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Effects of Particle Size Dispersity on the Response to Compressive Strains[1] MEENAKSHI DUTT, University of Cambridge, BRUNO HANCOCK, Pfizer Inc., Groton, Connecticut, USA, CRAIG BENTHAM, Pfizer Ltd., Sandwich, Kent, USA, JAMES ELLIOTT, University of Cambridge — Particle packings found in nature and industry are rarely comprised of single components, in terms of particle size. These packings are generated under a variety of circumstances which influence its response to an external load or strain. We explore both the effect of packing history prior to application of compressive strain, and the variation in the response with the size distribution of the component particles. We generate the packings by allowing the particles to settle under gravity for a fixed interval of time, or until a cut-off packing fraction is attained, followed by application of a compressive strain for a fixed interval of time. We repeat these studies using numerical experiments for samples of discrete size (200 microns, 195-225 microns , 170-260 microns, 150-295 microns) and random (100-300 microns, 100-400 microns, 100-500 microns) size distributions. We find the number of particles with fewer than 4 contacts to increase with size dispersity of the sample after the particles settle under gravity. In addition, the fraction of plastic contacts decreases with increasing variation in particle size during the compression. We also present correlations between the populations of low and high force bearing contacts, particle size and the yield state of the contacts.

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