

International Symposium on Advanced Technology and 3D Printing in Orthopaedics

Date: 9 September 2023 (Saturday)

Venue: 9/F Auditorium, CUHK Medical Centre, Shatin, Hong Kong

9 September 2023 (Saturday) 0830-1015

The Hong Kong College Of Orthopaedic Surgeons Saturday Inter-hospital Meeting

0830 – 0840

Opening Remarks SW Law

3D Printing - Orthopaedic Surgical Applications

Moderators: L Cheung, M Ong

0840 – 0855 Challenges and the Future of 3D Printing Application in Rehabilitation

SW Law

0855 – 0910 When an Orthopedic Surgeon Meets 3D Printing

H Cai

0910 – 0925 Metal printing applications in Orthopaedics, from design to manufacturing S Mak

0925 – 0940 Computer-assisted Upper Limb Deformity Correction

M Mak

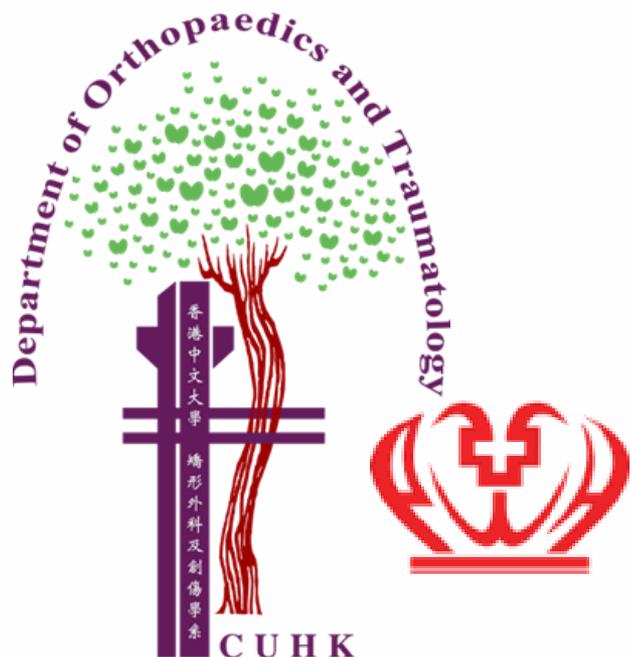
0940 – 0955 Computerized 3D Printing and Design in Prosthetic and Orthotic Devices

Ajax Lau



羅尚尉醫生

香港中文大學醫學院 矯形外科及創傷學系
榮譽臨床助理教授
矯形外科及創傷學科顧問醫生



香港中文大學內外全科醫學士
香港外科醫學院院士
英國愛丁堡皇家外科醫學院院士
香港骨科醫學院院士
英國愛丁堡皇家外科醫學院骨科院士
香港醫學專科學院院士(骨科)
香港中文大學流行病學與生物統計學理學碩士
香港中文大學職業醫學碩士
臨床老人學學士後文憑

3D Printing service in OLC (CUHK)



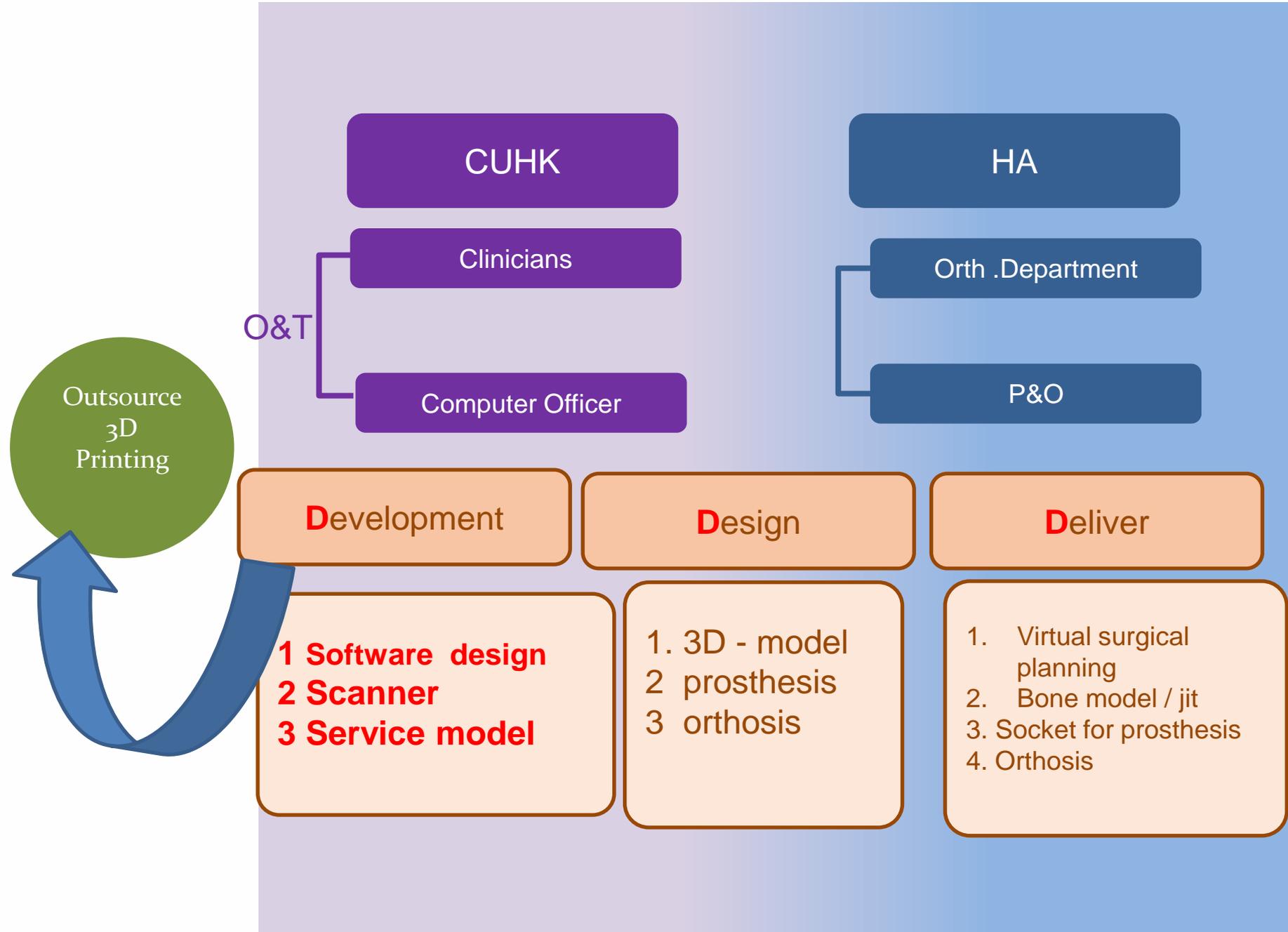
FORTUS 450mc

Since 2013 June

Bone model
Patient specific
instruments
Surgical guides



- Single colour
- Hard & high temp
withstanding ($> 100^{\circ}\text{C}$)
- **Sterilizable**



Collaboration Partner (Metal Printing Company)



- Koln 3D Technology (Medical) Limited



Precise medical metal 3D printing



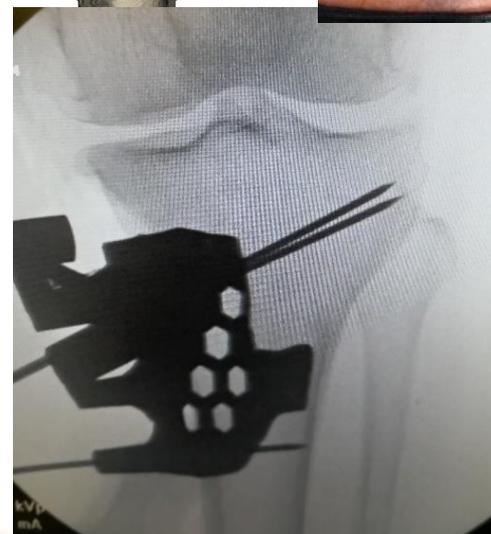
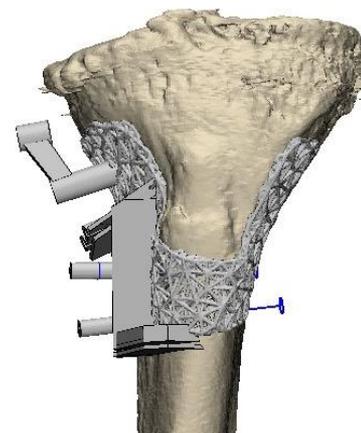
More than 20 successful clinical cases
(3 years follow through)

6 registered patented technologies

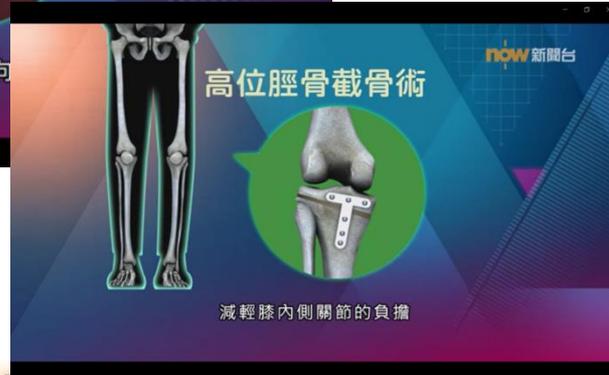
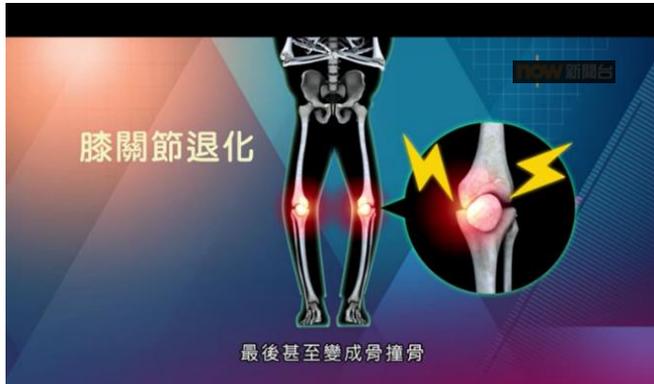


Metal Printing Applications

- Better strength
 - Deformity resistance
 - Smaller size
- Autoclave sterilization
- Higher heat deflection
 - Better cutting accuracy
- Higher jig positioning accuracy
 - Light-weight (mesh) design incorporation
 - Visible under X-ray



High tibial Osteotomy



✓ Visible under X-ray

Recent advance in 3 D printing

- Material available for printing increasing
- Availability and affordability of 3D printers
- software equipment have in effect become ubiquitous
- Paradigm shift ? In Prosthetic and Orthotic prescription ?

增材制造

- 比以前**更快**、**更便宜**、**更好**
- 地制造假肢和矫形器，
- 并为更多人提供更容易获得和**负担得**假肢



- 3D打印有能力采用当今定制的手工制造工艺，并将其转变为高度可重复且一致的流程，从而最终带来更有效的诊疗和更好的患者治疗效果

Traditional

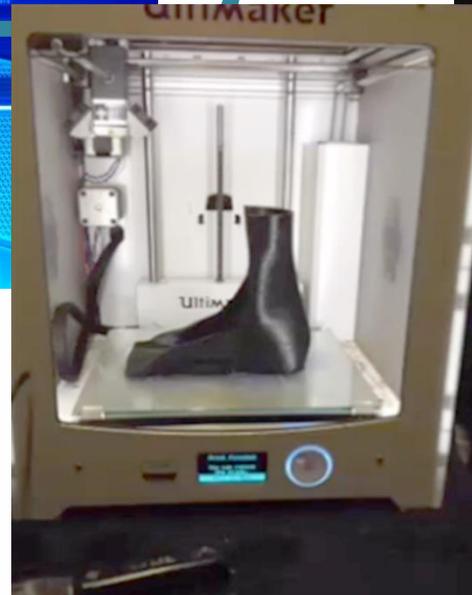
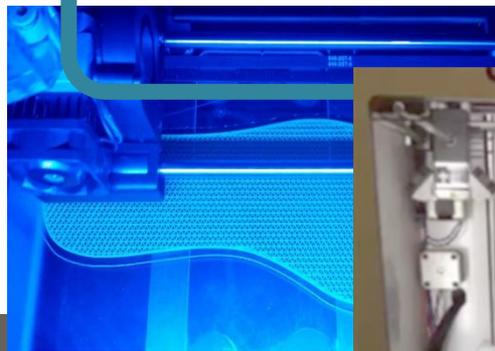
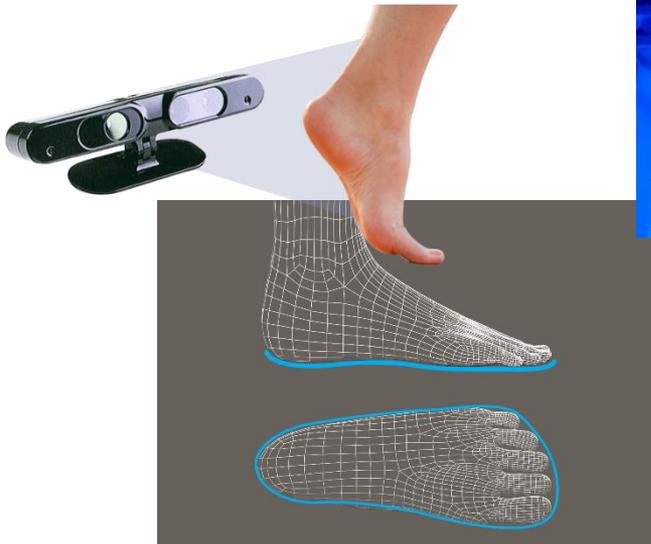


Plaster modification Casting

subtractive manufacturing



Computer modification Scanning Additive manufacturing





精英

3D打印疗法

每年有数千人失去四肢，低成本的技术能为他们提供帮助。

很多假肢仍使用石膏模具制作与残肢粗硬的接口。如果你有幸住在训练有素的假肢师身旁，你就会知道用模具制作与残肢完全匹配的接口既昂贵又麻烦。世界上有很多截肢患者得不到假肢。手机和3D打印或许能解决这个问题提供方案。国家地理的探险家林宇民表示：他在2016年失去了一只腿。手机摄像头能够扫描残肢，将测量数据提供给专业的3D打印人员，他们会制作出与之匹配的接口，成本还很低廉，并将制送到世界各地的截肢患者手中。——克里斯蒂娜·凯尼斯



本系列《精英》将推出科学改变美国社会的种种早期科技报道。国家地理杂志于美国东部时间1月7日零点，在亚洲地区时间晚上10点播出新剧集。

01.2019

NATIONAL GEOGRAPHIC 华夏地理



特别专辑

定制医疗

新技术与古疗法如何改变医疗卫生现状

Seems promising
But.....



香港中文大學 矯形外科及創傷學系(骨科) 威爾斯親王醫院
Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong, Prince of Wales Hospital.



3 Challenges

in 3 D

Scanner (hardware)

Software

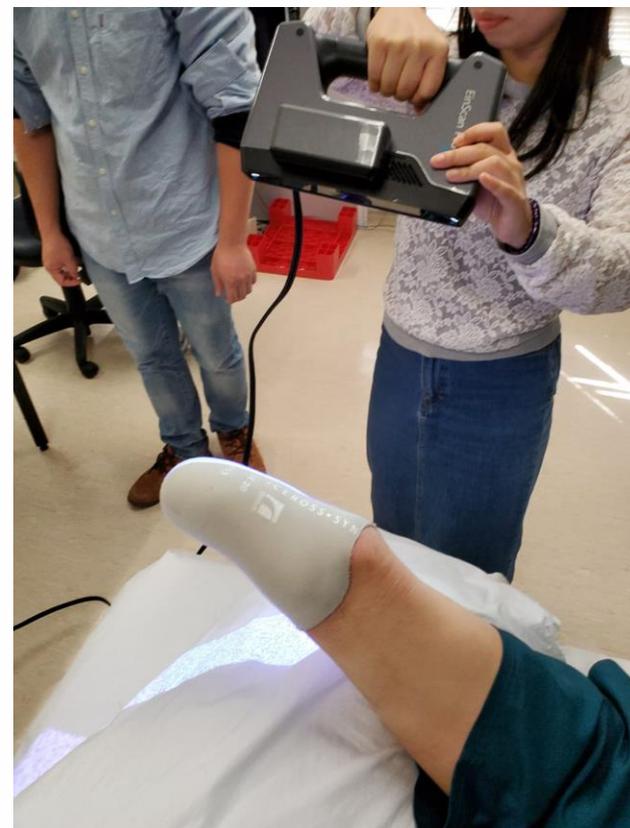
Service model



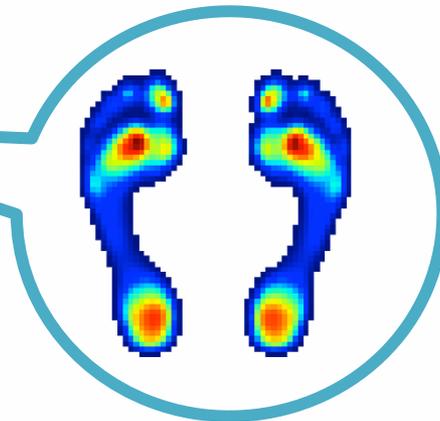
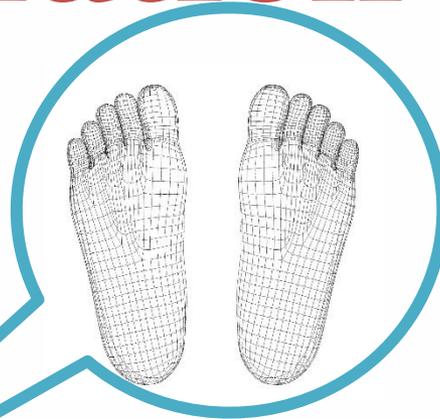
3S

硬件：扫描仪Scanner

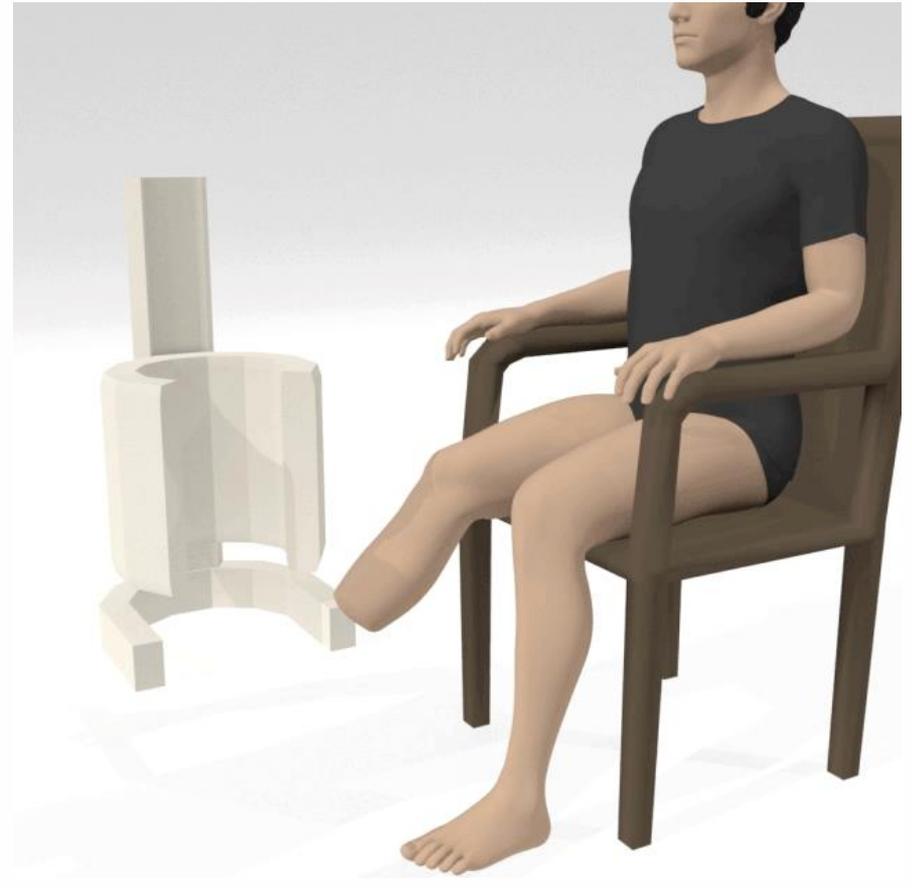
- 缺乏好的扫描仪
- 并没有针对矫形器用的扫描仪



Potential solution



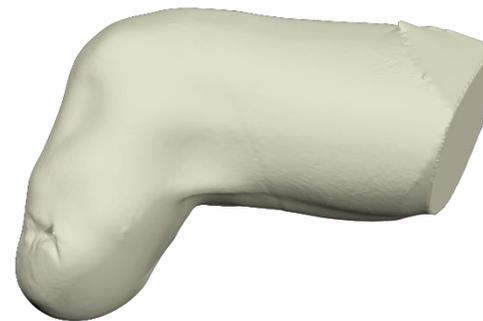
Scanner for amputee stump



魏雲露 [掃瞄情況]



魏雲露 女 左膝下截肢





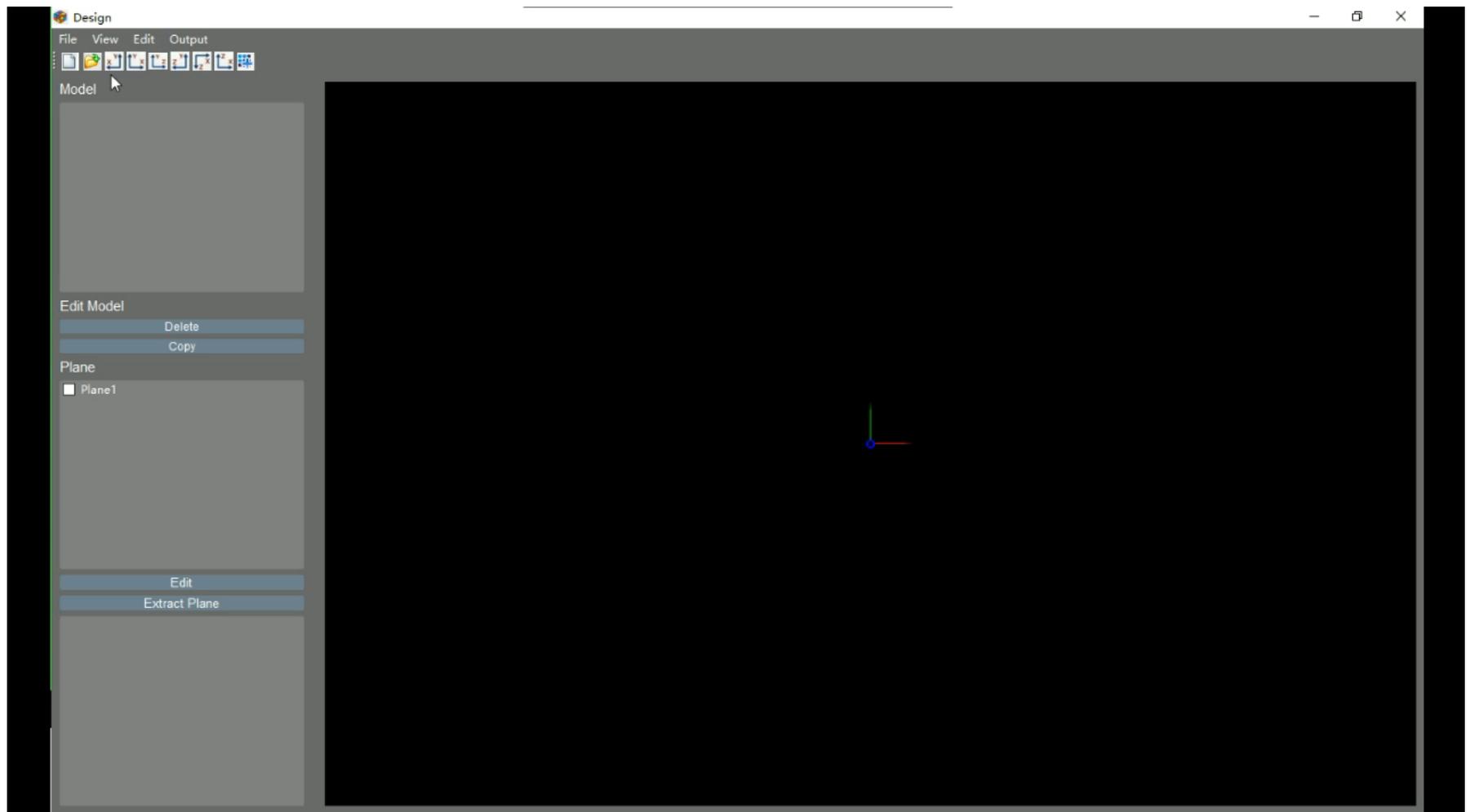


Software

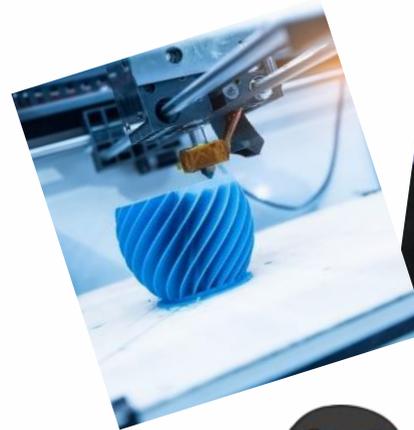
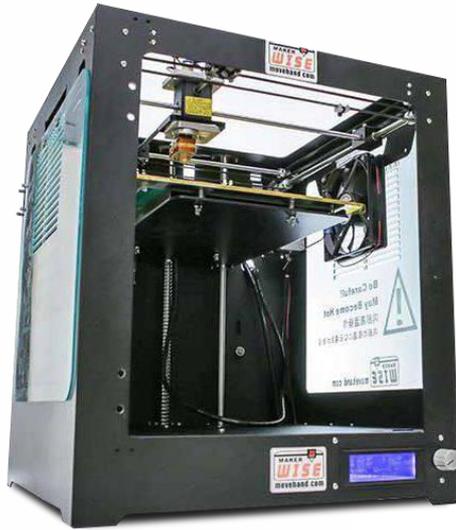
- designated software
- User friendly software is required



Our software



Service model securing sustainability supply

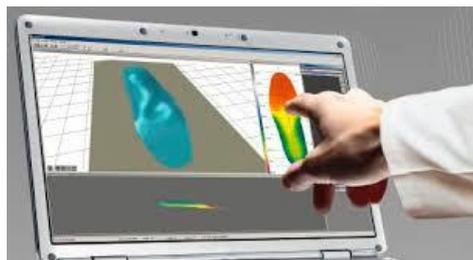
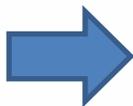


New Printer
New materials

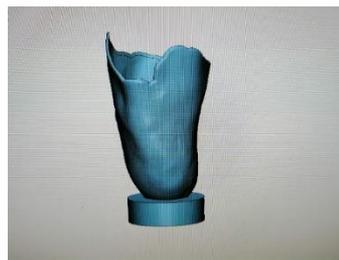




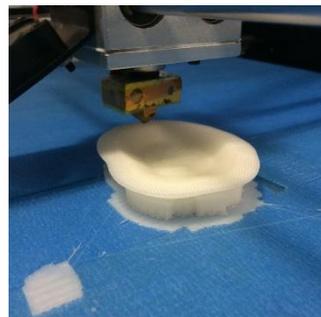
P&O 扫瞄



设计



Modelling



打印



P&O 修改



P&O Fitting

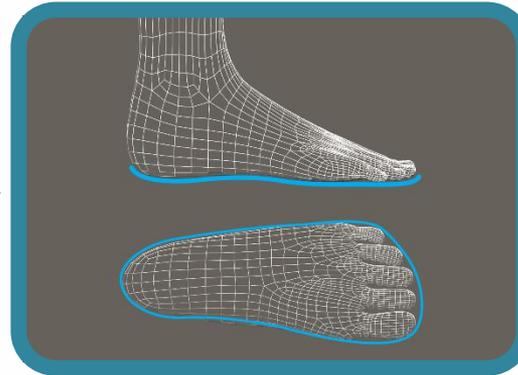


Service model Workflow (AFO)

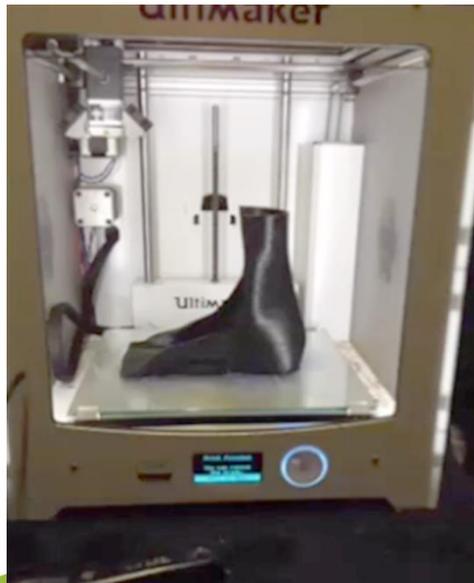
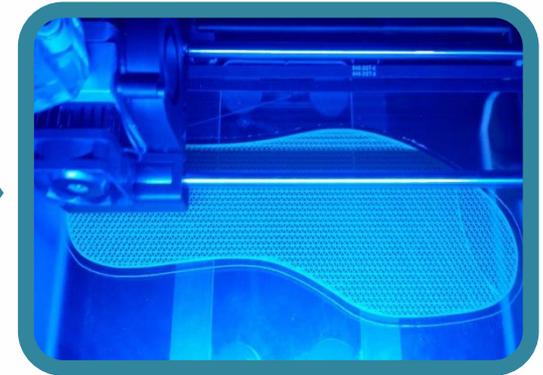
SCAN



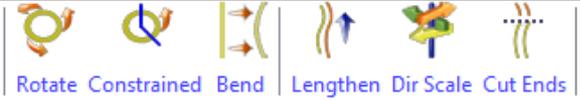
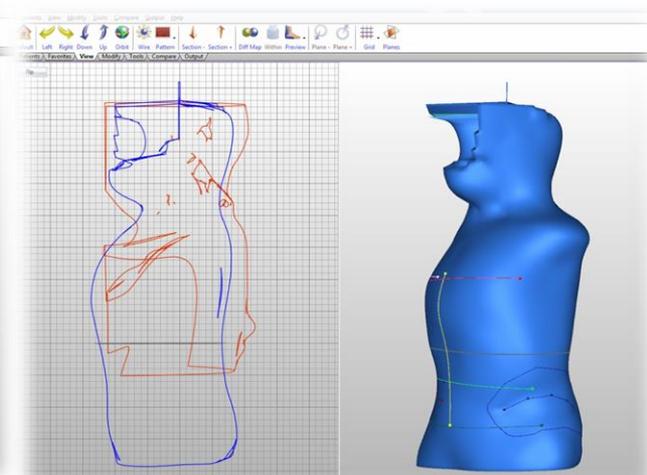
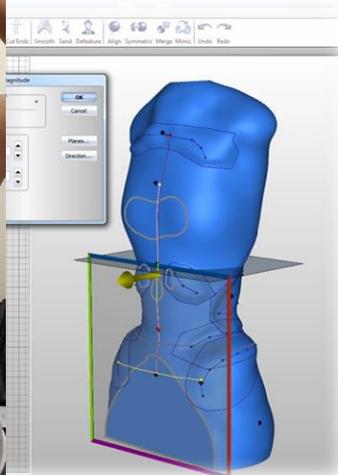
MODEL



PRINT



scoliosis



CARVE PREVIEW

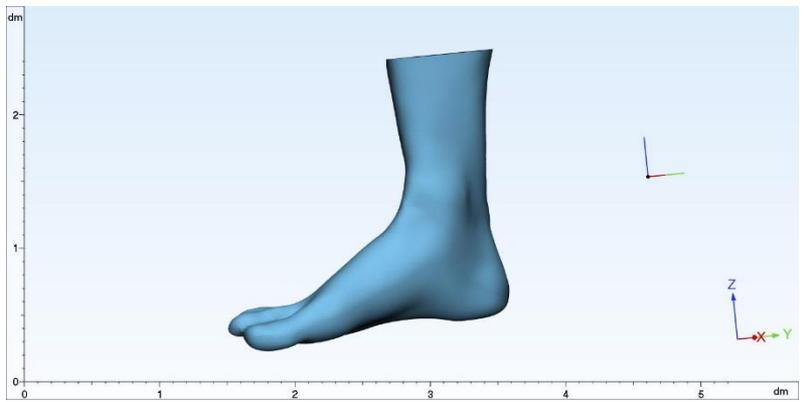
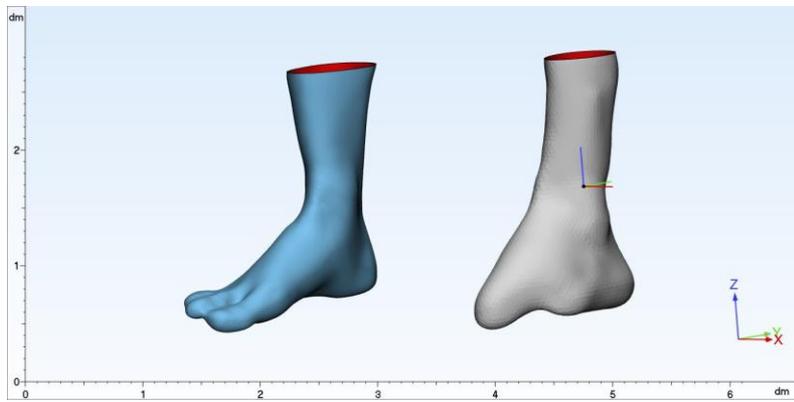
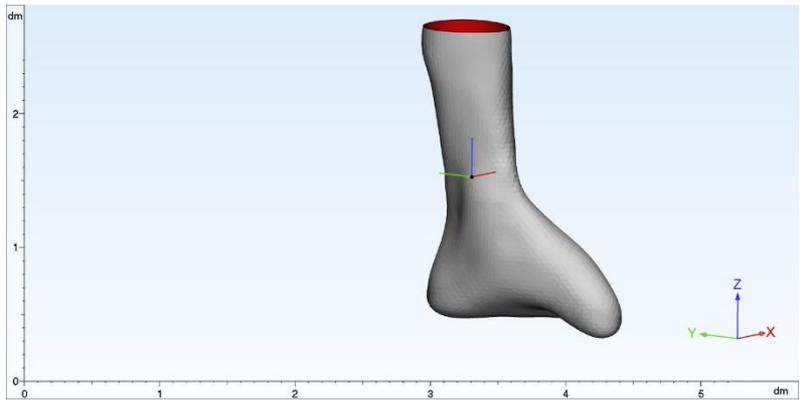
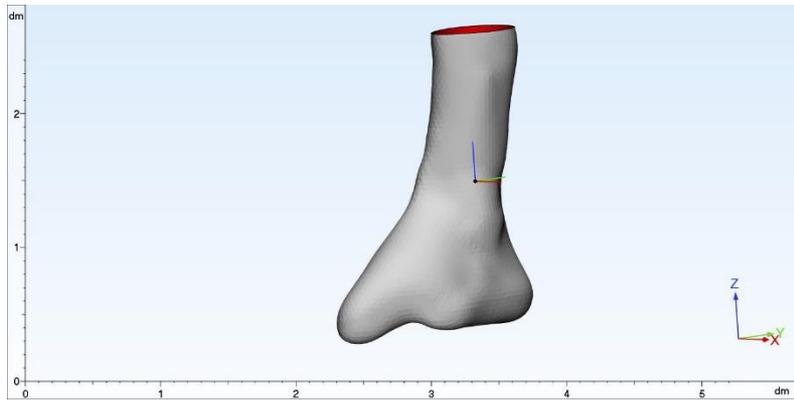
FRONT VIEW

AXIAL VIEW Default pitch : 5.0

CAM INFORMATION - Large 1

Carve File	sc-test_scolio3_001	Axis ID	1910
Click Name	Dummy		
Shape Tool	ROTY JACKPIT		
Tool	PVAN-RJ-1-alga		
Exp in Blank	NO	Number of Passes	2
Exp in Blank	NO	Parting Passes	NO
Click Feature	SPINAL PROX KEY		

NEXT SHAPE	STOCK BLANKS	PITCH ON	SECTION	MOVE SHAPE	LOAD SPACER	CARVE PREVIEW
DELETE SHAPE	USED BLANKS	INSERT PITCH	GRID	FLIP SHAPE	SIZE SPACER	WRITE TOOL PATH
LICENSE	RESIZE BLANK	DELETE PITCH	RAD	SELECT CARVER	MIRROR SHAPE	EXIT



Background

Current screening practice

Current model of care

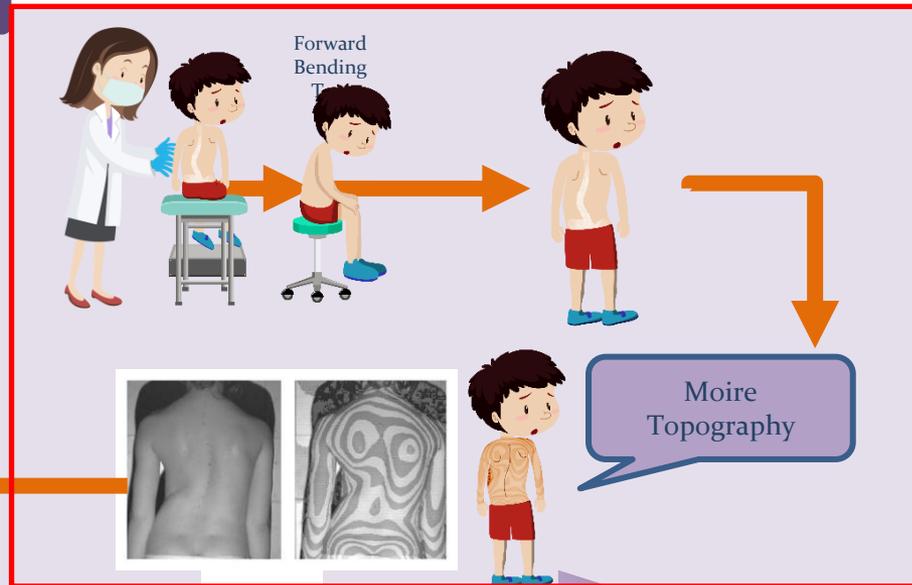


School screening
Primary 6



香港特別行政區政府
衛生署學生健康服務

Department of
Health
Student Health
Service



waiting time



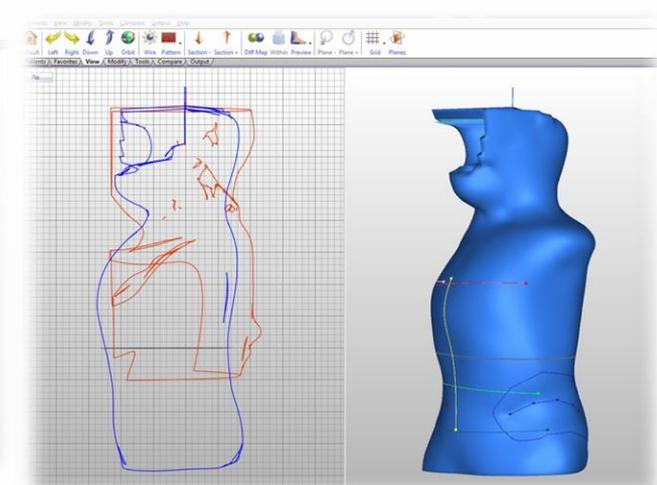
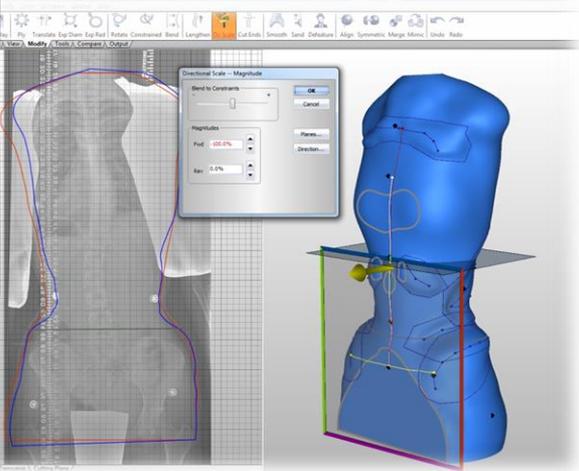
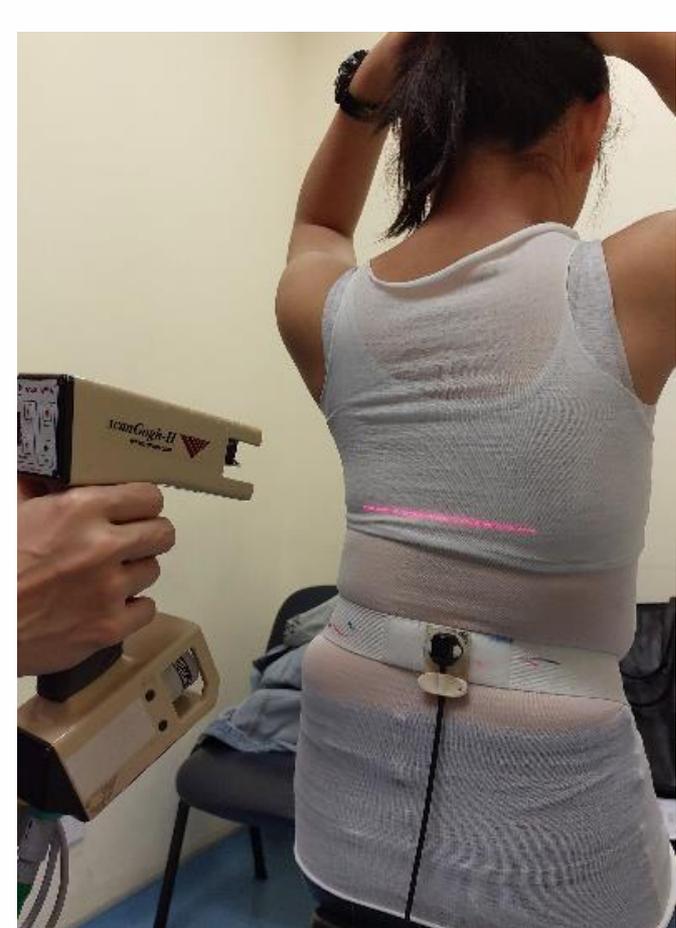


香港特別行政區政府
衛生署學生健康服務
Department of Health
Student Health Service

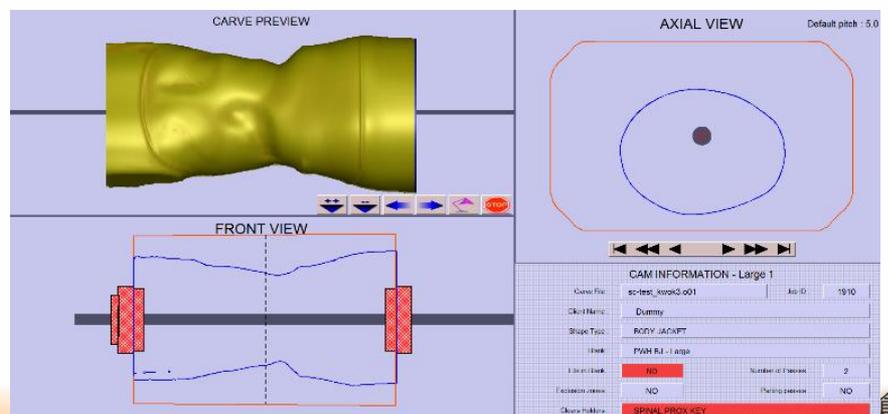
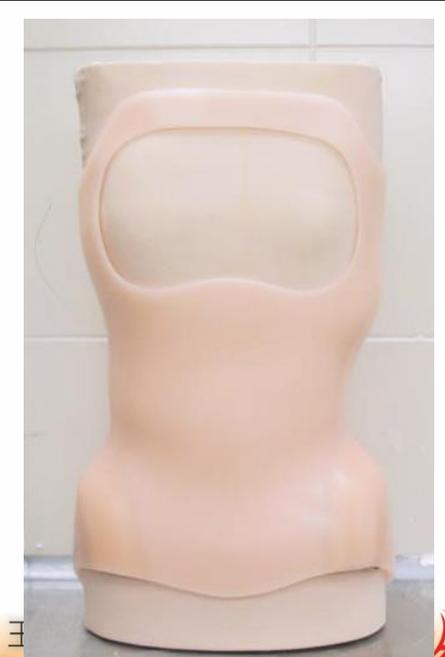


EOS





Region Mimic Overlay | Fly Translate Exp Diam Exp Rad





se



Future

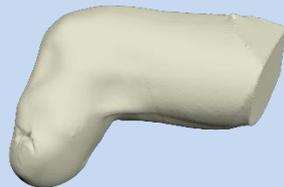
三維重建

CAM工藝規劃

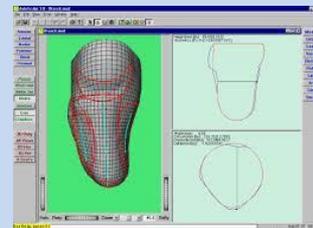
測量數據



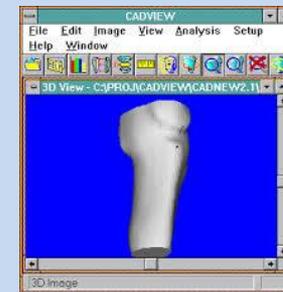
輸入原始數據



CAD模型修改



加工仿真



3D打印



接受腔形狀參考庫
Data base

New material , hybrid

FUTURE



FORTUS 450mc



OBJET J835



OBJET J750 DAP



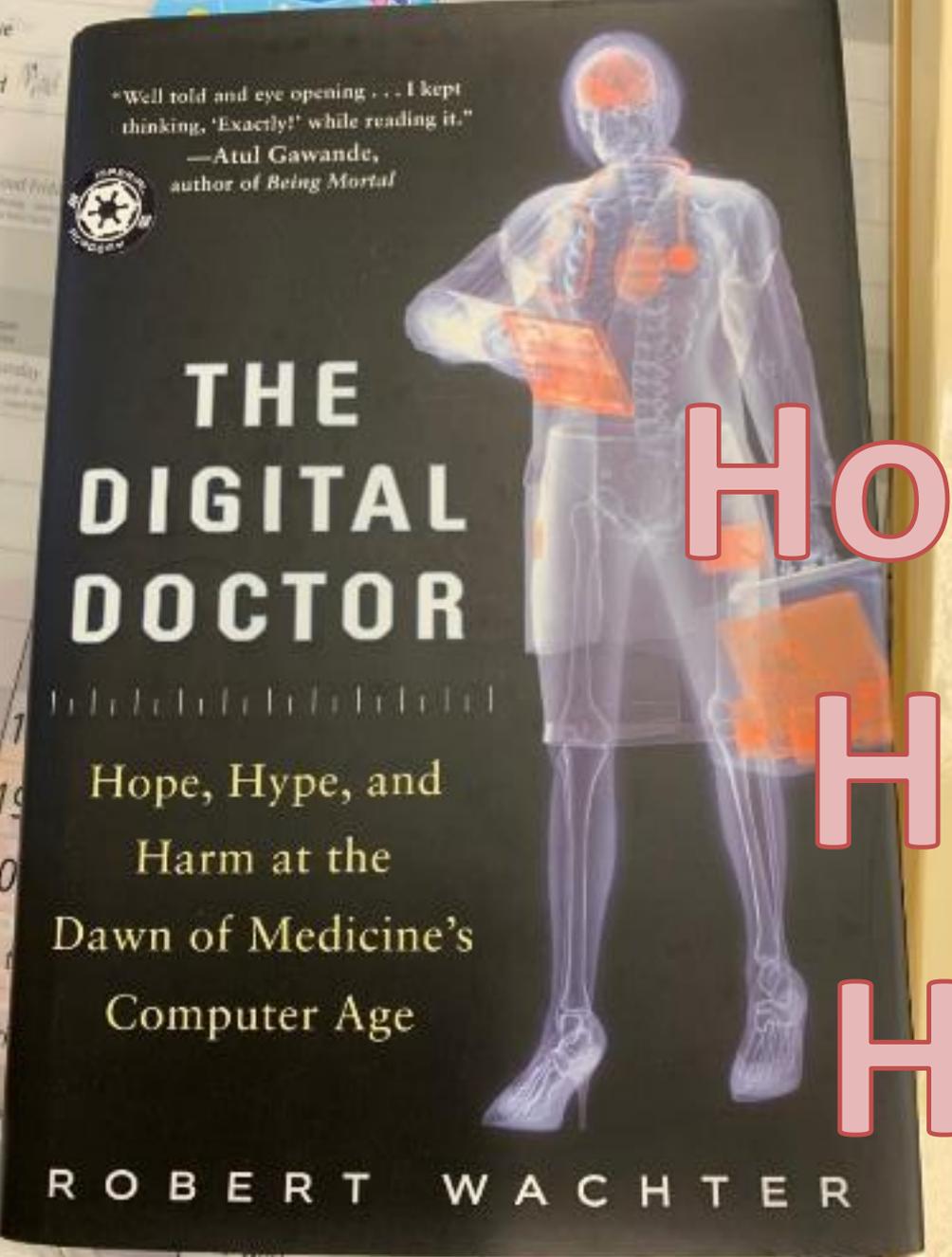
- Single colour
- Hard & high temp
withstanding ($> 100^{\circ}\text{C}$)
- Sterilizable



- Multi-colour / transparent
- Multi-texture
- Relatively soft & low temp
withstanding ($< 60^{\circ}\text{C}$)
- NOT Sterilizable



- Specific material matrices for
anatomy (bone/soft tissue /vessels)
- Multi-colour / transparent
- Multi-texture
- Relatively soft & low temp
withstanding ($< 60^{\circ}\text{C}$)
- NOT Sterilizable



Hope 希望,

Hype 炒作

Harm 傷害

PROSTHETICS

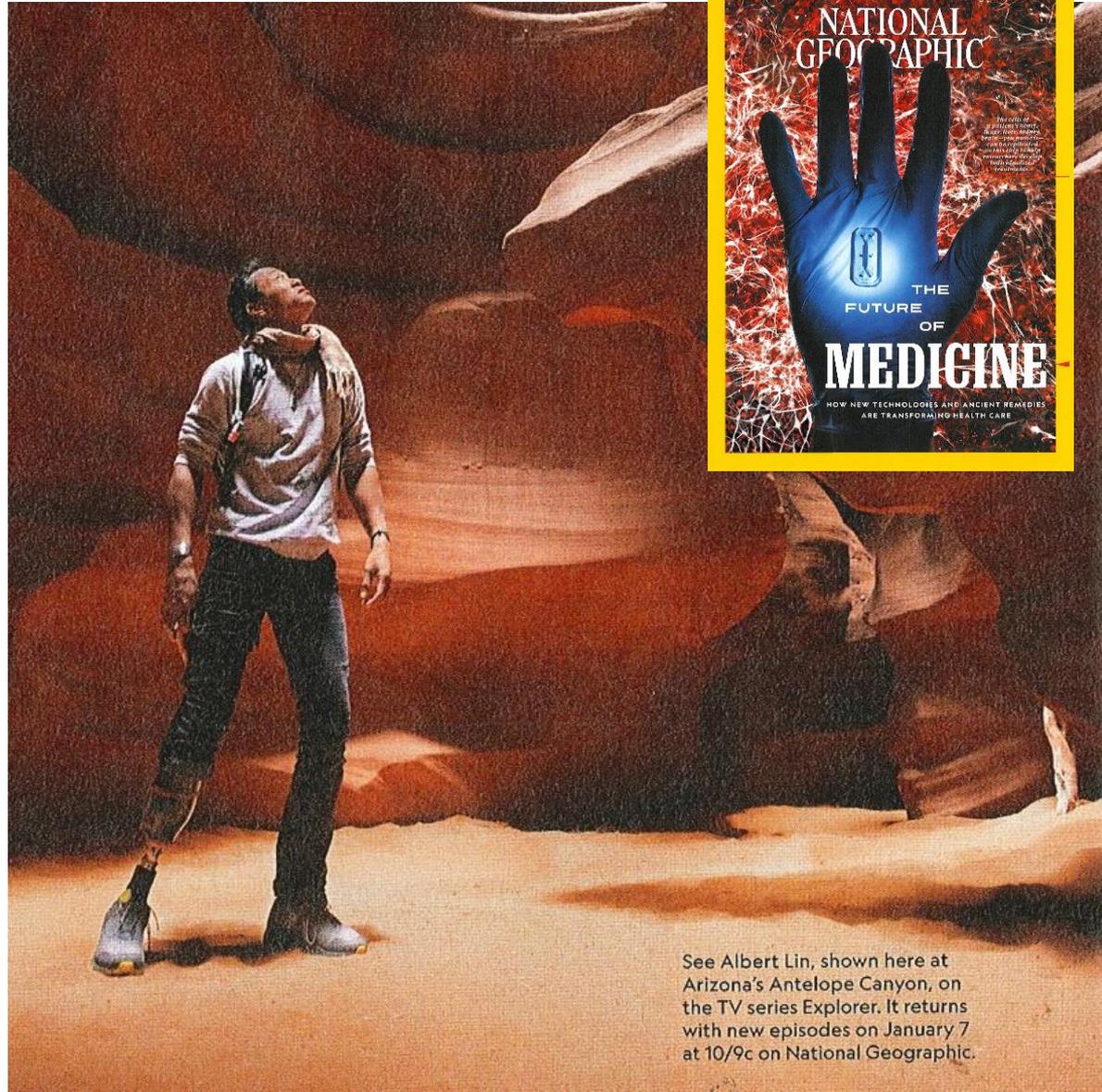
3D PRINT REMEDIES

THOUSANDS OF PEOPLE LOSE LIMBS EVERY YEAR. LOW-COST TECH COULD HELP THEM.

Many artificial limbs still begin with a plaster cast. Transforming that mold into a socket that comfortably fits the residual limb is an expensive and halting process—if you're lucky enough to live near a trained prosthetist. Many amputees world-

wide still find it difficult to get prosthetic limbs. Mobile phones and 3D printing may offer a solution, says Albert Yu-Min Lin, a National Geographic explorer who lost part of his leg in 2016. Phone cameras could scan residual limbs, providing measurements to professionals with 3D printers, who would produce matching low-cost sockets to be shipped to amputees all over the world.

—CHRISTINA NUNEZ



See Albert Lin, shown here at Arizona's Antelope Canyon, on the TV series Explorer. It returns with new episodes on January 7 at 10/9c on National Geographic.



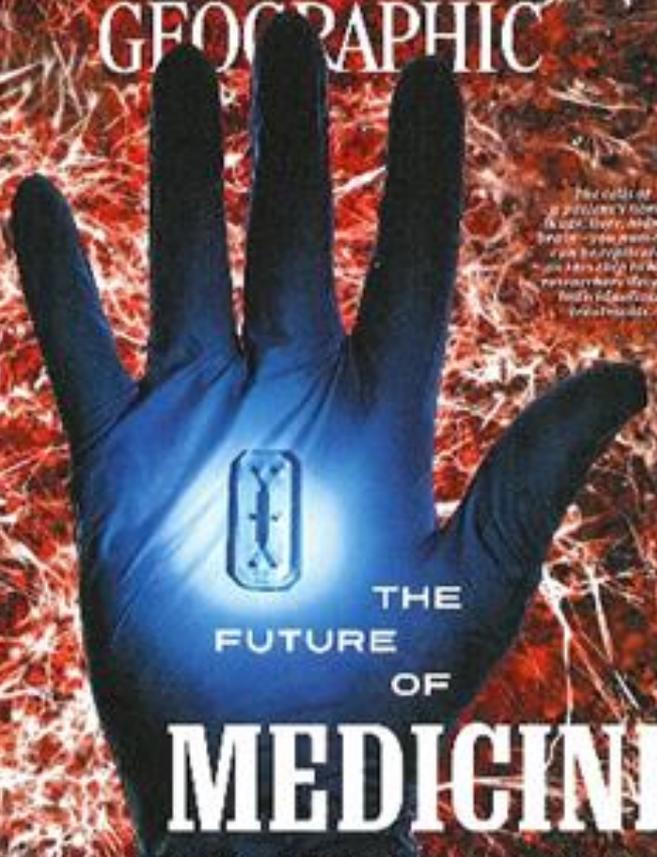
香港中文大學 矯形外科及創傷學系(骨科) 威爾斯親王醫院
Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong, Prince of Wales Hospital.



04.2012

SPECIAL ISSUE

NATIONAL GEOGRAPHIC



The world of
genetics, robotics,
3D printing, medicine,
and more, promises
to revolutionize health
care. But how do we
ensure that the future
of medicine is
ethical and
equitable?

THE
FUTURE
OF
MEDICINE

HOW NEW TECHNOLOGIES AND ANCIENT REMEDIES
ARE TRANSFORMING HEALTH CARE



香港中文大學 矯形外科及創傷學系(骨科) 威爾斯親王醫院
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