The future of wound measurements

ISiIP

3D - Technologies

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Inspiring tomorrow's professionals

THE AWARDS AWARD WINNER UNIVERSITY OF THE YEAR

theguardian UNIVERSITY AWARDS Winner 2013

2012 THE AWARDS WINNER Entrepreneurial University of the Year

THE QUEEN'S AWARDS FOR ENTERPRISE

Overview




The
future
of wound
measurements
ISiIP

- **Technologies**
  - **Textiles**
  - **Multi-disciplinary Innovation**
  - **3D printing product**
- **Innovation – prototypes, innovation, projects/research**
  - **Wiggle bag**
  - **Paxman cooling cap**
  - **21st Century Medical Bag**
  - **TSB project (Orthox, 3T, Cardiff University)**
- **The challenge of measurement**

Technologies




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3D Printing and knitting ADA


10gg Shima Seiki FIRST (wholegarment knitting machine)

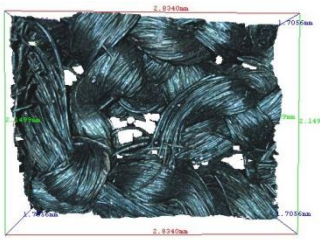
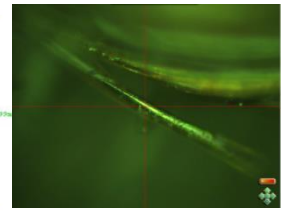

ZCorp 650

ZBuilder Ultra

Stratasys Fortus FDM 360

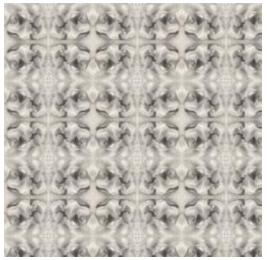
Projet 5500x – prints flexible materials

3D visualisation software







Computerized Tomography Scan (CT), Infinite focus Microscopy (IFM) 3D Microscopy,

X-Ray Florescence (XRF) – chemical composition

(Calvet, Power, Ryall, Bills - 2014)

Test sculpture for pattern making experiment by MA Postgraduate students (Taylor and Univer, 2013)

“Wigglebag”

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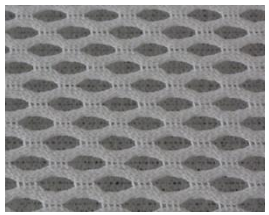
Harness to improve well-being of children with cancer

- Ergonomically designed
- Comfort / functionality/ dignity
- Stylish
- Antibacterial




Paxman cap

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Dr Unver worked with product Design team on externally funded Paxman cap design and manufacturing. This project currently being patented.

Paxman required new innovative, low cost and mass manufacturable of new caps. To challenge this, Paxman engaged the expertise of researchers at two of the University of Huddersfield's academic schools. Initially funded by an Innovation Voucher from Kirklees Council, Paxman started working with the School of Applied Sciences, using its cutting-edge cell biology techniques to help identify the mechanisms that govern patients' variable responses to scalp cooling. Following additional funding from **Knowledge Transfer Partnership** (KTP) and **Technology Strategy Board** (TSB) grants and from the Collaborative Ventures Fund at the University, the School of Art, Design and Architecture then joined the team to investigate the design of the scalp cooling cap

Cartilage repair




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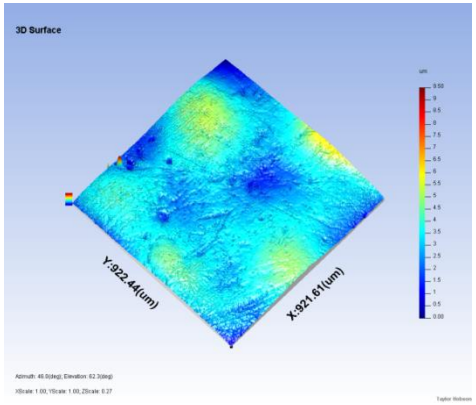


TSB project (Orthox, 3T, Cardiff University)

"Development of single protein fibre matrix composites for high performance cartilage repair devices" **Silkworm silk technologies for cartilage repair**

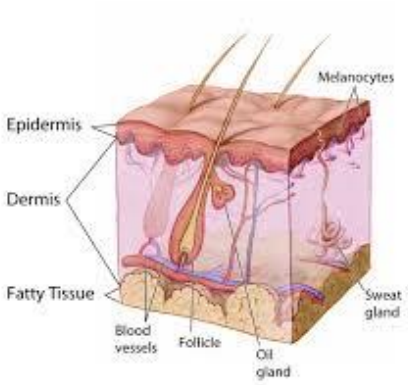

The knitted structure lays in the device to enable sutures to be anchored through the textile structure to the bone.

Why is measurement important?




Art
Design
Architecture
Huddersfield

- Assessing functionality and performance
  - Wound healing
  - Integrity
  - Risk
  - Device development



- Barrier
- Contact
- Support
- Delivery

Measurement of Skin Integrity



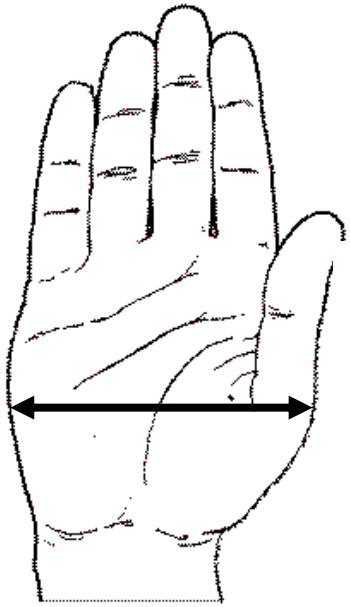
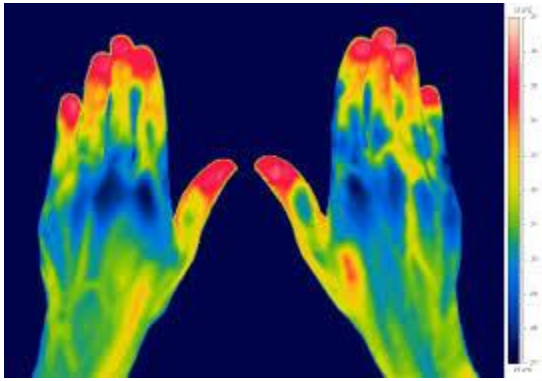
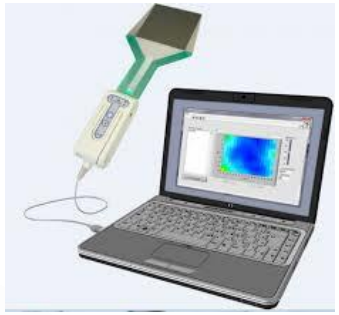
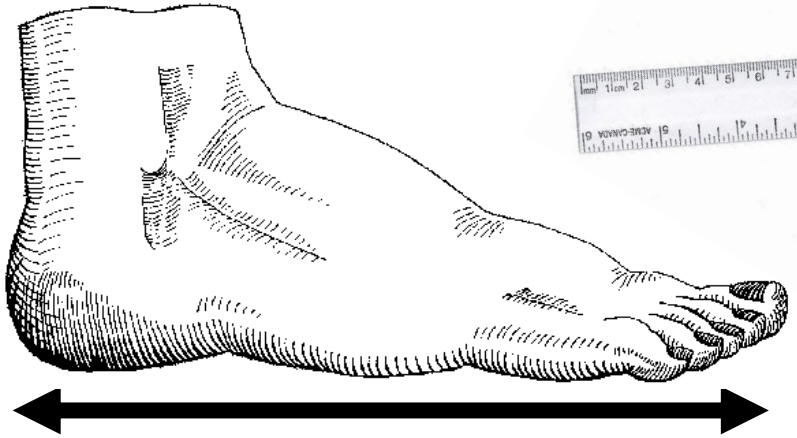

Art
Design
Architecture
Huddersfield

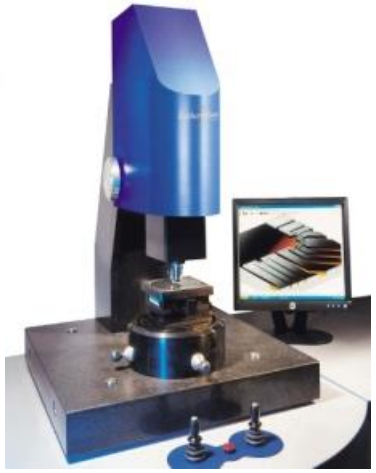
- Contact – Pressure, area
- Condition – Texture, moisture, temperature, integrity
- Performance – Hydration, absorption, elasticity, strength
- Interaction – Pressure, shear, friction, temperature

Measurement

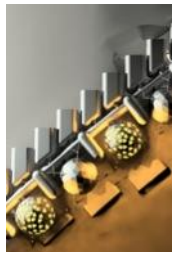



Art
Design
Architecture
Huddersfield



Measurement of skin texture

Art
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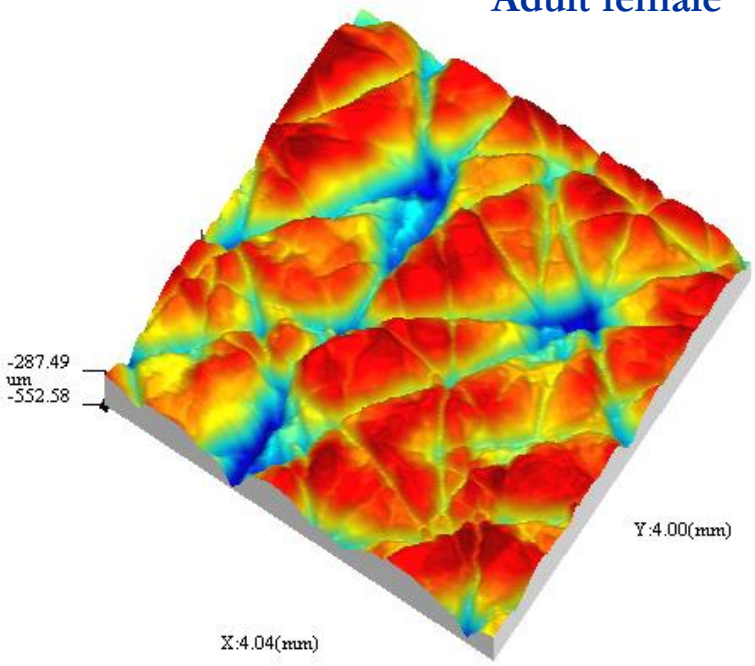
Architecture
Huddersfield

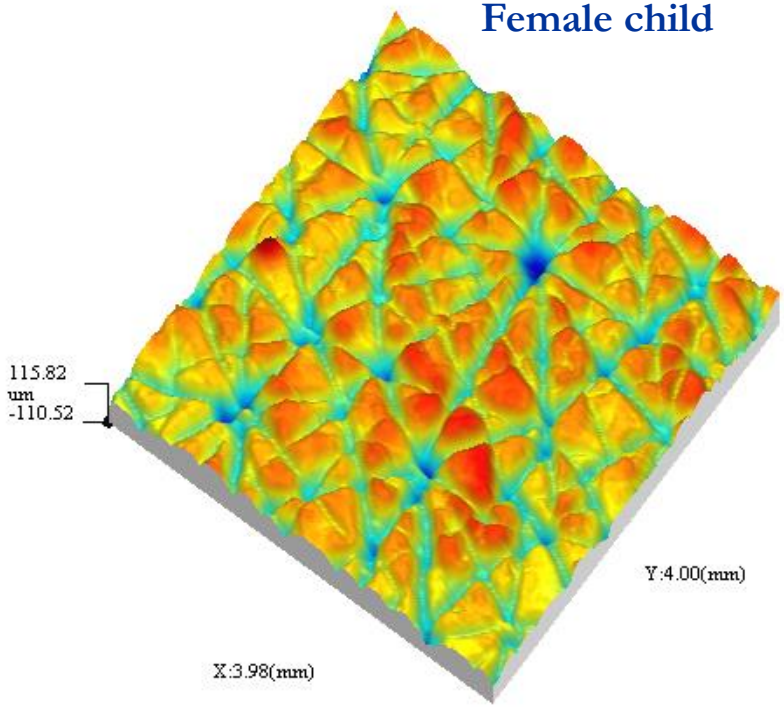
Adult female



Average roughness Sq= 92um

Functional pore volume Vvc =42mL/m^2

Female child



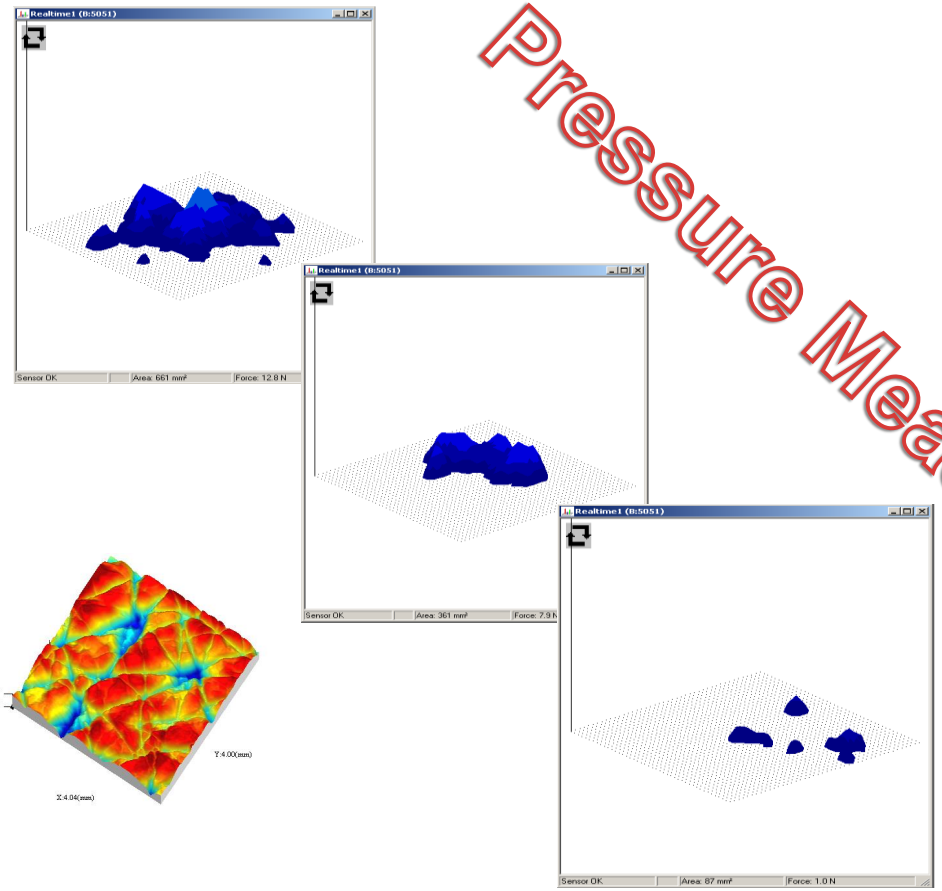
Average roughness Sq= 65um

Functional pore volume Vvc = 25mL/m^2

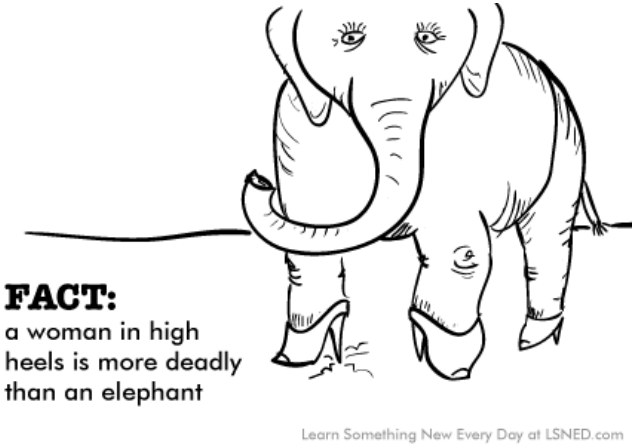
Assessing Pressure Care




Art
Design
Architecture
Huddersfield



Pressure Measurement



Assessing Pressure Care




Art
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Architecture
Huddersfield

Stiletto vs Elephant

(60kg/2) / 0.0001m²

= 3,000,000 n/m²

(3,000kg/4) / 0.1m²

= 125,000 n/m²

Challenges of measurement for Skin Integrity




Art
Design
Architecture
Huddersfield

- Integrity of the system
- Scale of the accuracy
- Repeatability
- Reliability
- Non-standard geometry (free form surfaces)
- Varying textures
- Hydrated surfaces
- Infection prevention
- Standardisation
- ……..etc