idity. Increasing the binder content and the nozzle temperature resulted to a decrease in the maximum injection pressure and improvement in the fluidity of the powder. Using the same PE content, increasing the temperature resulted to an increase in tensile strength of the injected product. However, the strain at break was decreased. Moreover, at PE content below 50%, the strength and strain decreased considerably.

**APP-13: Development of High Performance Ti Products by Micro Metal Injection Molding**

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Micro metal injection molding (μ-MIM) is hoped to be one of manufacturing process for minute parts in various engineering fields. In order to improve the quality of μ-MIM products, several techniques have been developed in the process. For example, it is important to make homogenous pellets because the size of products is quite smaller than a grain of single pellets. In the previous study, evaluation method of pellets was established and optimum mixing conditions were investigated. Moreover, injection molding process is also important to produce micro size products. One of solution methods is to use the micro injection molding machine. On the other hand, the properties of final products are influenced by the debinding and sintering processes. By controlling the debinding and sintering conditions, the quality and performance of the products would be improved. In this study, high quality and high performance micro metal injection molded parts were produced and evaluated.

**APP-14: Effects of Powder Size and Initial Arrangement on Cold Compaction**

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In the past, the most common assumption in every explicit modelling of individual powders for compaction is that powders have only one single size which are arranged uniformly. However, all powders used in practice have a distribution of particle size and random initial arrangement. In this work, a systematic theoretical study of the effects of initial powder arrangement and distribution of size has been investigated using numerical analysis tool. Various types of elements have been considered first. Considering the accuracy and the effort required, the two-dimensional plane strain element has been employed for the rest of the investigation. The initial arrangement of powder and the distribution of powder size were considered separately. The results show that the initial arrangement has significant influence on the macroscopic behaviour while the powder size has little influence. Both factors have noticeable influence on the microscopic behaviour.

**APP-15: Effect of Lubrication on the Improvement of Uniformity in Uniaxial Powder Compaction**

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Density distribution in powder compact caused by frictional force at die wall has been estimated. The pressure transmission ratio $\lambda$ was defined for the estimation of the magnitude of frictional force occurrence on die wall. The density gradient $\alpha$ was also defined for the estimation of density distribution. The iron and pre-alloyed stainless powder were tested, and the performance of zinc stearate and paraffin wax applied as internal lubricant or die wall lubricant has been investigated in various conditions. The die wall lubrication becomes effective way to increase $\lambda$ in comparison with the internal lubrication. Admixed lubricant prevents the occurrence of density distribution and uniform green compact is obtained in the critical amount of lubricant. Paraffin wax shows higher performance as a die wall lubricant compared with zinc stearate, and remarkable increase of lubrication effect is observed in the combination between zinc stearate as internal lubricant and paraffin wax as wall lubricant.