Adjusting Thread Tension

☐ Thread tension is probably the most common concern among quilters. It can seem mysterious and complicated, but the principles of achieving balanced tension are not difficult to master—it's the variables that quilters toss in which create the challenges.

☐ First, understand that tension is really just a simple game of "tug of war" between the top thread and the bobbin thread. The ultimate goal is to have no "winner" in the tug of war; instead we want a balance between the two powers—we want the thread to lock between the top and bottom layers of the quilt, in the batting layer.

Many factors affect the outcome of this tug of war, including:

a. hook movement
b. needle size flex
c. direction machine is moving
d. speed of the machine
e. hopping foot height
f. fabric tautness
g. fabric content
h. fabric treatment
i. fabric thread count
j. humidity
k. thread content
l. thread color
m. thread thickness
n. thread quality
o. batting thickness
p. batting content

With all those things working against a quilter, it's surprising that we can quilt at all! Learning about how all the factors affect your tension will help you produce a quality quilt.

☐ Some factors affecting tension are related to your quilting machine, such as needle size and flex, machine direction, machine speed, etc. Here is some information to help you better understand these variables and solutions to common issues:

Hook Movement:

Your machine's hook travels in a counter-clockwise motion around the bobbin. Therefore, the machine will stitch the best when moving from left to right when standing on the free-hand side of the machine, and from right to left when standing on the pantograph machine. (Hint: that's why it's difficult for some people to quilt pantographs—you move the machine in the opposite direction from which we "read.")

Needle Size and Flex:

The hook must pass behind the needle at precisely the right time to make a stitch. If the needle flexes as it enters and exits the fabric, then that slight needle movement will cause the hook to pass the needle at a slightly different time—perhaps too soon or too late. The needle could even flex away from the hook and cause erratic stitches or pull toward the hook and break thread.

That's why we recommend an MR 4.0 needle for most quilting applications. This sturdy needle reduces the issues that flexing causes. However, its large size *does* leave a large hole behind. Provided the needle is sharp as it penetrates the fabric, these holes should close up the first time the quilt is washed.

Machine Direction and Speed:

As earlier mentioned, the hook assembly travels counter-clockwise to make a stitch. Therefore, certain movements of the quilting machine will cause the tension to change slightly as the hook motion and needle flex combine to affect the tension. You may notice that the top thread is pulled to the back more frequently when you move the machine to the LEFT and AWAY from yourself when standing on the free-hand side of the machine. This direction is like stitching with the "reverse button" held in on your domestic sewing machine. The stitches will not look quite the same as when you stitch "forward".

Regardless of whether you have the stitch regulator on or not, if your movements are quick or jerky, this increases needle flex—which in turn changes your tension Strive for smooth, fluid motions. In manual mode, set the motor speed so that your movements do not result in

long stitches. In automatic mode, try increasing the number of stitches per inch to reduce needle flex.

Hopping Foot Height:

The hopping foot is set at the factory for today's common thin battings. However, if the gap between the hopping foot and the throat plate is not correct, then the fabric sandwich is not held securely as the machine takes a stitch. This means that the fabric is "bouncing" under the foot when the stitch is made, resulting in poor tension. Check to see that the foot is correctly set for the project on which you are working.

Fabric Tautness, Content, Thread Count and Treatment:

If you have ever hand quilted, or quilted using a domestic sewing machine, then you are accustomed to the amount of tension most quilters apply to a quilt. Hand quilters often use a hoop, but the fabric is loose enough so that the quilter can "rock the needle" up and down to create tiny stitches. With domestic machine quilters, only the pressure of their two hands creates the tension on the fabric.

For some reason, when quilters switch to a long arm quilting machine, they feel that the fabric must be "drum tight" to be properly quilted. In fact, one of the major causes of poor tension is fabric that is stretched too tightly between the rollers.

Put enough tension on the fabric so that the machine will not pull the fabric around and so that wrinkles are not found in the top or back. The fabric should not "cup" around the machine's foot, but should instead gently lie under the foot and across the throat of the machine.

Avoid over-tightening the clamps on the sides of the machine, as this can also distort the fabric and cause poor tension.

Fabric content and thread count also affect tension. Batiks and bed sheets have a high thread count, which makes it difficult for the needle to penetrate. Try to loosen the tension on the fabric between the rollers, make sure the hopping foot is set correctly, and in this instance consider a slightly smaller (MR 3.5) needle so that the needle's scarf doesn't cause the fabric to bounce under the foot. Fabric content can cause the thread to lay on the surface of the fabric rather than to "nestle in" between the fabric's fibers. Polyester/cotton

blends, polished cottons, chintz, etc. all tend to hold the thread up on the fabric surface.

Thread Content, Color, Quality, Thickness and Humidity:

Many threads are available today, and more appear on the market every year. Review the information on threads listed earlier in the manual to become familiar with the characteristics of each. Use the best quality thread you can afford.

Thread color can impact the tension. Darker threads tend to break more frequently due to the amount of dye needed to achieve darker shades. Thread thickness can cause tension imbalance as well; thicker thread does not want to penetrate the quilt's layers as easily as thinner thread. You may even notice knots at direction changes when using the manual stitching mode.

Humidity, or lack thereof, can make the thread dry and brittle. Refer to the thread section again for tips on storing thread. It's also possible to just have a spool of "bad thread"—even from a respected manufacturer. Try another spool instead of getting frustrated trying to make one work.

Batting Content and Thickness:

The batting thickness is one important key for consistent tension. With very thin batting, the machine doesn't have much "air space" in which to place the locking stitch. Try using a batting with *some* loft so that the machine has a chance to lock the stitch in the proper place.

Now that you've learned about what can affect your tension, you're ready to learn how to adjust the machine to make a good stitch:

☐ Try to make any tension changes first with the top tension knob. Turn the knob to the LEFT to loosen the top tension, and to the RIGHT to tighten the top tension. Unlike domestic machines where a small change on the tension knob translates into a big change in tension, you'll have to turn your tension knob a half-turn or more to see any impact on the thread. (NOTE: You may want to use a fine-point permanent marker to add a "reference dot" to your top tension knob. The dot can go anywhere on the knob since you will use it only for reference when changing the tension.) If you can't achieve balanced

tension by adjusting the top tension knob, then you'll also have to adjust the bobbin case tension.

- ☐ If the top thread "lies" on the quilt top, either *loosen top tension* or *tighten bobbin tension.*
- ☐ If the bobbin thread "lays" on the quilt back, either *tighten top tension* or *loosen bobbin tension.*
- ☐ Consider having different bobbin cases for different bobbin threads—mark and adjust each one accordingly so that you don't have to continually change one case back and forth.
- ☐ Try flipping the spool over if the spool feeds poorly. Use cross-wound thread on the rear thread spindle, but for thread that is "stacked" on a spool a horizontal spool holder works the best.
- ☐ If the top thread is fragile, try skipping one or more of the three pre-tension holes just above the top tension disks; however, you must go through at least one of the three holes for the thread to feed properly.
- ☐ Move the thread as close to the tension disks as possible by using an optional dual spool holder, available in both a horizontal and vertical model. This reduces the distance the thread must travel to reach the needle and can improve tension.
- ☐ Keep the tension disks clean; pull the disks apart with your fingers and use compressed air to clean between them often.
- ☐ Be willing to test different combinations of threads in the top and bobbin. Pre-wound bobbins or those you wind yourself using very fine, 60-weight thread can help with uncooperative top threads.
- ☐ Since there is always a chance the top thread can pull to the back in certain spots or as the machine is moved in a reverse direction, many quilters switch to "busy print" backing fabric or match the top and bobbin thread colors to avoid seeing the "pokeys" of top thread on the back of the quilt.

Finally, be sure that you are dealing with imbalanced tension before you make adjustments. Remember that the needle you use is very large; it will leave a large hole behind. If your thread does not completely fill up that hole, you could still see the "color" of the top or bobbin thread inside the hole and still have great tension. Run your fingernail along the thread line and listen or feel for a "click-click-click". If your fingernail catches on loops of top thread that are pulled to the back, then the tension is imbalanced and should be adjusted.