



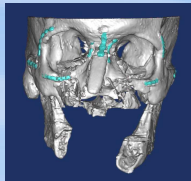
Pre-Combat Image Acquisition, Virtual Surgical Technique, Custom Implants and Computer Manufactured Devices

Craniofacial Imaging Research , Naval Postgraduate Dental School

Gerald T. Grant, CAPT, DC, USN, Peter Liacouras, PhD , Robert M Taft, CAPT, DC, USN, Shayne Kondor MSAE, Charles Doyle

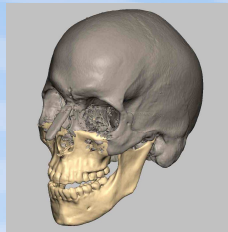
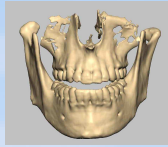
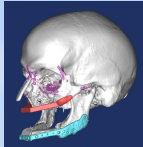


Reconstruction



Combat trauma image can be registered to pre-combat images to recreate missing anatomy.

Combat Trauma Image



Pre/Post combat injury composite.

Missing anatomy is isolated from the digital reconstruction for virtual surgery, custom surgical guides, custom implant fabrication and/or Facial Transplant planning

Forensics

Forensic Facial reconstruction software in development with the FBI registers skull information and regenerates the missing bone and soft tissue for identification. This same process can be used to design missing anatomy if no pre-combat image exists.

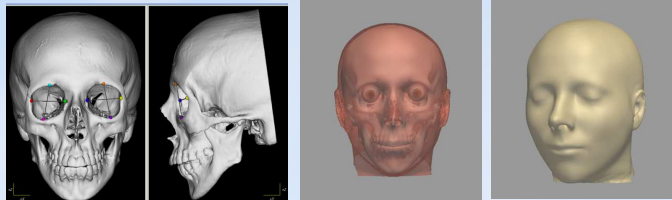
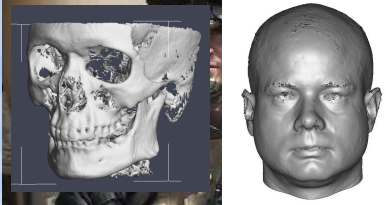
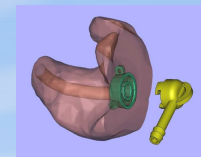
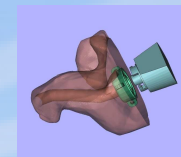
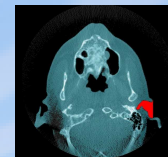


Image Capture



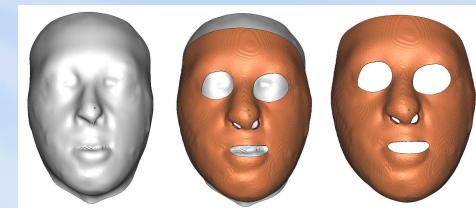
Pre-Combat Images / Craniofacial Database

Custom Devices From Images



Custom Hearing protection/Communications Devices

Pre-combat images present the opportunity to digitally design and fabricate custom devices that fit anatomical areas. Hearing devices for protection or communication can be designed from the CBCT scan,. A standard mount can be attached, and the devices printed on a multi-material Additive manufacturing machine. Reprints can be provided on demand and refitted from new images as needed in minimal time.



Burn Dressing Devices

Facial burns require dressings as they heal. To control the contours of the healing process a hard "mask" is fabricated. CAD/CAM techniques provide the opportunity to provide them quickly from a digital scan and can be designed with the patient's final contours from pre-combat records.