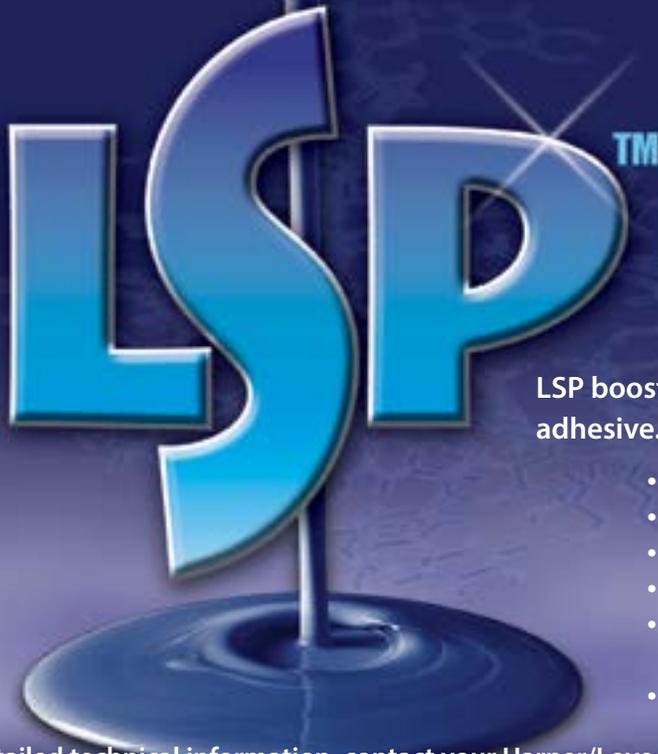
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