

PHOTOGRAPHIC LIFE PREDICTION MATRIX FOR FORMING FABRICS

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*A SIMPLE PHOTOGRAPHIC TECHNIQUE FOR ESTIMATING A FABRIC'S REMAINING USEFUL LIFE
WHILE IT'S STILL ON THE MACHINE.*

ONE OF THE MOST COMMON QUESTIONS PAPERMAKERS ask about a forming fabric is “Will it make it to my next shutdown?” It is an important question that remains hard to answer despite numerous articles relating fabric life with fabric wear and a wealth of papers outlining techniques to calculate and measure the life loss (or the life remaining) in a fabric.

This article describes a simple procedure for evaluating the remaining life potential in a forming fabric while it is still on the paper machine. Papermakers can use this approach to help them decide whether a felt will run with optimal performance until the next shutdown.

CONVENTIONAL TECHNIQUES

There are two widely used techniques for predicting or measuring fabric life: measurement of fabric caliper and fabric analysis by the supplier.

Fabric caliper

A popular method of estimating the remaining fabric life involves measuring the caliper while the fabric is on the machine. The fabric caliper is then compared with a

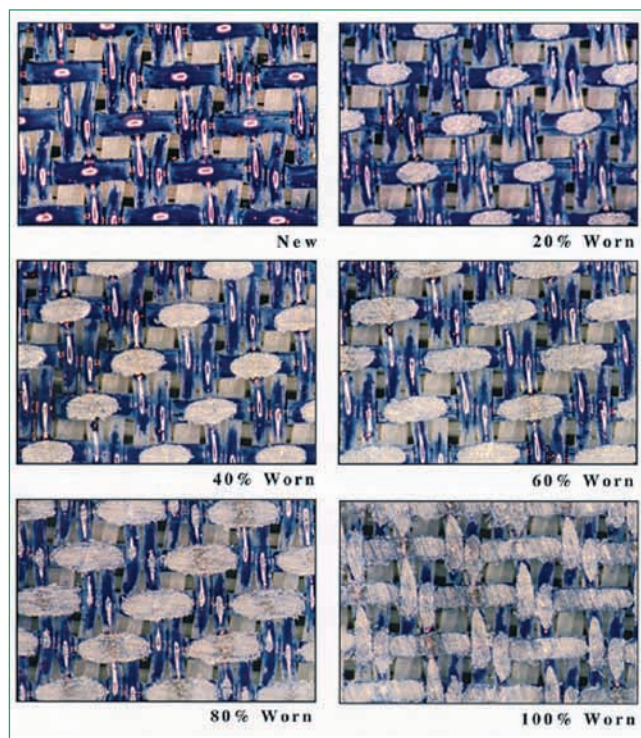
caliper chart similar to **Table I**, which lists design calipers that correspond to various levels of wear.

There are three factors to consider when developing such caliper-wear data:

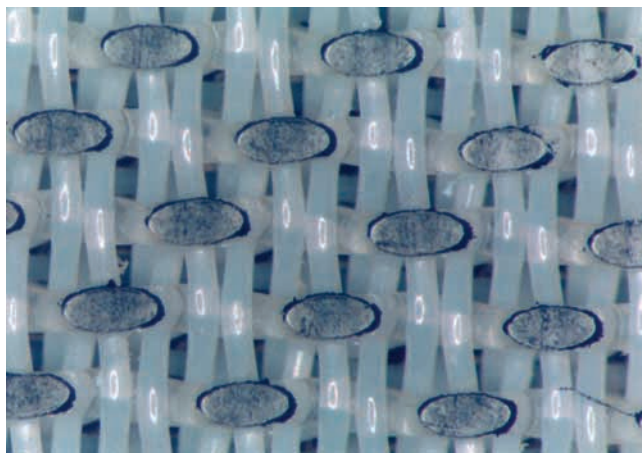
- The diameter of the machine-side yarns in the cross-machine direction
- The crimp amplitude of the machine-side yarns in the cross-machine direction
- The assumption that all wear occurs on the machine side.

There is a fundamental flaw in this approach for predicting wear. Not all machines wear on the bottom (machine) side only. Indeed, many machines have top (sheet)-side abrasion, which also reduces the caliper. The measured

caliper includes loss on both the top and bottom sides of the fabric, while fabric life is affected only by loss on the bottom side. Thus papermakers who rely solely on caliper measurement as an indicator of fabric life can end up removing a fabric before it has reached the end of its useful life.



1. Life-Prediction Matrix shows machine-side wear for a specific fabric



2. Fabric at 40% wear

Fabric analysis

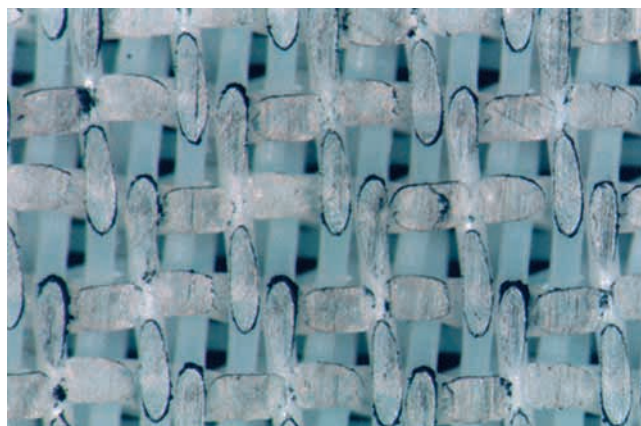
Another method is to cut the fabric off the machine and send it back to the supplier for a caliper-and-wear analysis. Such analyses tells the papermaker—after the fact—how long the fabric *could* have run. While such information is useful in the long term, it comes at a cost, since the fabric must be destroyed for analysis.

LIFE-PREDICTION MATRIX

There is a more realistic and reasonable approach to determine the remaining life of a forming fabric while it is still on the machine. Asten has developed the Life-Prediction Matrix, which looks exclusively at the machine side to determine the remaining life of felts in service. This is a visual approach that is performed when the fabric is still on the machine. The papermaker can use this technique to determine the life potential and decide whether to continue running the fabric or simply to cut it off.

How does the Asten Life Predication Matrix work? A series of photographs have been taken of the machine side of a particular fabric design, as shown in Fig. 1. The series of pictures show the machine side of the fabric at levels of wear from zero (new) to 100%. This pictorial series is used as a comparative scale for determining whether the fabric should be removed. The comparison is made by visually inspecting the machine side of the forming fabric with a magnification device that enlarges the fabric surface 20–30 times. The matrix is referenced to find the photograph that most closely matches the wear as seen with the magnification device. Thus, the level of wear for the fabric can be determined while the fabric is still on the machine.

The photographs in Figs. 2 and 3 are examples illustrating the use of this technique. Figure 2 shows the machine side of a fabric that has run on a machine. Comparing this photograph with the matrix, it is clear that



3. Fabric at 100% wear

Wear, %	Caliper, in.
None (new)	0.0330
20	0.0316
40	0.0302
60	0.0289
80	0.0275
100	0.0261

1. Fabric wear chart

this fabric is only 40% worn and can continue to run on the machine.

Figure 3 shows the machine side of another fabric. Again, by comparing this fabric with the matrix, it is evident that this design is 100% worn and should be replaced immediately.

Asten has taken the major fabric designs used in the market and applied this simple yet effective technique, which gives papermakers an alternative to the widely used conventional methods of estimating fabric wear.

Measurement of fabric caliper can lead to overestimation of fabric wear and thus underestimation of fabric life. Fabric analysis by the supplier may help in future decisions about when to replace the fabric, but that is of little help for the papermaker who needs to know if the current fabric will make it to the next shutdown. The Life-Prediction Matrix is a useful benchmark of fabric wear that can help the papermaker decide when a fabric is ready for replacement. The pictorial matrix is easy to use and is cost effective, especially when considering the extra run time achieved and the avoidance of unnecessary downtime. **TJ**

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