

Meeting: 1003, Atlanta, Georgia, AMS CP 1, AMS Contributed Paper Session

1003-05-765 **Matthew M Menzel*** (mmm002@marietta.edu), 105 McArthur Ave., Marietta, OH 45750, and
Carl W Lee. *Generalized Sewing Constructions for Polytopes.* Preliminary report.

For ages, people of all mathematical backgrounds have been acquainted with convex polygons and three dimensional convex solids. Euler's relation, which relates the numbers of vertices, edges, and 2-faces of a three dimensional polytope, provided one of the first major results dealing with the combinatorial structure of a polytope. Two major combinatorial problems of recent study are to characterize the f -vectors and flag f -vectors of d -polytopes. For 3-polytopes, the problems were solved Steinitz nearly and century ago. They also were solved for the class of simplicial polytopes by Stanley and Billera and Lee more than twenty years ago. For $d \geq 4$, however, the problems of characterizing the f -vectors and flag f -vectors of general d -polytopes are unresolved. Several linear and non-linear inequalities for flag f -vectors of d -polytopes have been established, but in order to obtain a set of conditions whose satisfaction is sufficient for being the flag f -vector of a d -polytope, it is necessary to discover methods for constructing classes of polytopes with extremal f -vectors and flag f -vectors. This paper will focus on two techniques for constructing d -polytopes, specifically in the $d = 4$ case. (Received September 29, 2004)