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Instrumented Pressing of HE and Inert Materials to Study the Effect of Particle Size JAMIE STULL, CAITLIN WOZNICK, RACCI DELUCA, BRAIN PATTERSON, DARLA GRAFF THOMPSON, Los Alamos National Laboratory — It is well known that detonation and mechanical properties of high explosives (HE) depend on density. Computationally it has been shown that specific particle-size distributions will lead to better pressed parts. Theoretically this should improve moderate compaction conditions, uniform density and strength. There are many other powder characteristics that are important such as crystal shape and strength. We are interested to explore the role of HE powder characteristics on compaction properties and pellet integrity.\pard We have used an instrumented compaction instrument to press inert and HE powders such as TATB and HMX, which have very different crystal structures. The force and displacement measurements from the instrumented press provide information on the quality of compaction of the specimen in the form of Heckel plots, etc. We have evaluated the thermal and mechanical integrity of resultant pellets by measuring the coefficient of thermal expansion and the compressive strength and strain at failure. We have employed micro x-ray computed tomography (CT) to characterize the microstructure and to quantify the number, the size, and the location of voids. The lack of binder in these specimens greatly simplifies the microstructure analysis and makes the data more amenable to modeling and interpretation.

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