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### Evaluation for long-term structural shading materials for use in harsh environments

This paper evaluated the performance and durability of leading structural shading materials to be used in the Super Containerized Living Units (Super-CLU's) project. Fifteen unique shading fabrics were tested in five different experiments in order to evaluate their strength, resistance to wind, abrasion, and heat and to assess their heat transmissivity and breathability. A current United States Navy material was used as a control material for the evaluation of the other tested materials. Samples of each fabric were first tensile tested in both their warp and weft orientation to create an 'as-received' baseline condition. Then, additional samples of each fabric were exposed to wind, abrasion, or heat and subsequently tensile tested to observe the change in tensile strength compared to the 'as-received' samples. The heat transmissivity and breathability testing was conducted separately.

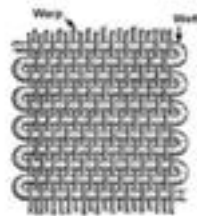


Figure 1: Warp and Weft Thread Orientation

### Recent Publications

1. Z Zupin and K Dimitrovski (2010) Mechanical Properties of Fabrics from Cotton and Biodegradable Yarns, Bamboo, SPE, PLA in Weft, Woven Fabric Engineering edited by Polona Dobnik Dubrovski, Sciyo Publisher, 25-46.
2. O S Es-Said, J Foyos, R Noorani, M Mendelson, and B Pregger (2000) Effect of layer orientation of mechanical properties of rapid prototyped samples. Journal of Materials and Manufacturing Processes 15(1):107-122.
3. V Vega, Clements J, Lam T, Abad A, Fritz N, Ula N and O S Es-Said (2011) Journal of Material Engineering and Performance 20(6):978-988.
4. Montgomery, Douglas C and George Runger (1994) Probability and Statistics for Engineers. N.p.: Wiley 74.

### Biography

Omar S Es-Said is a Professor in the Mechanical Engineering Department at Loyola Marymount University in LA, California. He was a full Professor from 1998 to present. He received his PhD in Metallurgical Engineering and Materials Science from the University of Kentucky, Lexington in 1985. His current research interests include metallic processing and modeling. He published over 300 papers. He has been an Associate Editor from 2008 to present for the Journal of Materials Engineering and Performance. He received several grants and awards for research funds for a total of over \$3.6 million. He was a consultant for the Navy from 1994-2015 and a fellow of the American Society of Materials in 2005.

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