

# Casting To Ensure Prosthetic Success

Frank Snell, CPO, LPO, FAAOP

# Preparation of New Amputation For Casting

- ▶ Limb Protector
- ▶ Shrinker/ Ace Bandage
- ▶ Prescription from the Doctor



# History of Prosthetic Casting

- ▶ Wooden Exo-skeletal Hand Carved Prosthesis
  - Plaster cast
  - Paper templates
  - Pulling tools/  
Blue chalk



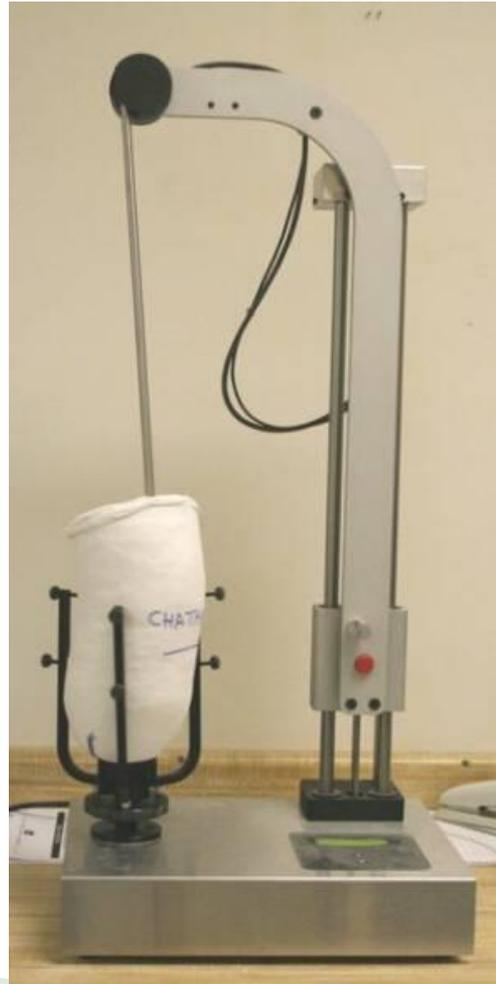
# History of Prosthetic Casting

- ▶ Hand Plaster Casting
  - Pour male model mold
  - Modify mold by hand
  - Test socket procedure



# History of Prosthetic Casting

- ▶ Hand Casting– Tracer Digitizing
  - CAD/CAM carving
  - Test socket



# History of Prosthetic Casting

▶ 7



# History of Prosthetic Casting



# History of Prosthetic Casting

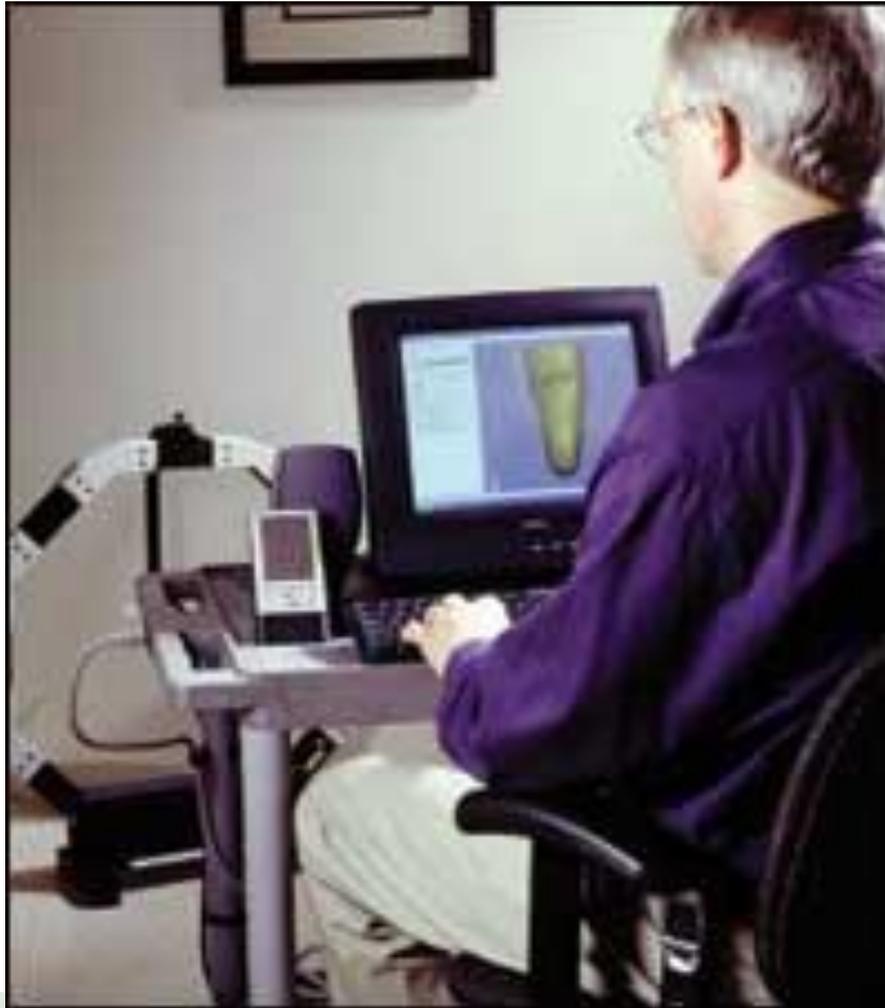
- ▶ T-Ring With Optical Imagers
  - CAD/CAM carving
  - Test socket



# History of Prosthetic Casting



# History of Prosthetic Casting



# History of Prosthetic Casting

- ▶ Hand Held Scanner
  - OWW Ipad
  - CAD/CAM carving
  - Test socket



# History of Prosthetic Casting



# History of Prosthetic Casting

- ▶ Symphonie Aqua System



# Symphonie<sup>®</sup>

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## Aqua System

All benefits in one system

1. Individual
2. Standardized process
3. Cast while standing
4. Volumetric Compression



# Symphonie Aqua System

- ▶ The surface is too big to develop enough pressure on its own for a well fitting socket with no modifications. This is what led to the vector control unit.

# Symphonie®

## Aqua System

“The Symphonie Aqua System has revolutionized our prosthetic services. The accuracy and the repeated success of each socket, truly enhances our quality and comfort for each patient. I’ve enjoyed practicing for over 47 years but the Symphonie system makes coming to work fun again”

**Frank Snell, CPO, LPO, FAAOP**  
**Snell Prosthetics and Orthotics**  
est. 1911 (108 yo )



**VC = Vector Control**

Use and delete different force Vectors to get perfect socket volume and shape

# Symphonie Aqua System

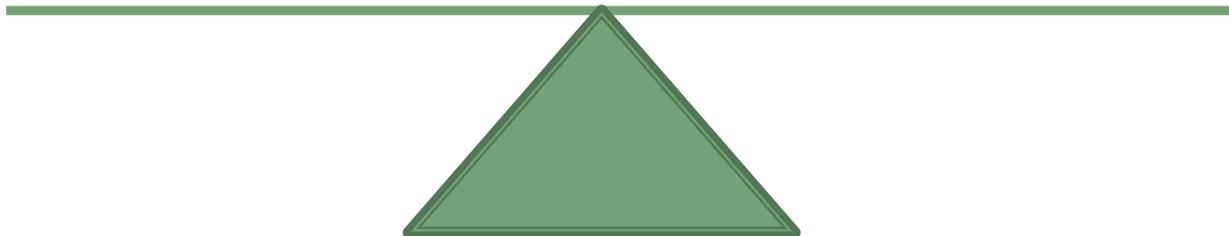
The limit with the passive system is the:

- Passive hydrostatic principle
- $\text{Pressure} = \text{Force} / \text{Surface}$

Balance between

Body weight kg  
Size of limb

Water pressure



# Symphonie Aqua System

- ▶ Stabilized Socket Fitting Process Increases
  - High flexibility of staff
  - Cost efficiency
  - Improved work flow

# Symphonie Aqua System

## ▶ Pressure Distribution By Water While Standing

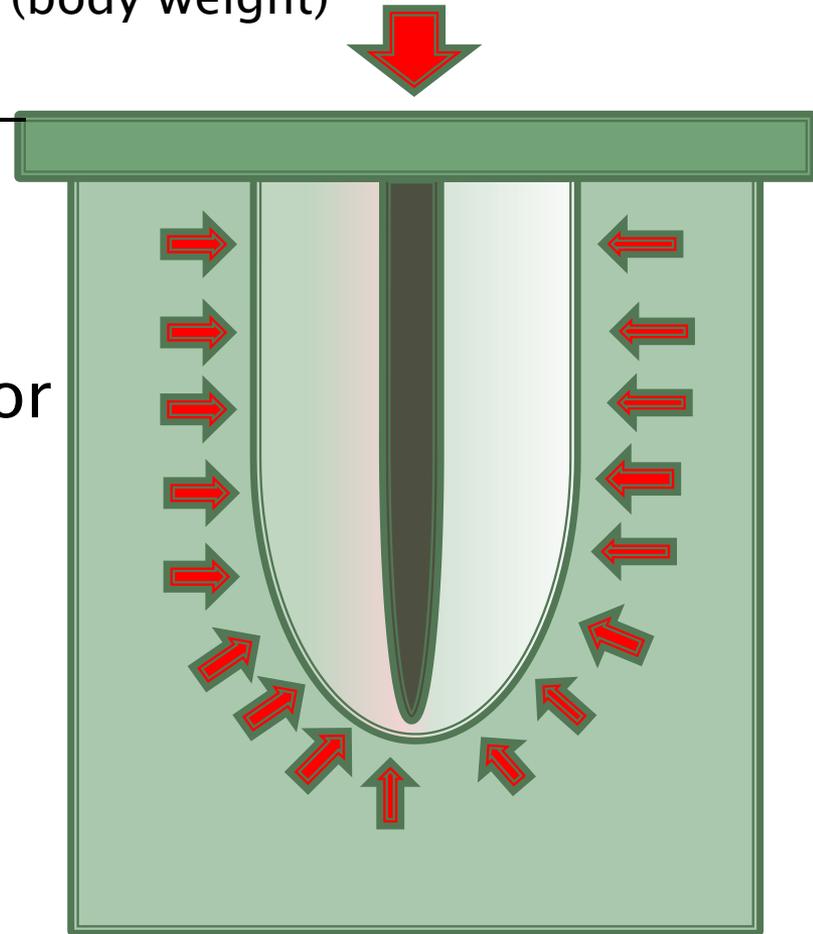
Force F (body weight)

Load tolerance of the underlying soft tissue and bony areas! Optimal match

Volume is fundamental factor of success in socket design

Hands off process shows a constant casting result

Less radius variation vs. Hands on



# Symphonie Aqua System

- ▶ Symphonie Aqua System Process
  - Evaluate limb
  - Apply plaster cast
  - Full weight bearing in aqua system
  - Remove hardened cast to reveal negative mold of actual residual limb
  - Pour positive model
  - Fit and adjust test socket

# Symphonie Aqua System

- ▶ Use the SAS app to calculate the individual socket pressure and volume
- ▶ Select between weight, size, K level, and density of soft tissue

The screenshot displays the Symphonie app interface. At the top, the time is 11:05 and the app name 'Symphonie' is visible. The main content area shows two adjustable settings: 'Weight' and 'Circum...'. The weight is currently set to 187 pound, with a range of 66 - 463 pound. The circumference is set to 13.0 inch, with a range of 11.0 - 23.0 inch. Below these settings, there is a section for 'Measuring point of the circumference: MPT (Mid patella tendon)'. Underneath, there are three buttons for 'Connective tissue' selection: 'Soft', 'Medium' (which is currently selected), and 'Firm'. At the bottom, there is a 'Functional level' section and a blue bar showing 'Commended pressure: 13.10 psi'. The bottom navigation bar contains two icons: 'Calculator' and 'Settings'.

11:05 Symphonie

Weight 66 - 463 pound **187 pound**

Circum... 11.0 - 23.0 inch **13.0 inch**

Measuring point of the circumference:  
MPT (Mid patella tendon)

Connective tissue

Soft Medium Firm

Functional level

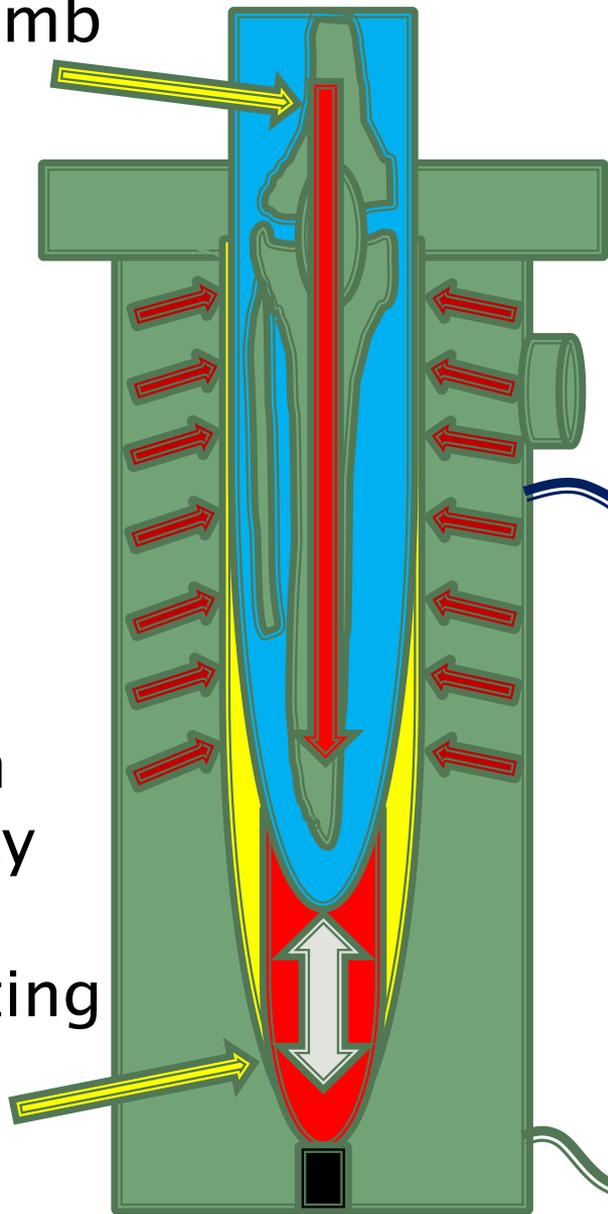
Commended pressure: **13.10 psi**

Calculator Settings

# Symphonie Aqua System

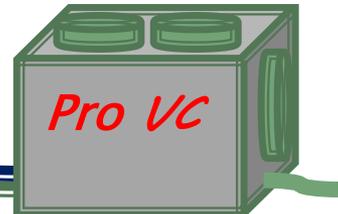
*VC*

Residual Limb

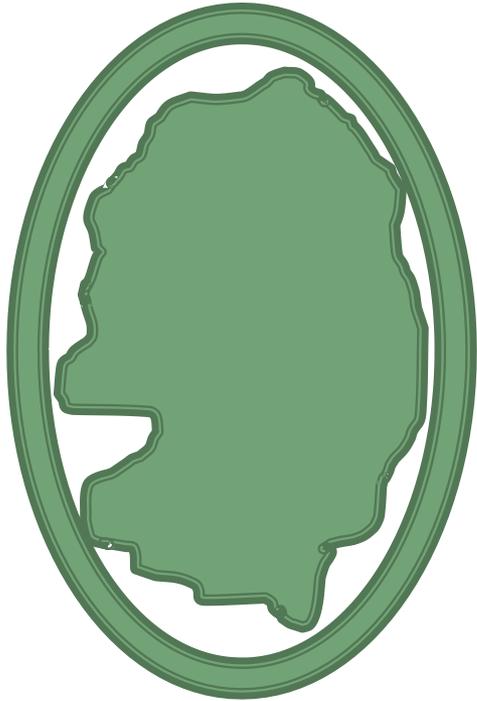


Solid cup with soft foam inlay to eliminate distal supporting vector

Water intake and outtake



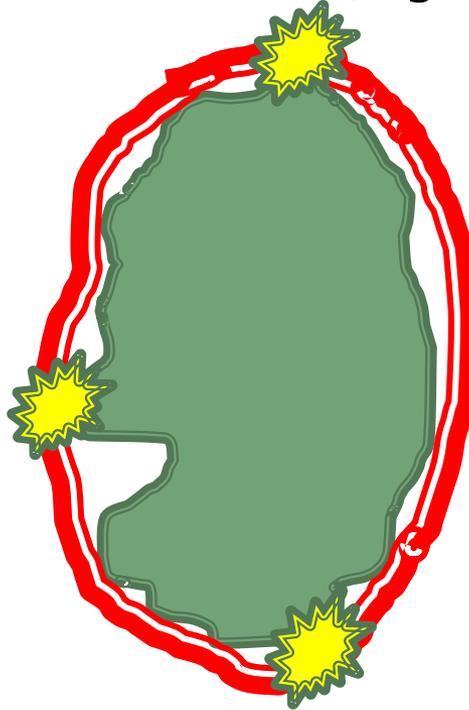
## Result of Scanner/software technology



**Scan:**  
Only shows a non weight bearing surface, far to big and you need software modification (digital rasp)

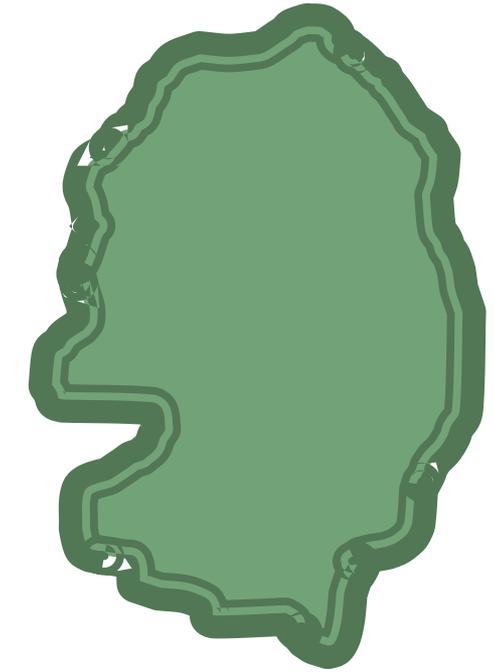
You will only know how the socket will fit after the socket is produced.

## Results of elastic/tight bandage



**Hand cast:**  
Extremely individualized based on skill level (years of experience), not reproduceable.

Elastic bandages are not uniform in compression. You have areas of higher pressure across the bones.



**SAS Technology:**  
You can reach one high quality standard in your O&P company regardless of experience or current skill level.

Consistent high outcome in O&P socket manufacturing.

# Casting Process with SAS VC System

- ▶ Evaluate limb and take initial measurements



# Casting Process with SAS VC System

- ▶ Wrap plaster cast



# Casting Process with SAS VC System

- ▶ Cast while fully weight bearing



# Casting Process with SAS VC System

- ▶ Check the negative mold



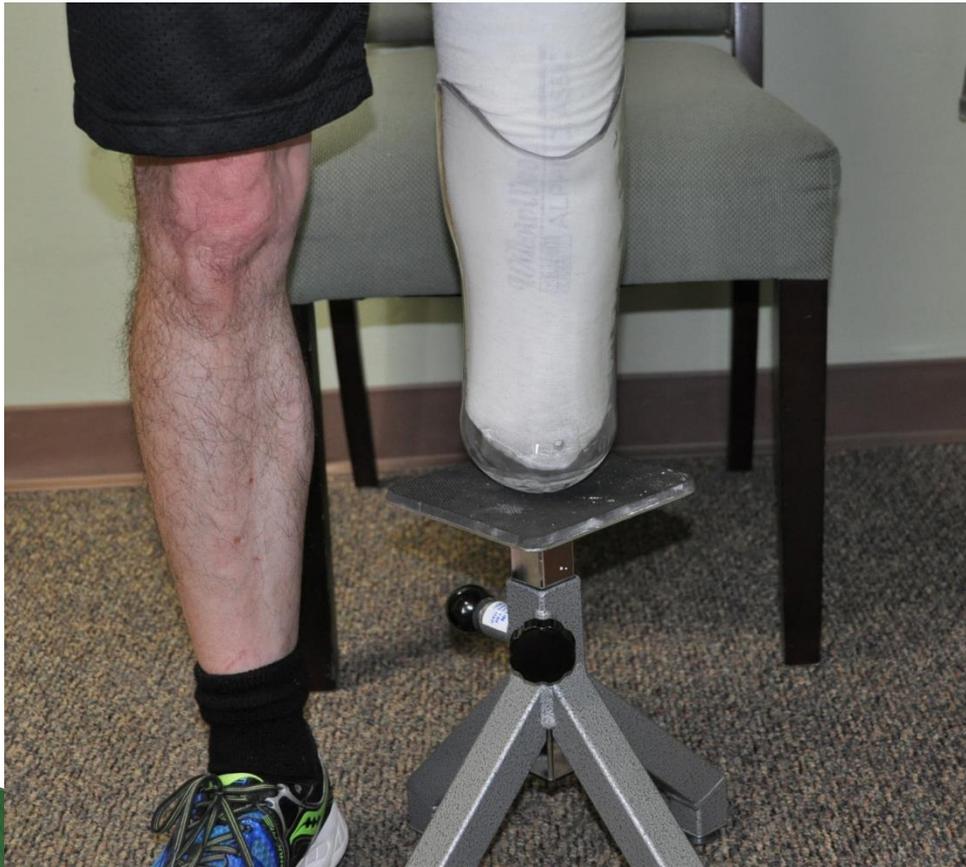
# Casting Process with SAS VC System

- ▶ Plaster cast positive mold



# Casting Process with SAS VC System

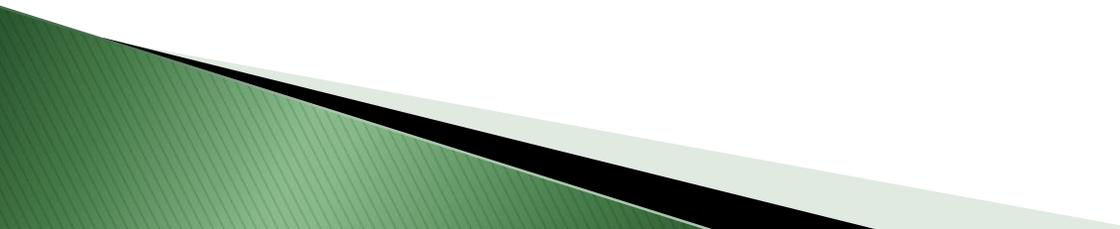
- ▶ Fit and adjust test socket





Symphonie  
VC  
pump system

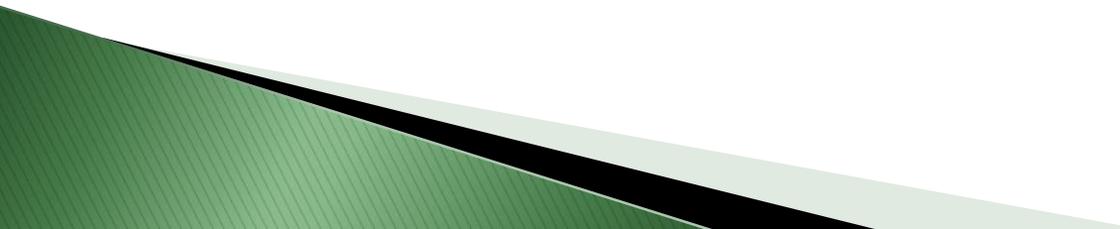
# Symphonie Aqua System Outcomes

- ▶ Over the course of 16 months, my experience shows that we have successfully fit over 300 patients by utilizing just 1 diagnostic test socket per patient 98% of the time.
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# Symphonie Aqua System Outcomes

- ▶ Patient testimonials and scientific outcomes are positive proof that casting patients in a total weight bearing condition significantly improves casting accuracy.

# Lambert Foster

- ▶ Marine Corps Veteran
  - ▶ Amputee since 1991
  - ▶ Active runner
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Questions?