Surface engineering and the Titanium Particulate Injection Moulding process.

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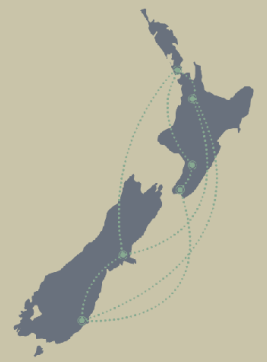
Introduction.

The outer surface of an object is an important consideration of the consumer as aesthetics effects value perception.
Finish can be varied and the surface topology structured to have any number of functions, it can also affect mechanical properties.
Two contrasting investigations are considered and are the basis of further study of engineered surface features.



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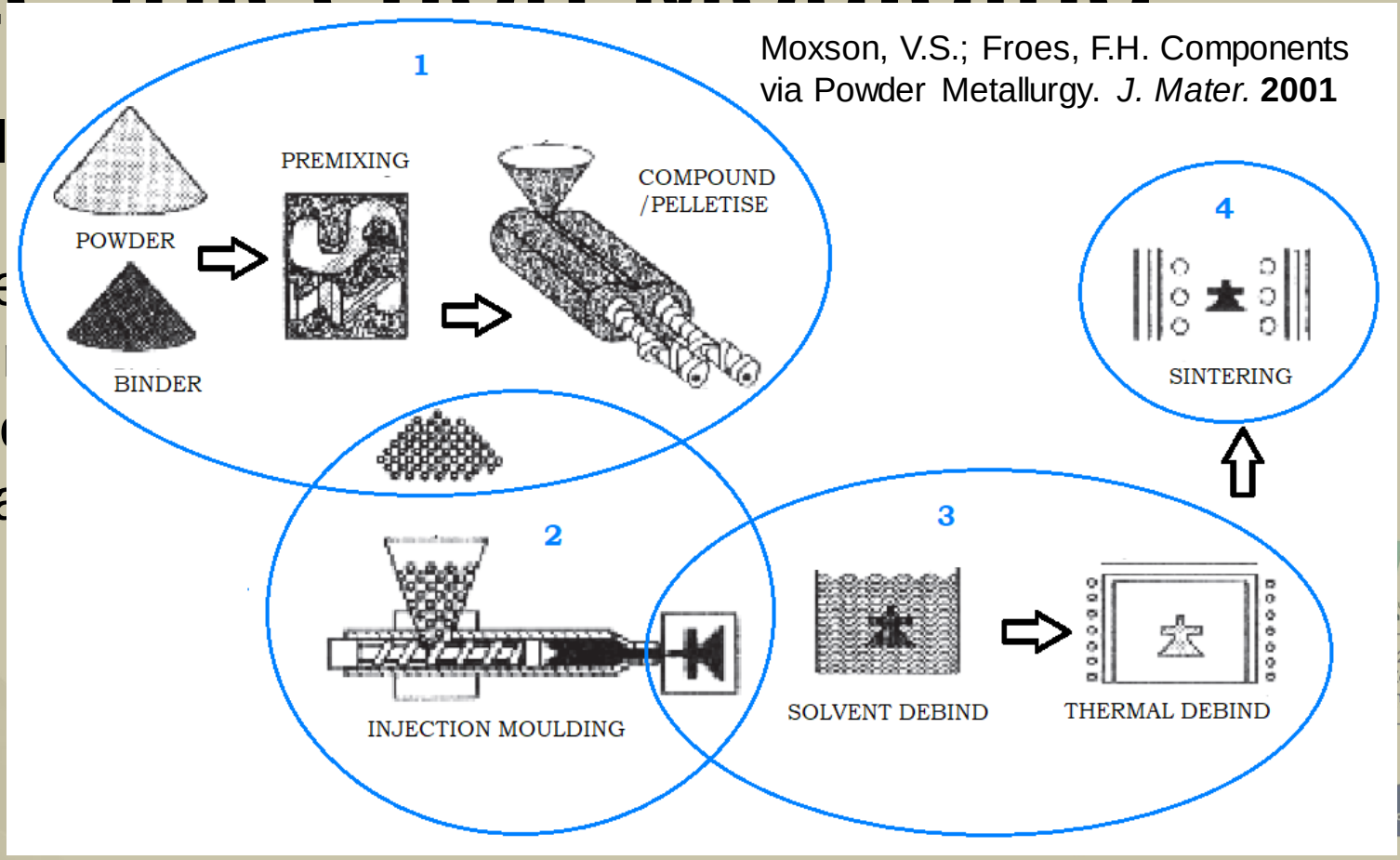
Particulate Injection Moulding

PIM fabrication invol

- Formulation of the
- Moulding of the g
- Debinding treatm
- Thermal consolida

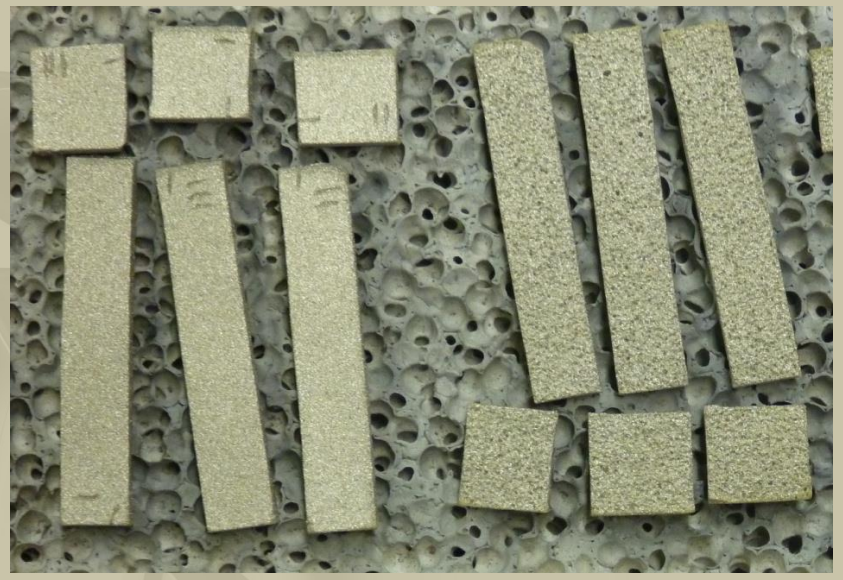


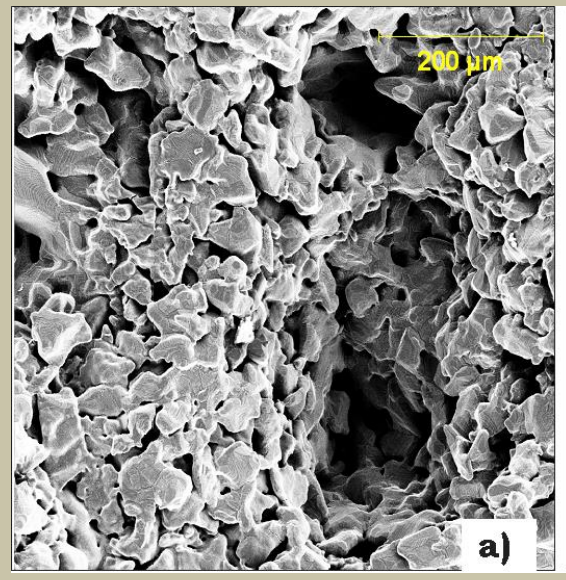
Moxson, V.S.; Froes, F.H. Components via Powder Metallurgy. *J. Mater.* **2001**

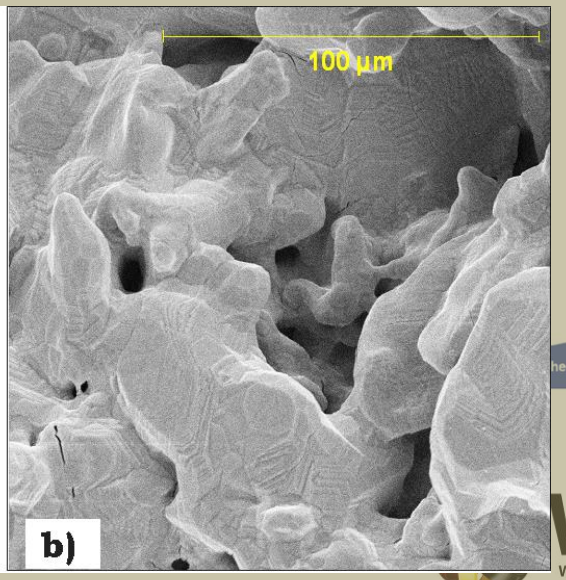
Case. 1

Samples produced using PIM to mimic the surfaces and porosity of bone.

The SEM images show the nature of an individual feature.



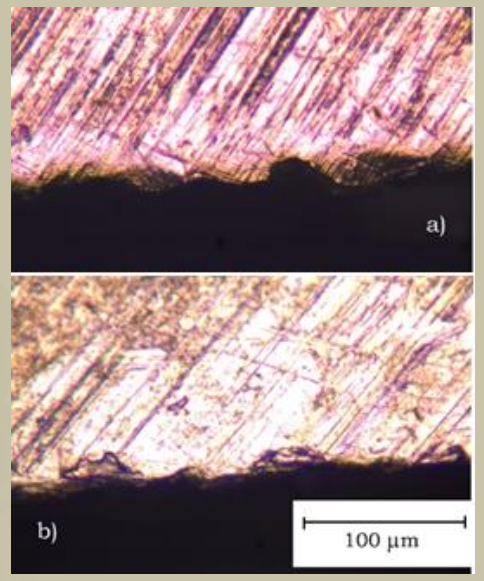


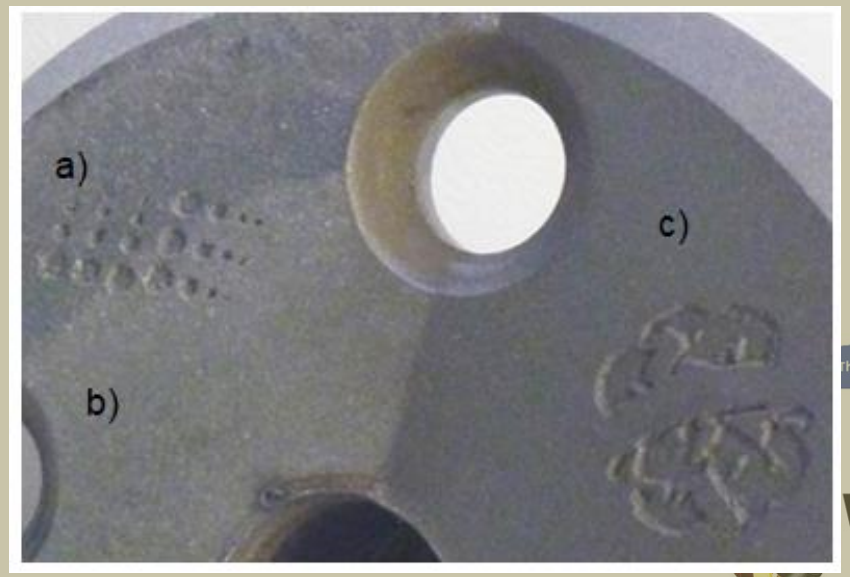


Case. 2

Parts were produced for field testing using PIM but an irregular surface condition required further investigation.

Microscope images indicated an irregular particle layout.





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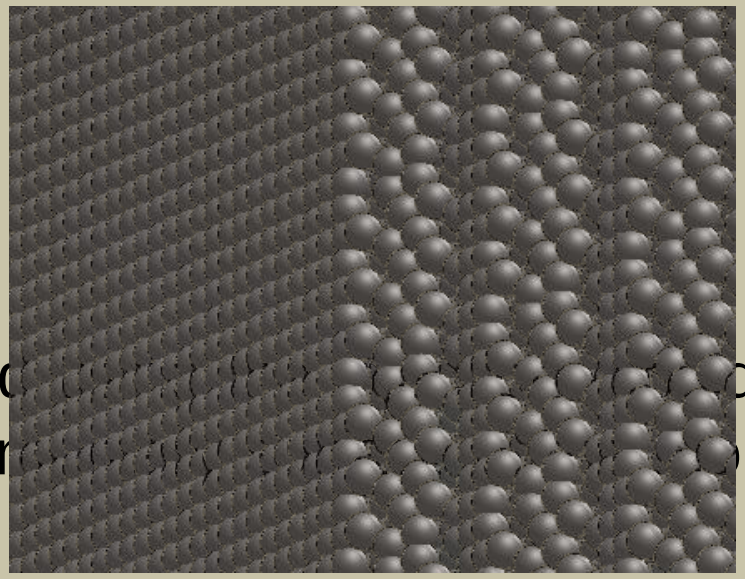
Discussion.



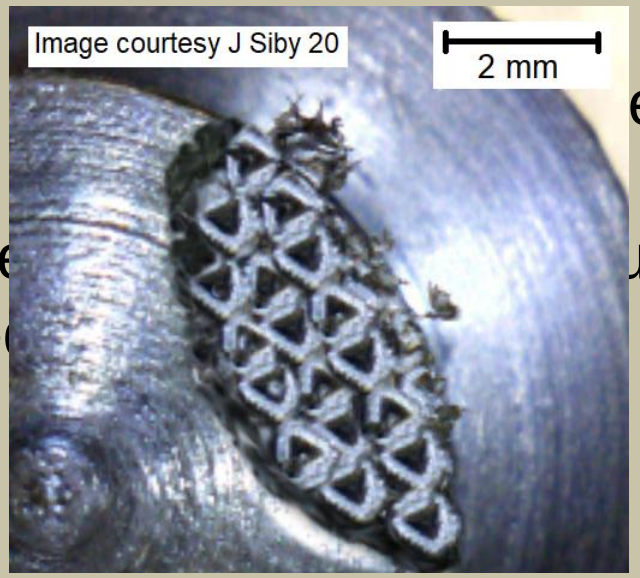
The surface texture of parts produced ding process is typically varied through the compli uld cavity surface.

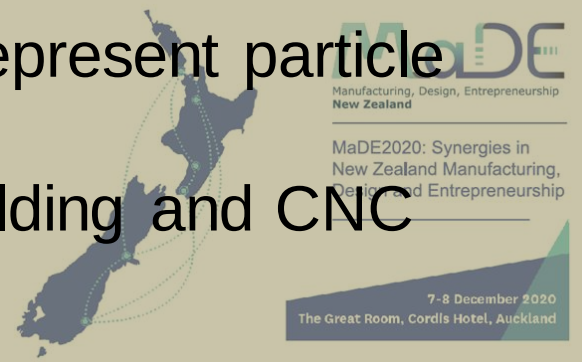
Case 1. Showed surface features repeatable based on the mould insert.

Case 2. Produced different surface textures through a processing irregularity.

Both cases could be modelled using epresent particle packing.

This has allowed us to investigate the ulding and CNC micro-machining to create engineere





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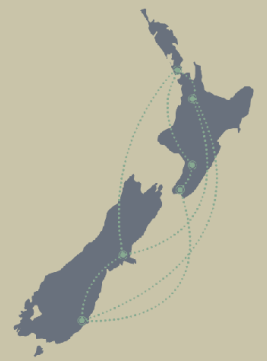
Conclusion.

The surface finish of an object can be varied to suit its purpose.
Particle arrangement on the surface of PIM parts was seen to create different effects with as little as 10 - 20 µm variation in depth.
The surface effects can be modelled using solid models.
The use of CNC micro machining techniques will be further investigated for the engineering of functional surface features using PIM.



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- PGE Injection Moulding Ltd, Hamilton, New Zealand

References.

- Ewart et.al. Surface irregularities in titanium marine parts formed by the particulate injection moulding process. Inpress, Technologies for Lightweight Structures (TLS) 2020.

Questions please?

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