Overview

• Spinout company from the University of Leeds
• Primarily an engineering software company
• Also take on consultancy projects
• Expertise in the packing of objects & particles, microstructure characterisation, structure-property relationships.
• Product ranges:
  • DigiPac™ – packing and structure-property simulation software
  • NuPlant™ – nuclear decommissioning
• Investment and industry experience from Management Team
Management Team

Neville Chamberlain, CBE
Chairman
Formerly CEO, BNFL

Prof Richard A Williams, OBE
Co-Founder, Director
Also Vice Chancellor, Heriot-Watt University

Dr Peter Watson, OBE
Non-Exec Director
Formerly CEO, AEA Technology

Dr Xiaodong Jia
Co-Founder, Chief Technology Officer
Expertise in simulation & modelling

Dr Alison Fielding
Non-Exec Director
Formerly COO, IP Group PLC
DigiPac Technology

Key step – digitise the shape/structure

Arbitrary shape → Collection of pixels → Grid mapping the packing space

Precision increases as voxel size gets smaller. Up to measurement machine precision.
• Packing simulation software

• **How do objects pack together in a confined space?**

• **How will the packed structure behave?**
Digitisation

Convert from CAD model

3D optical scanner

Build directly using software

3D X-ray microtomography
Digitisation

From 2D image to 3D models

DigiPac has a host of bespoke routines to help generate models that mimic real particles.
Areas of Application

- Chemicals, pharmaceuticals, mining and any other process industries that store, handle or transport fine powders.  
- Specialty chemicals companies (catalyst manufacturers) that make or use packed column reactors.
- Decommissioning of (nuclear) plants where optimisation of dismantling and packaging large objects are required.

Medium size examples: packed column and bucket of popcorn
Decommissioning challenges:

- Visualisation
- Cutting & Packing
- Optimisation
- Plan / Estimate
- Reporting

Vision – from nuclear facility to packed waste containers
Structure-Property Relationships

- X-ray microtomography
- Confocal microscopy
- SEM or photo micrograph of real particles

DigiPac software suite

Structures and structure-property relationships

- Flowability
- Dissolution
- Segregation
- Permeability
- Compaction
Structure-Property Relationships

Lattice Boltzmann Method for flow

Porous structure

Flow rate distribution

Packing structure

Flow distribution

Structure Vision
Structure-Property Relationships

Finite Difference Method for conduction

Temperature field in digitally specified structures. **Red** = high °C, **blue** = low °C.
Six components, each having their own dissolution characteristics.

FDM for dissolution
Structure-Property Relationships

Finite Difference Method for dissolution

How dissolution kinetics depends on particle size and granular structure
Structure digitisation and analysis

Micro CT scanner

Spatial resolution up to 0.5 μm/pixel
Voltage up to 180 kV
Resolution = Sample size / 2000

Tissues (with Dental Institute)

Fabrics (with School of Design)
Possible contribution

Micro-structure characterisation and property simulations