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imagine. change.

Ricoh UK Ltd Partners Day – Beyond Print

# Clinicians & Engineers

## A coalescence of skills

NHS
The Robert Jones and Agnes Hunt Orthopaedic Hospital
NHS Foundation Trust

Keith Miller - ORLAU

- Keith Miller
- Mechanical Engineer
  - *Background of mechanical engineering design*
  - *C.Eng with the IMechE*
  - *MSc in Clinical Engineering*
  - *State Registered Clinical Scientist*
- My role is that of a Rehabilitation Engineer
  - *Team Lead (a team of 6)*
  - *Departmental Quality Manager (for sins in another life!!)*
- 24 years in a department known as ORLAU

## ORLAU?

*Orthotic Research & Locomotor Assessment Unit*
*The Robert Jones & Agnes Hunt Orthopaedic Hospital, Oswestry, Shropshire*

## Brainchild of a leading children's orthopaedic surgeon

*1975 - He could see how engineers could help him treat patients*
*He employed an engineer from industry*
*Together they obtained 5 years of funding to….*

## Develop two groundbreaking devices

*The ORLAU Parawalker*
*The ORLAU Swivel Walker*

The Robert Jones and Agnes Hunt Orthopaedic Hospital NHS Foundation Trust

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## The Parawalker
(Spinal injury)

## The Swivel
(Spina Bifida)

Design Council


Both devices went on to be commercially successful across Europe, through several industrial partnerships.

## ORLAU has developed further commercial devices

### *ORLAU Video Vector Generator*

*Real time ground reaction vector superimposed onto video tape, used to assess forces in the lower limbs.*

### *ORLAU Locomotor Guidance System*

*Simplified Parawalker which transmitted spastic movements into rudimentary ambulation coupled with body weight relief.*

### *ORLAU Standing frame*

*For use in mainstream & special schools*

### *ORLAU Contracture Correction Device*

*For stretching soft tissues around the limbs*

## ORLAU celebrates is 50th year in 2025!

## ORLAU Today

*New facilities in 2008*

*Grown slightly – 30 members of staff (Physio's, Surgeons, Bioengineers, Clinical Scientists, Technicians, Administrators)*

*Multi-disciplinary approach*

*Equal mix of children and adults, all of which are NHS funded*

*3300 patient episodes per year (and rising!)*

*What we do, can be split into three main functions:-*

- *Clinical Movement Analysis*
- *Education of HC Professionals*
- *Rehabilitation Engineering*

## Clinical Movement Analysis

*Clinical Movement Analysis Laboratory*

*3D Movement Analysis*

*2D Ground Reaction Vector Analysis*

*Functional Electrical Stimulation (FES)*

*Pedobarography (PBG)*

*Electromyography (EMG)*

*Upper Limb Assessment*

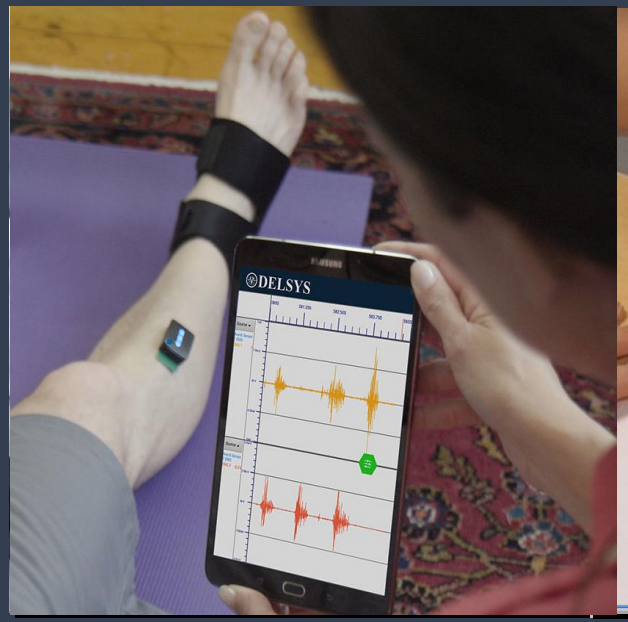
*Services designed to assess patient ability & inform the next steps.*

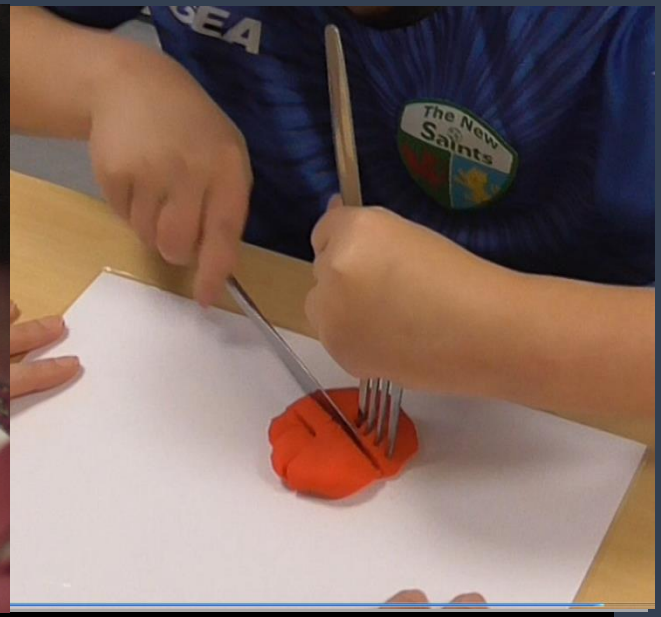
## Education of Professionals

*We're actively involved in a range of course that are aimed at educating clinical professionals.*

*2 in-house courses per year but contribute on many others*

*Certified training centre for the National School of Healthcare Scientists*



# Rehabilitation Engineering

## The Team

*2x Clinical Scientists, 3x Engineering Technicians, 1x QMS Data Officer*

## Core Business

*Standing Frames – In-house manufacture*
*Walking Devices – Commercially purchased & modified*
*Stretching Devices – Mix of in-house and sub-contract manufacture*

## Bespoke Solutions

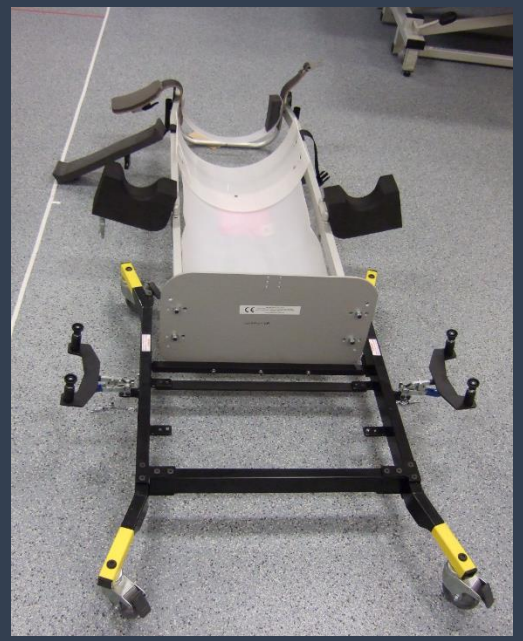
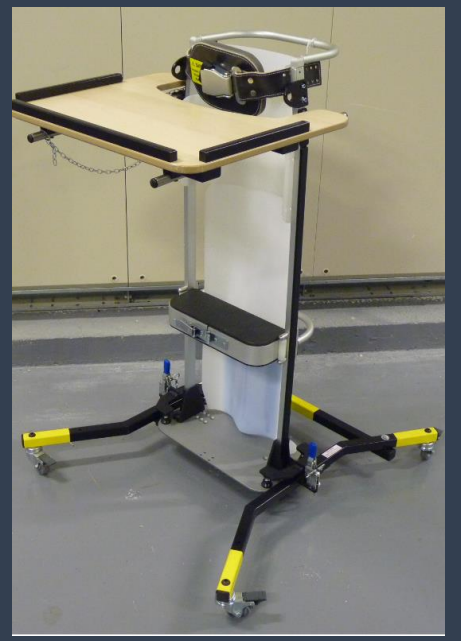
– *Patient Assessment, design & development, manufacture, supply & routine review*

## Quality Management

*Develop under ISO 13485 and have a strong ethos of safe design & physical testing prior to supplying to patients*

## Standing Frames – *Measure, manufacture, supply & review*

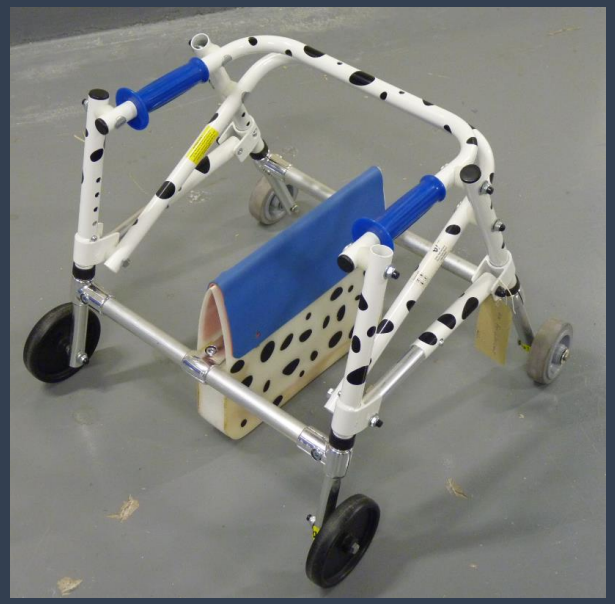


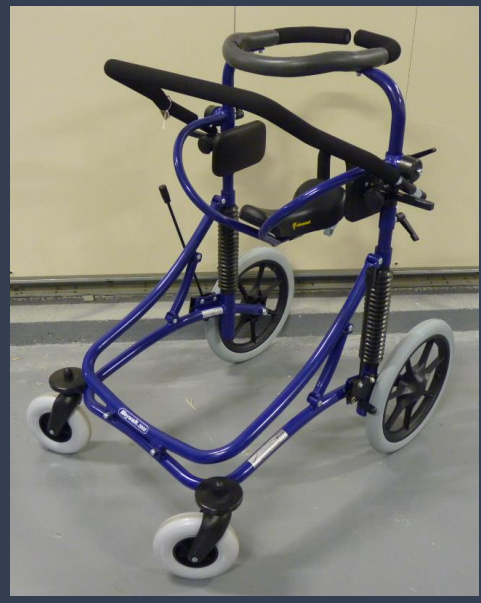

ORLAU 1000 & ORLAU Adult Standing Frame

Meercat - (R82)

# Walking Devices – *Measure, supply & review*



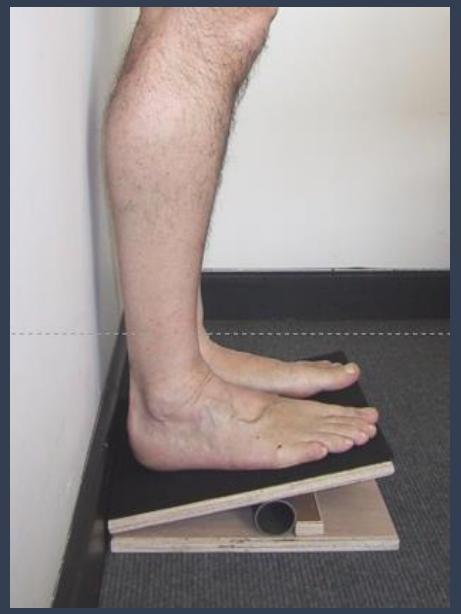
Kaye Walker - (RMS)



Meywalk - (Meyland Smith)

Grillo - (Ormesa)

## Stretching Devices – *Measure, manufacture, supply & review*



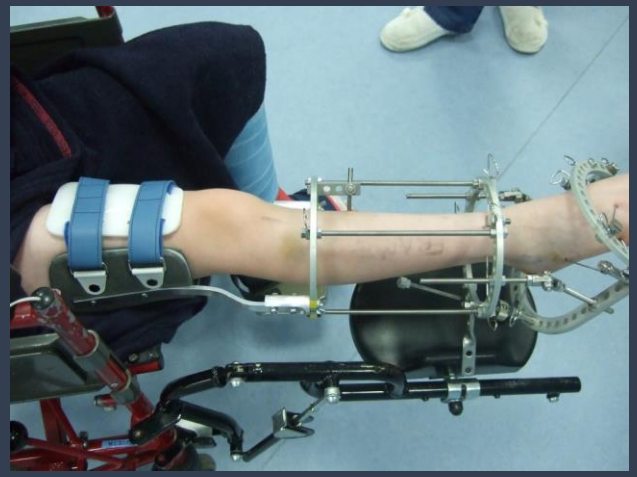
ORLAU Os-Stretch

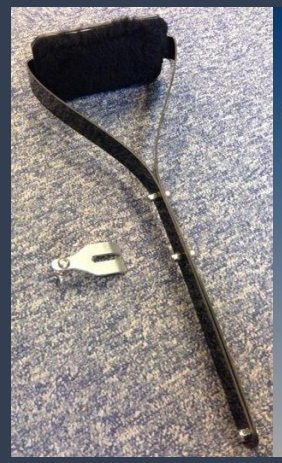
ORLAU CCD

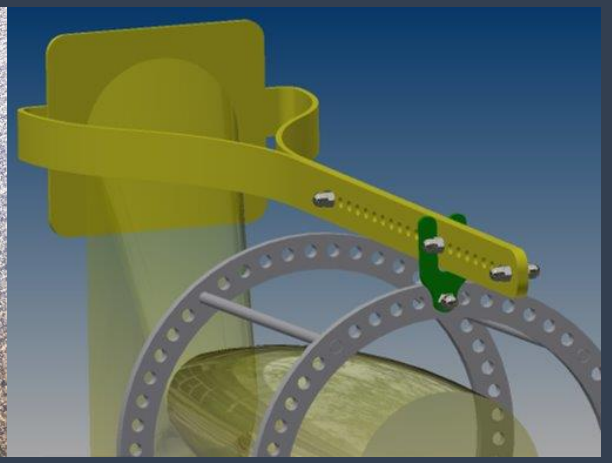
Commercially available Stretching Joints

Commercially available Stretching Devices

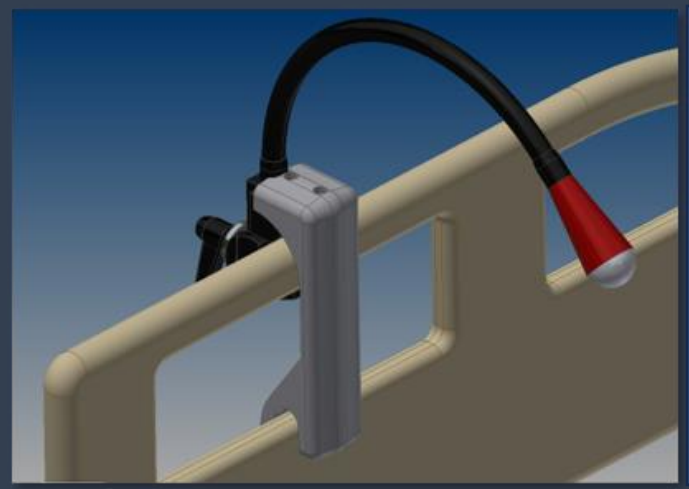
## Bespoke Solutions – *Assess, design, manufacture, supply & review*

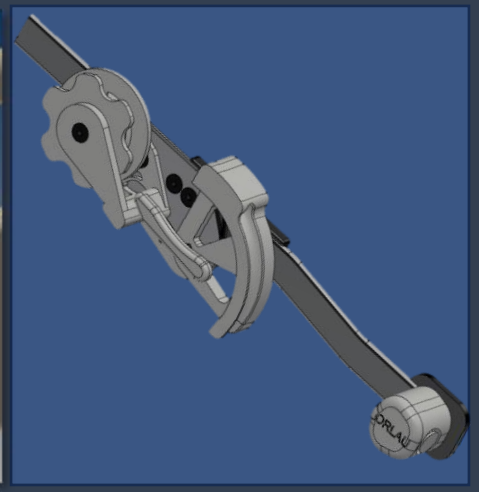


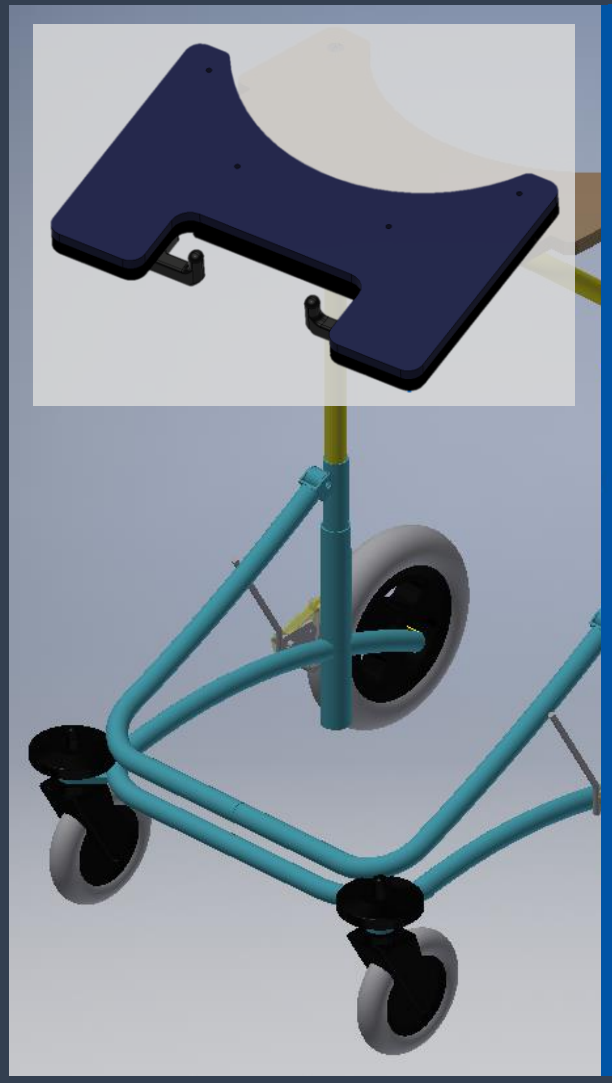


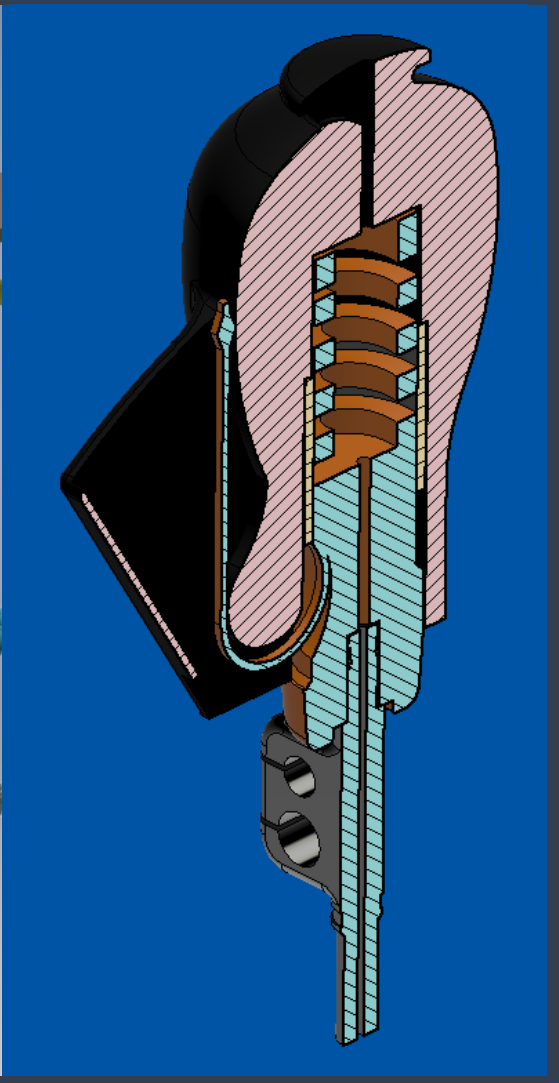


# Bespoke Solutions (AM) – *Assess, design, manufacture, supply & review*





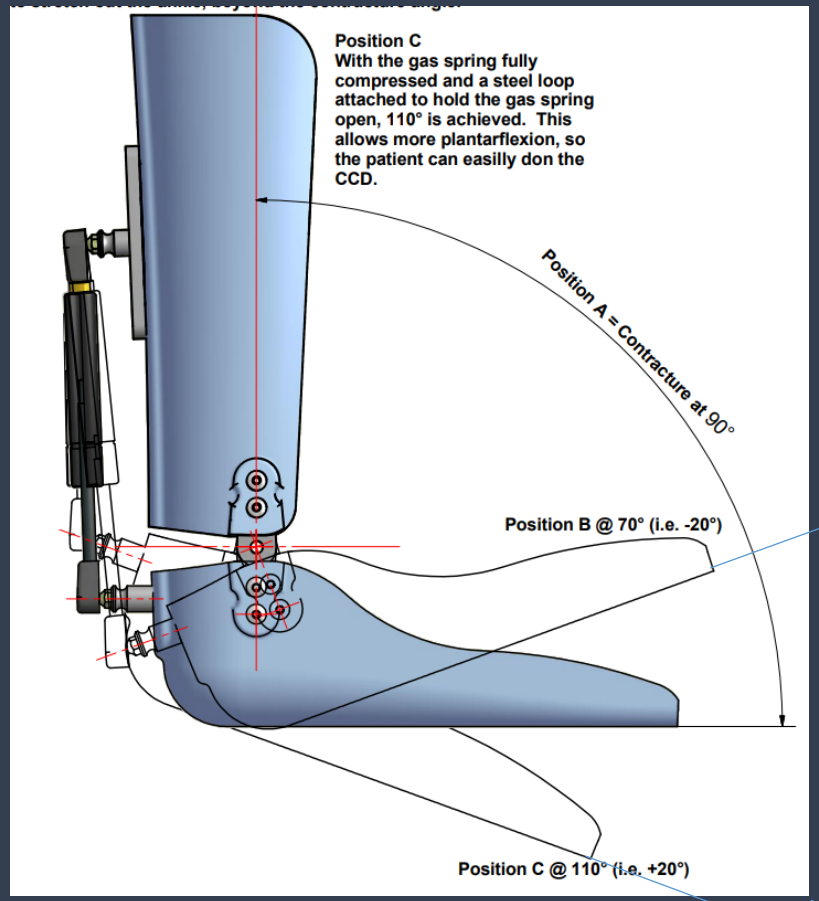


## Partnership with Ricoh 3D

*Started in 2017*
*Location here in Telford was key*
*Professionalism of the team*
*Their knowledge of AM*
*ISO 13485 certification*

## Help with a long-standing problem…

# Partnership with Ricoh 3D




Stretching position

Donning position

## Partnership with Ricoh 3D

*Difficult to use!*

*Complicated to machine and the cable kept failing*

*Off-centre loads deformed the pivot point*

## Ankle CCD Lever partnership

*Very successful, used on all ankle CCD's*

*650 put into service Dec 17 to Mar 22*

*But the ball was susceptible to popping out!!*

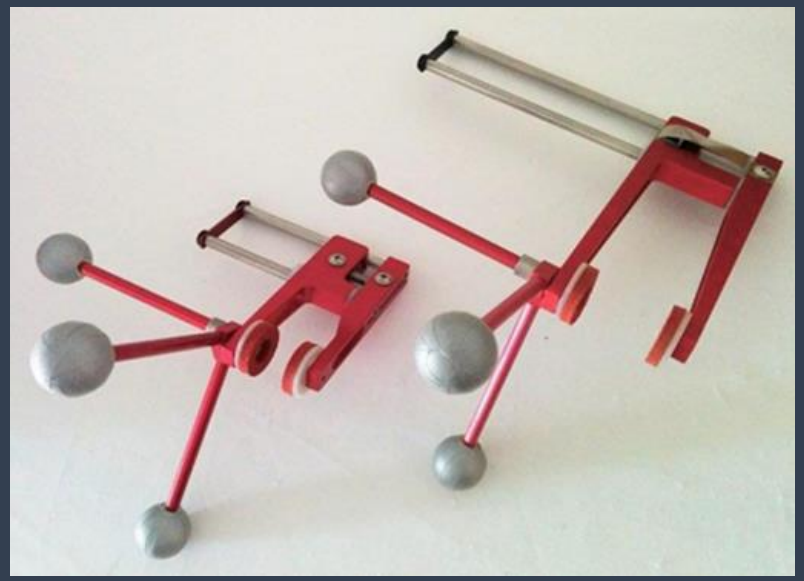
*to be continued…*

## Multi Jet Fusion

*The game changer for us!*

*Strength & visual appeal – finished products instead of prototypes!*

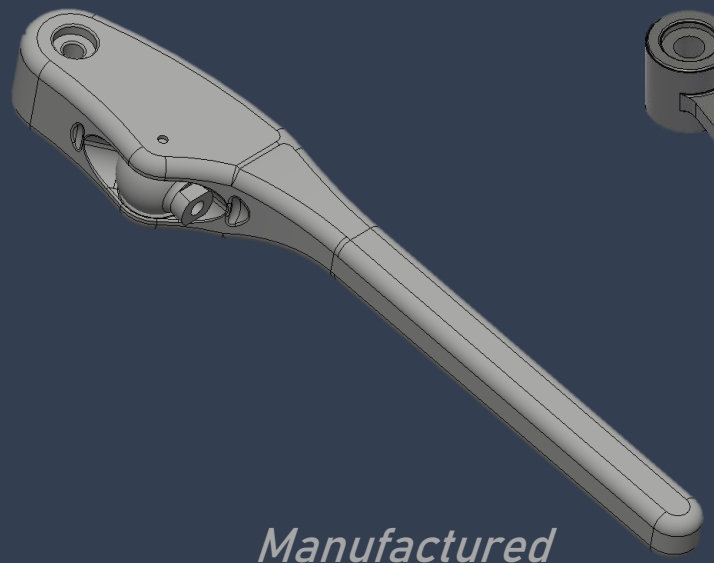
## Knee Alignment Device & TCT Award



Partnership with RICOH

## Multi Jet Fusion CCD Lever

*The SLS lever was being routinely attached to every ankle CCD in ORLAU*
*The strength of MJF provided an opportunity to redesign it*
*Make it slimmer*
*Make it more attractive*



*Manufactured 650 – Dec 17 & Mar 22.*

*Manufactured 540 – Jun 22 & Dec 23*

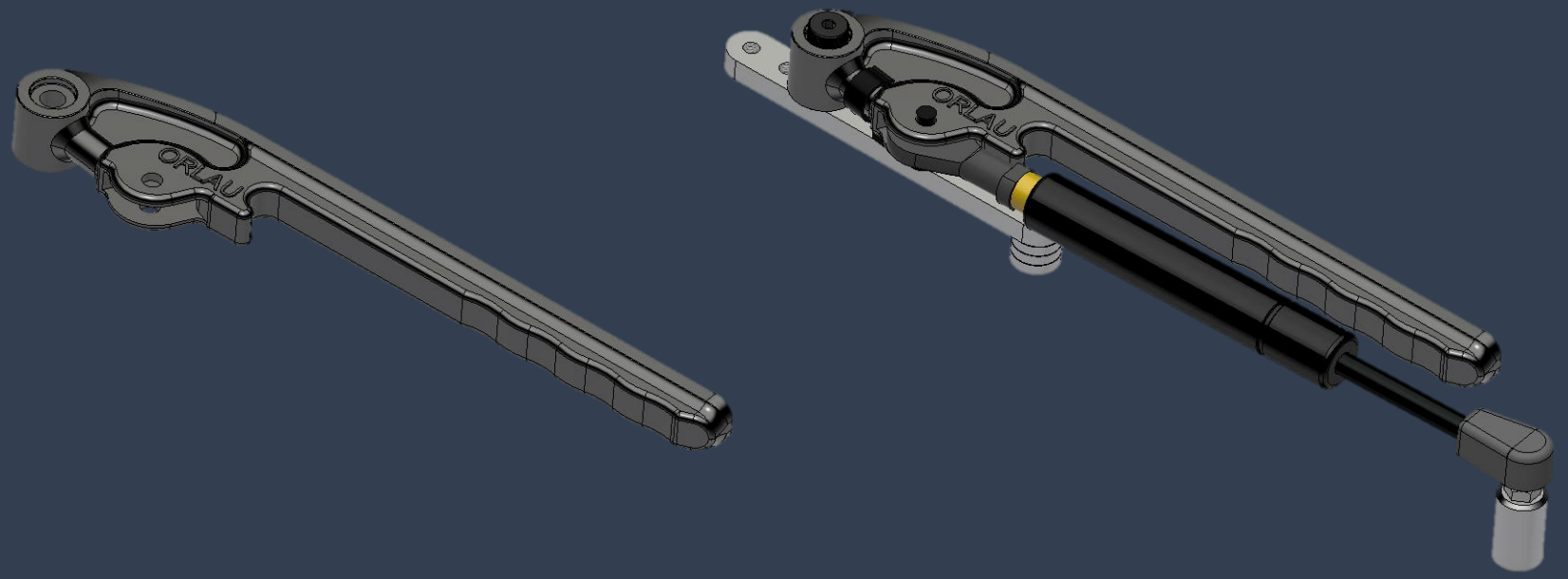

*Manufactured 100 - Jan 24*

Partnership with RICOH

## Commercialisation of the CCD Lever Kit of Parts

*Ambition to commercialise the lever and componentry*
*Ricoh 3D showed some tentative interest*

*As of April, this ORLAU developed kit will be commercially available to the wider UK healthcare market!*
*This marks the first commercialisation of a new ORLAU product for over 15 years!*



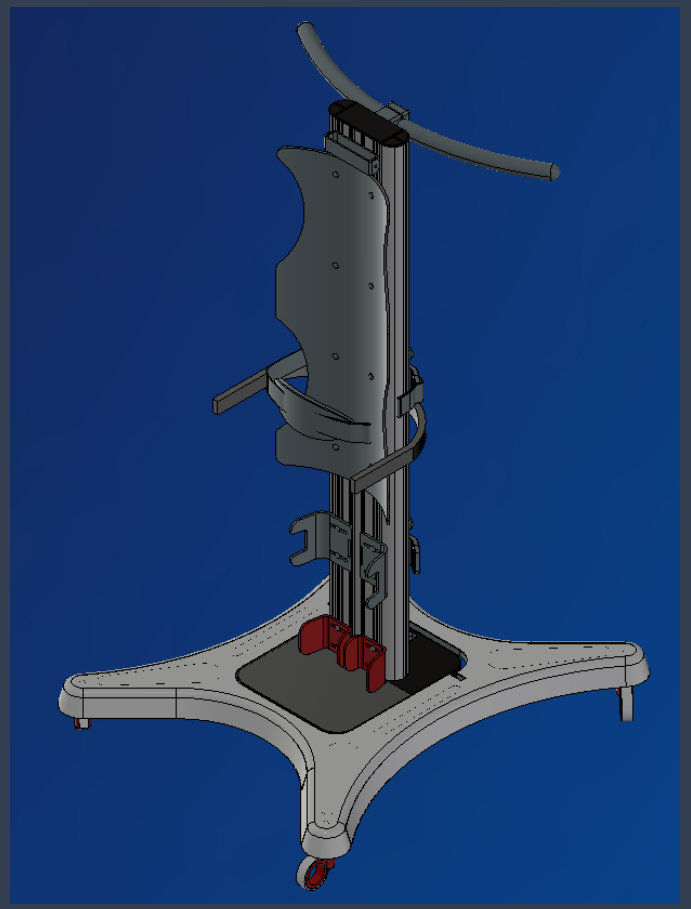
## What the future holds??

*Redevelopment of our standing frame*


[Manufacturing Technology Centre (the-mtc.org)]

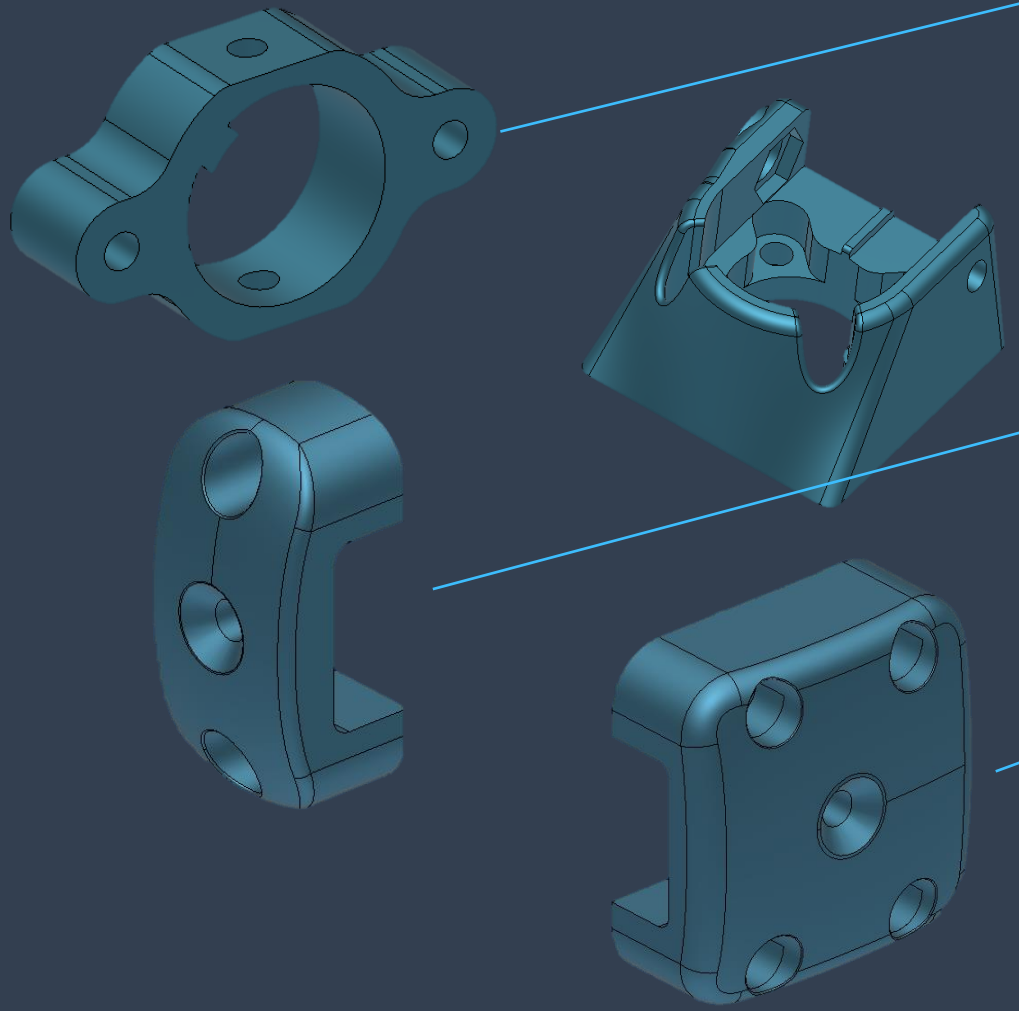
## What the future holds

*Redevelopment of our standing frame*



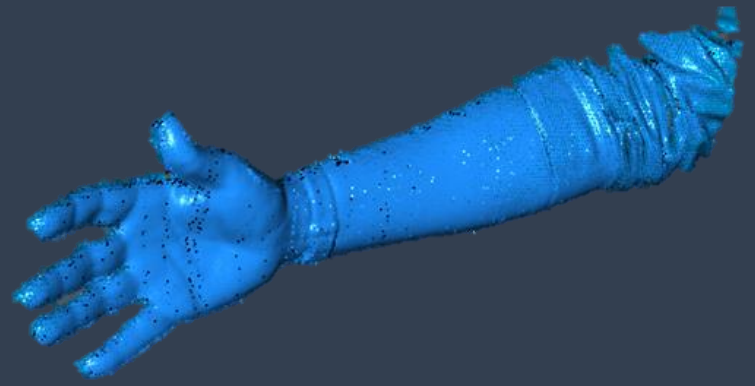
## What the future holds

*Redevelopment of our standing frame – more AM!!*



## What the future holds

*Use of more design technology*



### Patient Scanning

*Purchased a scanner last year*
*To move from tape measure to direct modelling*
*Hoped for even more tailored solutions*

### More use of emerging technology

*Generative design (Reached the limit of my CAD skills!!)*
*Utilise topology software to reduce material use/mass*
*Keep an eye on flexible materials such as TPU*
*Aluminium Metal Binder Jetting & Composite-Based AM*

Hopefully, I have…

*Introduced you to a world of engineering that you've not seen before.*

*Demonstrated how engineers and clinicians can combine to produce unique & essential, patient centred solutions.*

*Highlighted AM as a vital component of our future developments.*

*Provided a sign of things to come from RJAH/ORLAU.*

# Thank you

for listening