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Ceramic Injection Moulding Using a Partially Water-Soluble Binder System: Effect of Back-Bone Polymers on the Process

With the technique powder injection moulding (PIM) it is possible to manufacture near-net-shape complex micro geometries cost effectively and multiplicatively. Quality and stability of each process step as well as properties of final parts strongly depend on the choice of a suited combination of binder polymers. On this reason the represented research work deals with the study concerning to the process stability if different raw materials of poly-(methyl-methacrylate) (PMMA) are applied as a back-bone polymer. Feedstocks based on zirconia powder were observed, polyethylene glycol was used as basic polymer. To provide a uniform distribution of powder particles in the binder matrix stearic acid was added as a surfactant. Three kinds of commercially available PMMA and one of own production were compared whereby all four feature a similar molar mass distribution and differ in their apparent condition only: granular, pearly and edged shaped. The results of this study showed which essential influence this outward property of PMMA have on compounding of homogeneous feedstocks, separation occurs between powder and binder components, dimensional stability of injection moulded and sintered parts as well as achieved densities of final micro products.