# Sophisticated Screen Stretcher can pay huge dividends

By James E. Ellis, President, Credence Engineering, Inc., Tempe, Ariz.

When looking for ways to improve screen life one has to be open to ideas that might not be obvious at first glance. Through experience we discovered that the number one factor that affects screen life is the uniformity of the tension of the wire mesh. As the screen is used and the number of prints increases, the mesh begins to relax and the overall tension within the screen begins to drop. As the tension reduces the image burned into the emulsion follows the pattern that the mesh takes as it relaxes. The wires with the highest starting tension tend to stay in place while the wires that began at lower tensions tend to give way to the pull of the stronger wires. This tension variation causes the image to distort and shift, usually in the direction of the squeegee motion. As the lines and spaces get smaller in size, the shift of the image becomes the main reason for premature screen scrap. This can happen far sooner than the emulsion breakdown, which is the number two factor.

If the wires within the screen mesh all have exactly the same tension (<1% variation) and care is taken to submit a consistent area of the screen to the strokes of the squeegee during all setups, then the image does not move as the wires relax. It just takes less force to push the screen down to the surface being printed. In essence, the wire relaxation has almost no effect on the screen life once the tension is totally uniform. At this point the screen life is at least 2X greater than the screen with tension variations in the 2 -3% range and higher. At this point the emulsion durability is the main factor.

How do we consistently hold screen tension within a frame to less than 1% variation? This would seem like an easy task until one carefully examines the commercially available screen stretchers. Typically screen stretchers have banks of clamps either manual or pneumatic along all sides of the stretcher. These banks are either “Stretching” or “Stationary”. There is a Stretching bank always opposite a Stationary bank. The stationary bank of clamps holds the mesh while the Stretching Bank of clamps pulls the mesh to a predetermined distance or pressure. On commercially available stretchers, if the mesh is carefully inserted into all clamps equally the stretcher can only achieve a 3-5% variation throughout the whole screen. This is primarily due to one of several factors:

1) Most stretchers Stretch by pulling the entire Stretch bank simultaneously. Any variation in where each clamp along the bank has a grip onto the mesh translates into tension variation.
2) Most stretchers have rigid clamps that do not “Give”, or compensate, for the variation of tension between the various wires gripped by the specific clamp.
3) Most Stretchers use low-grade Wheel Bearings that do not roll along the Car Rail as easily as they can. This sets up variation in the tension because the cars and clamps

cannot move to the optimum position where the tension on the individual wires is equalized.

We at Credence Engineering have taken the Screen Stretching Process several steps beyond the norm. We do not pull an entire bank in unison. Not only do we have stationary clamps and stretching clamps, we use individual pulling cylinders for each stretching clamp. This compensates for the unevenness in the amount of mesh within each set of jaws. Each clamp pulls to its correct pressure thereby equalizing the tension within all of the wires.

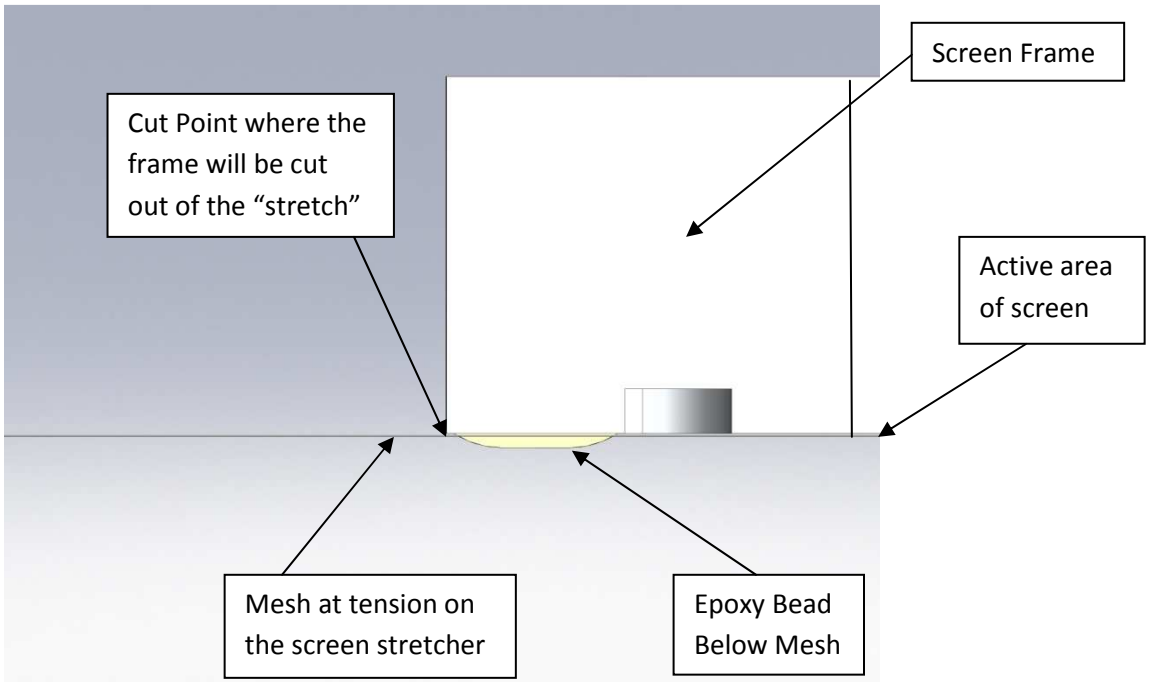
We use swivel clamp jaw sets on all clamps that allow the jaws to swivel to equalize the tension of the wires within each jaw set. The jaws also overlap so that there are no gaps or zones of mesh that have no forces applied.

Each clamp and pull-clamp is on its own bearing mechanism that allows it to move in the direction of force. We use high quality bearings and high quality rail guides so each mechanism can roll easily to its most optimum position, where the wire tension is the most uniform. As the stretch-clamps pull, the clamps adjacent and next to them can move where the forces are pulling. This allows total uniformity in each wire of the mesh.

We did not stop there. There is another factor that contributes to the total life of the screen. The screen frame is typically mounted into the printer with its top surface held up against a solid mounting surface that is machined or ground flat. This sounds great except for one small issue…flatness of screen frame. Most users believe this is not a problem since the screen frame is pulled flat when mounted to the mounting surface of the printer. Unfortunately a screen frame that is slightly warped during the gluing process when pulled flat in the printer, no longer has the uniform tension that it did before it was installed. Any influence on the frame after gluing results in minute changes in tension of the mesh wires which can easily move the tension variation into the 5% range. I will address this issue later.

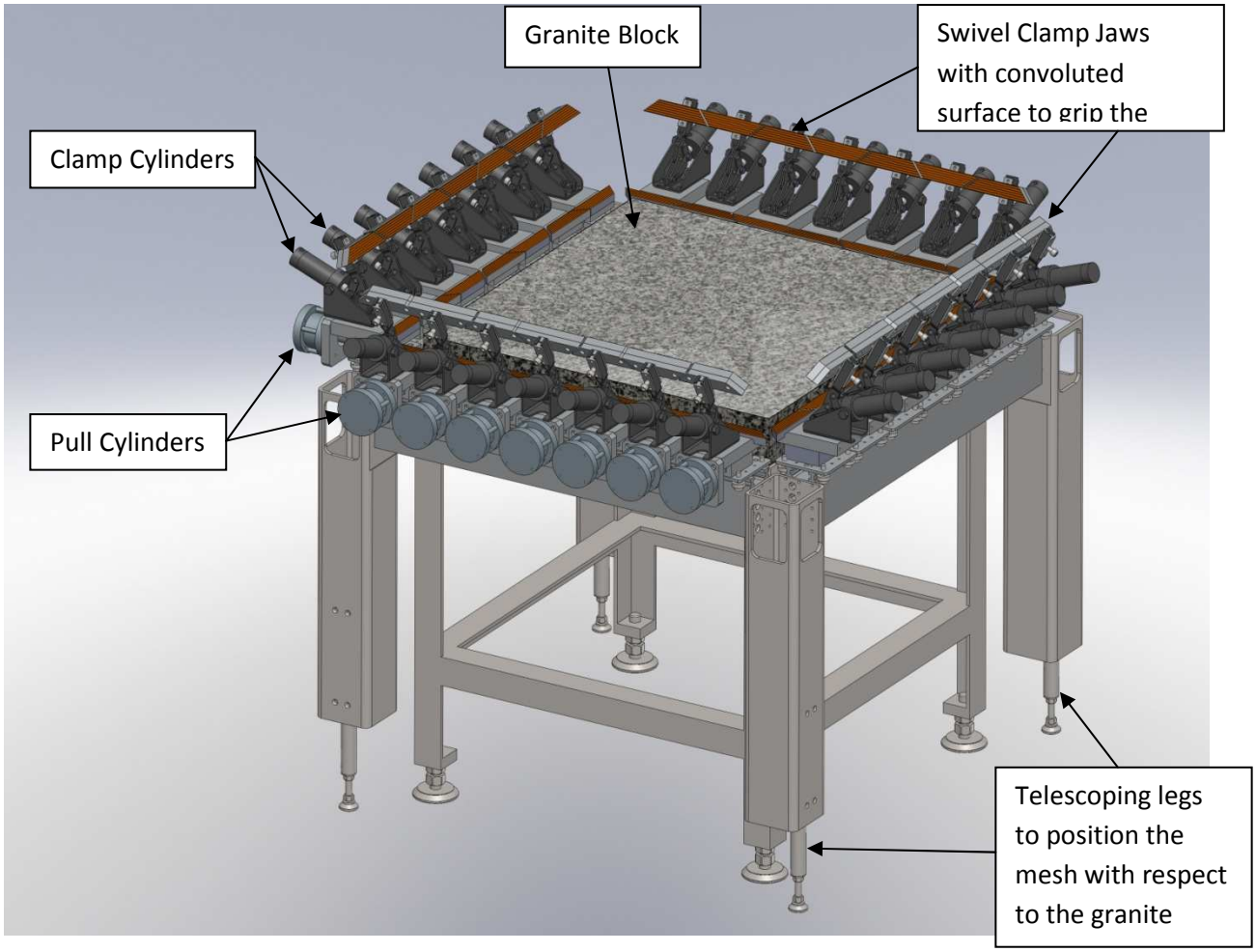
Another major factor that contributes to the overall screen life is incorrect Snap-Off adjustment. The snap-off is the distance that the screen mesh is above the surface to be printed before the squeegee touches the screen. This distance should be minimized to allow for minimum screen vertical movement, which stretches the mesh, yet allow sharp line resolution. Once an optimized distance is defined, you want to make every effort to make this portion of the setup as automatic as possible. Inadvertent damage or premature fatigue of the mesh occurs when the snap-off distance is set up incorrectly. We have devised a way to eliminate the adjustment of the snap-off entirely. By precisely controlling where the screen mesh is located vertically in the printer we can eliminate the snap-off. This sounds simple, but cannot be

accomplished easily. In order for the mesh to always locate in the Z direction in exactly the same place we need to eliminate the variation within the screen frame thickness. We do this by "Bottom" locating the screen frame. If we can locate the frame by setting the mesh onto a fixed surface in the printer and locking it there without influencing screen warp we can effectively eliminate the snap-off adjustment. Locating the screen by setting it down onto a locating surface where the mesh rests on the surface is not only a dangerous move for screen life, but is irresponsible at best unless we have a safe way in which to do it. This brings us back to an important feature in the Credence Screen Stretcher. All commercially available screen stretchers suspend the stretched mesh while the glued frames are placed onto it until the epoxy cures. The epoxy bead around the bottom surface of the screen frame works through the mesh and forms a bead on the underside of the mesh.




In our Stretchers we employ a granite block on which to rest the mesh and also support the weight of the screen frames. We protect the granite by placing a sheet of Mylar® on the granite under the mesh. This provides a smooth release surface to which the Epoxy will not adhere. With the mesh resting on top of the Mylar, when the glued frame is placed onto the mesh, the glue forms around the individual wires of the mesh, but does not sag below the mesh. This surface interface where the mesh and glue are at the exact bottom surface of the mesh is extremely flat and durable. The epoxy also fills in any variation in the bottom surface of the frame thereby making it perfectly flat. Now, when the screen is located in the printer on this

glue/mesh interface and clamped into position, there is no movement of the frame and the tension variation after installation is the same as it was prior to installation.




Credence ST-26X26

We added a center granite block to our screen stretcher for two reasons:

1) By providing a very flat surface on which to place the mesh we can glue the frame onto the mesh causing the glue bead to be flat and literally at the bottom surface of the mesh. This allows us to mount the frame into the printer and locate it on the bottom surface of the frame or the actual mesh itself.

2) By gluing the frame to the mesh while it is located on the granite block, we create a flat bottom surface in the glue that compensates for any out-of-flatness that might be in the frame.

These two factors allow us to mount the frame into the printer on the bottom mesh surface. It allows us to clamp the screen in place and not have any effect on the tension because we are not flattening out any existing warp in the frame.

And we now can totally eliminate the snap-off as a variable in the print process. Once we decide what the optimum snap-off distance is, we can lock it down and since there is now no variation in frame thickness (bottom locating). The snap-off distance is always the same. We would just have to increment the snap-off to compensate for differences in product thickness.

The Credence line of Screen Stretchers are truly unique and bring to the party a series of advantages that will help you achieve the longest screen life in the industry.