INTRODUCTION

This lecture describes results obtained when investigating fragmentation achieved in models which contained large flaws. Figure 1 is a photograph of a working bench face in the Pinesburg limestone quarry located near Hagerstown, Maryland. The segmentation seen in Figure 1 is typical of rock found in quarry locations. Much of the segmentation in a quarry bench is blast damage incurred in fragmenting the material that was removed in previous shots. These detonations loosen up the joints and faults that are present in the formation, but not to such an extent that the material can be removed.

The spacing of these joint sets and bedding planes vary from rock type to rock type and even from point to point in the same rock formation. The orientation of these fault sets also varies, but the assumption is that the joint sets and the bedding planes make an orthogonal triad of planes. Rock joints in limestone range from open sets filled with mud to very tightly bonded calcite joints with a strength nearly equal to the tensile value found in the adjoining rock masses.
Jointed models were constructed of Homalite 100. All models were 6.4 mm (0.25 in) thick and were made by bonding together 50 mm (1.97 in) wide strips of Homalite 100. The strips were rough cut on a band saw and then routed to final size to provide smooth edges. One very important parameter in the model is the bond formed between the two photelastic strips. During the experimental program variations in bonding strengths were utilized from grease filled joints to very tough epoxy glues. The particular bonding agent used throughout the test series to be described here is a product sold under the trade name "M Bond 200". M Bond 200 is marketed by Eastman Chemical Products, Incorporated, and contains cyanoacrylate ester which sets rapidly under a slight pressure. The adhesive was spread uniformly with a resulting bond that was approximately 0.075 mm (0.003 in) in thickness. The joint could be classed as medium in strength in that it normally could be handled without