

Development of binder systems for manufacturing metallic and ceramic components using PIM technology

Summary/Characteristics

Researchers at Universidad Carlos III de Madrid have extensive experience in Powder Injection Moulding (PIM) technology. The main advantage of this technique is the production of small, complex-shaped components that cannot be manufactured using conventional technologies.

Our group has successfully developed, in collaboration with various companies, several binder systems to manufacture metallic and ceramic parts from powders ranging from the nano- to the micrometre scale (nm- μ m).

Collaboration is sought with companies producing metal, ceramic, or plastic components in various industrial sectors (automotive, aerospace, electronics, etc.) that wish to adopt this manufacturing technology.

Innovative Aspects

- In-house development of optimized feedstocks: formulations combining metallic/ceramic powders with polymer-based binder systems tailored to the material and moulding process.
- Adaptability to multiple compositions through customized feedstocks made from a wide range of metallic and ceramic powders.
- Rheological control of the feedstock, with precise adjustment of viscosity and flow behaviour.
- Optimized debinding stage to ensure lower defect rates.
- Compatibility with subsequent processing steps.
- Industrial scalability and transferability.

Competitive Advantages

- Development of non-patented binder systems, significantly reducing costs and eliminating legal use limitations or supplier dependency.
- Flexibility in feedstock design, with formulations adaptable to multiple materials.
- Highly efficient, scalable, and reproducible process, with near-total material utilisation, reduced energy consumption, and lower waste generation.
- Potential integration with advanced manufacturing technologies.

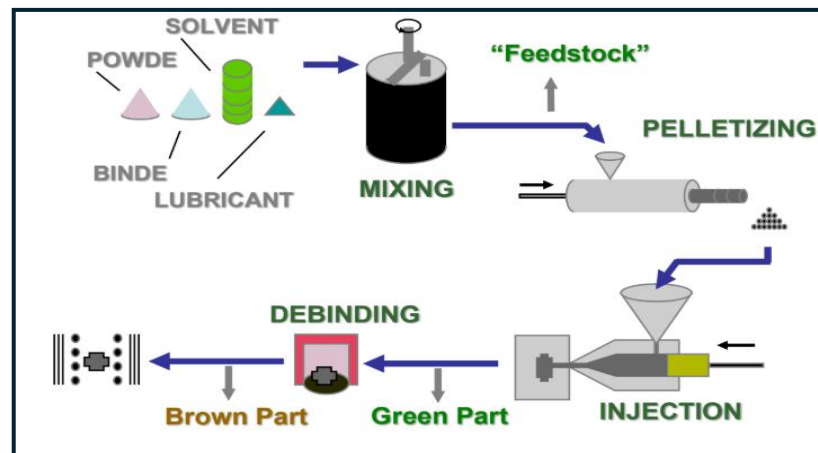


Diagram of the stages in the powder injection moulding process

Technology readiness level:

Under development. Tests performed in controlled environments. TRL 4.

Intellectual and Industrial Property Status:

Trade secret – know-how.

Type of collaboration sought:

Technical Cooperation Agreements, R&D&I Agreements, or Licensing Agreements are sought with industrial partners involved in the manufacturing of metal/ceramic/plastic components interested in this technology.