OBJECTIVE

- Determine effects of weaving on strength retention in S2 glass fibers.
- Identified sources of damage include abrasion during weaving as well as the curvature of the fibers.

CURVATURE TEST

- Isolate effects of curvature by wrapping dry control fibers around rod of radius equal to woven fiber radius then test and reduce like impregnated fibers.

PROCEDURE

- Carefully extract tows from all sub-layers of fabric:
  - Weft Top, Middle, and Bottom
  - Warp Top and Bottom
  - Z-tows
- Impregnate tows with Vinyl Ester 8084 and post-cure
- End-tab for testing with ASTM Standard D 4018-99
- Test, then use Minitab to reduce strength data and find peak and mean strength retention

WEFT RESULTS

- With respect to control fibers, peak strength decreased by ~10% for weft top tows and ~14% for weft middle and bottom tows

WARP RESULTS

- With respect to control fibers, peak strength decreased by ~9% for warp top and bottom tows

CONCLUSIONS

- Strength distributions for fibers show overall fiber strength loss of ~10%, with warp having the highest retained strength and Z-tows showing the lowest retained strength.
- From curvature test, it seems that abrasion is responsible for the majority of the strength loss.

FUTURE WORK

- Attempt to isolate effects of abrasion on the fibers as closely to what is experienced in weaving process
- Analyze effects of interaction of the curvature with abrasion

ACKNOWLEDGEMENTS

This work is supported by the 3TEX® company.