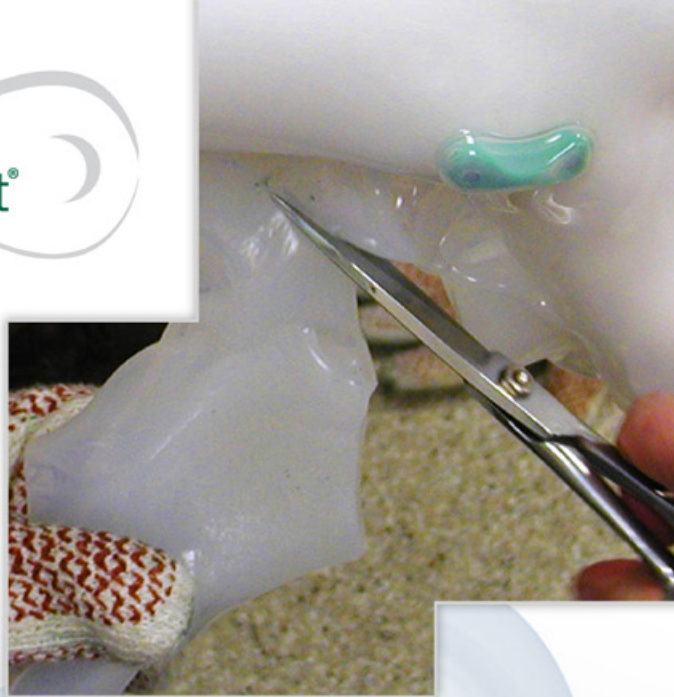


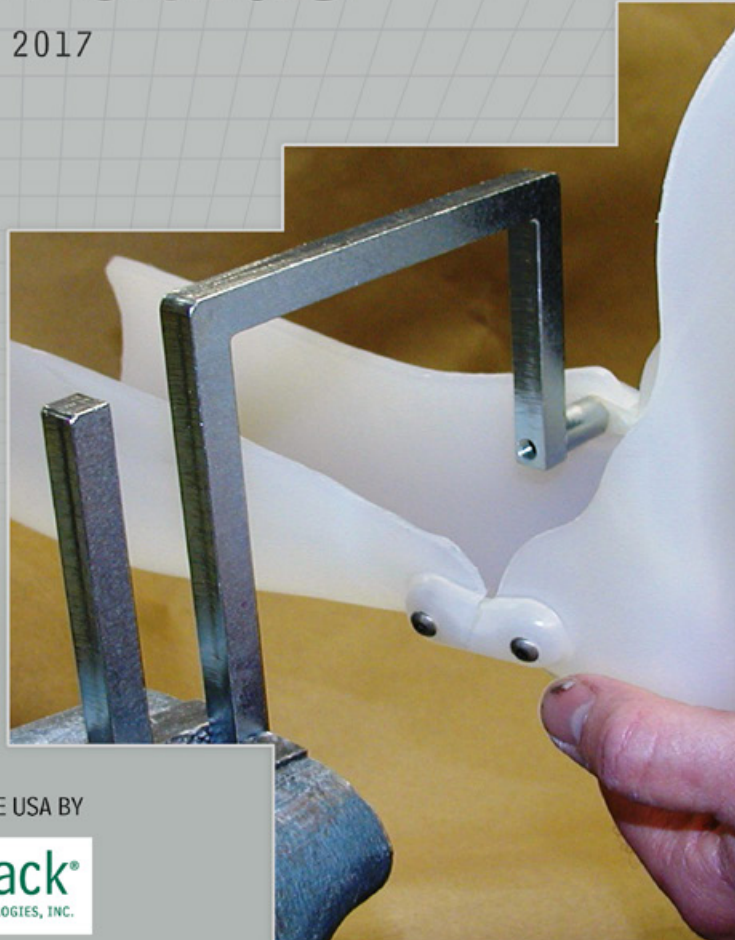


MADE IN MINNESOTA ★ U.S.A. ★



Tamarack • Fabrication Guide

3RD EDITION 2017



MANUFACTURED IN THE USA BY



Tamarack®
HABILITATION TECHNOLOGIES, INC.



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I. Tamarack Flexure Joint Product Overview

Fig. 1 Free Motion (Model 740)

- 85 durometer hardness level
- Available in large, medium, and pediatric sizes
- Choose from natural or black joint color



Fig. 2 Dorsiflexion Assist (Model 742)

- Choose from 75, 85, and 95 durometer dorsiflexion assist levels
- Available in large, medium, and pediatric sizes
- Choose from natural or black joint color



Fig. 3 Variable Assist (Model 743)

- Unique adjustment system provides up to 3x the dorsiflexion assist moment of standard 85 durometer dorsiflexion assist joints
- Available in large and pediatric sizes

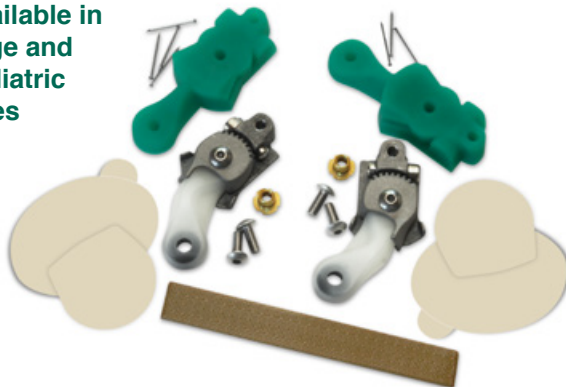


Fig. 4 Tamarack Flexure Joint® Caps (Model 741-CAP)

- Easily convert rigid AFOs to articulating using external mounting cavities
- Available in large, medium, and pediatric sizes
- Choose from Natural or black cap color
- Also available in adjustable assist model to generate additional dorsiflexion assist



Fig. 5 Tamarack Plantarflexion Limiter Kit (Model 741-ML-PF)

- Features a unique medial-lateral mounting system to eliminate shoe fit issues
- Provides continuous adjustment capability to achieve the perfect plantarflexion stop angle.
- Available in large and medium sizes
- Kit includes a set of Tamarack Molding Dummies (reusable approximately a half dozen times)



Fig. 6 Tamarack Flexure Joint Hand Tools (Model T-740)

- **Tamarack Hand Punch (T-740-2)**
Provides quick and accurate hole alignment in joint cavities
- **Tamarack Spanner Wrench (T-740-3)**
Secure flange nut/bushing while installing or removing joints
- **Tamarack Hex Driver (T-740-4)**
A large-handled driver for installing and adjusting metric hardware





Fig. 7
Tamarack Flexure Joint Family

- A Molding Dummies**
3 sizes (the same dummies are used to form all cavities for Free Motion and Dorsi Assist joint applications)

PEDIATRIC

Joint Dimensions
(Length x Width x Thickness)
1.25" x 0.42" x 0.5"
3.175cm x 1.07cm x 1.27cm

- B Free Motion Flexure Joints**
(740 Series)

Available exclusively in 85 durometer

MEDIUM

Joint Dimensions
(Length x Width x Thickness)
1.50" x 0.50" x 0.368"
3.81cm x 1.27cm x 0.93cm

- C Dorsi Assist Flexure Joints**
(742 Series)

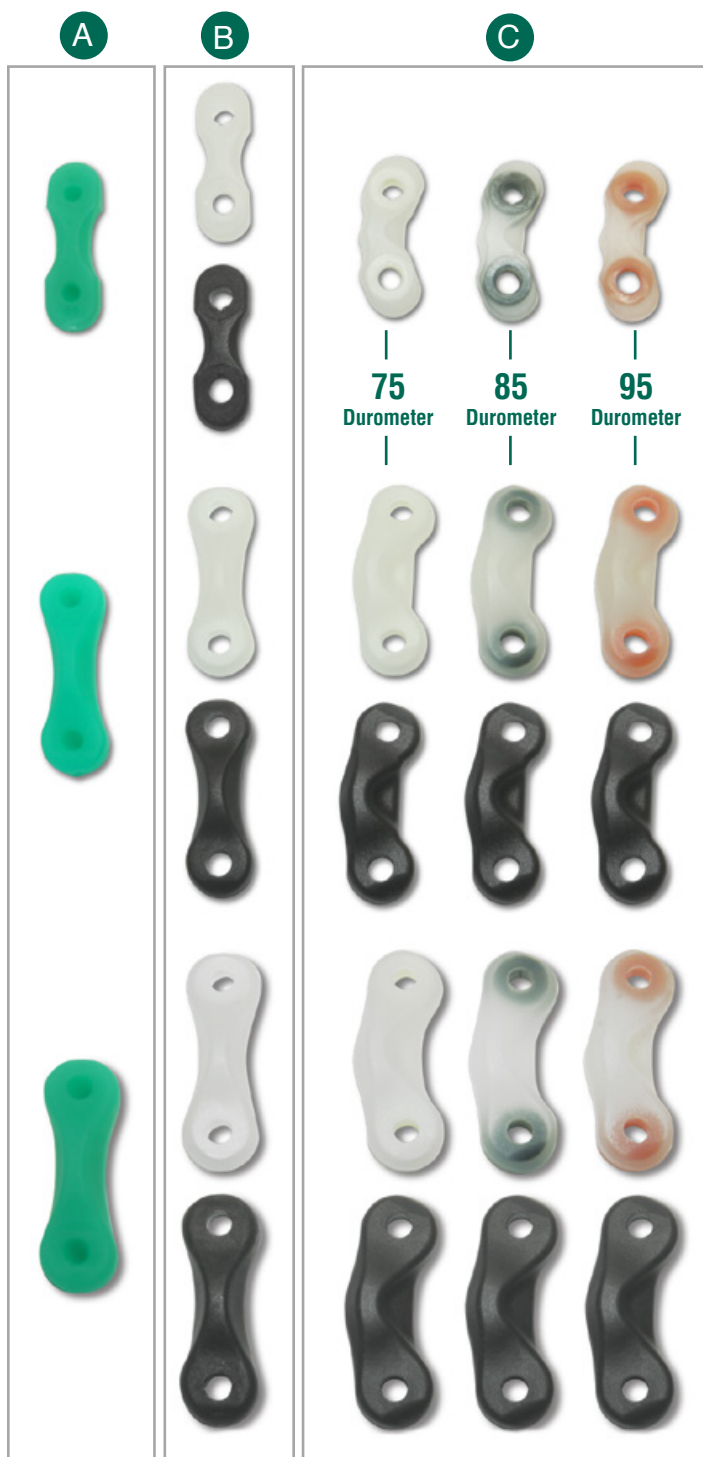
Dorsi Assist Joints are available in 3 durometers
- White collars designate 75 durometer
 - Black collars designate 85 durometer
 - Red collars designate 95 durometer

- D Variable Assist Tamarack Flexure Joints**
(743 Series)
Available in pediatric and large sizes

LARGE

Joint Dimensions
(Length x Width x Thickness)
1.8125" x 0.591" x 0.4140"
4.60cm x 1.50cm x 1.05cm

- E Veterinary Tamarack Flexure Joints**
(VET-65 Series)
Blue collars designate more flexible model for veterinary bracing applications





II. Indications for Use

Tamarack Flexure Joints are ideal for articulating joints in lower and upper extremity orthoses made using thermoformable and thermoset materials.

Tamarack Flexure Joints (TFJ's) work well for several reasons:

- TFJ's are time proven since 1995 to be extremely durable for a wide spectrum of service conditions and users. Tamarack continually monitors durability and pays close attention to this product. Tamarack 100% inspects TFJ's so the customer can depend on quality.
- The Orthotist can choose to use line of progression or anatomical joint alignment. No special attention or fixturing is necessary since the joints automatically co-align to a single axis when installed in pairs.
- The joints are low profile and are available in three sizes.
- There are free motion and motion-assist options available in each size.
- Purchase price is low.
- Fabrication is very easy.

The most common application for TFJ's is at the ankle, but other applications such as at the elbow, wrist and knee are also good applications. 740 and 742 Series joints bend readily but don't elongate when under tension. They allow free dorsi and/or plantar flexion depending on how the orthosis is fabricated. The rotation and transverse stability is excellent and can be optimized by using a well formed cavity and deliberate trim lines to control and support the joint. TFJ's are not designed to withstand high compression loads.

The most common application for the 742 Series joints is to assist ankle dorsiflexion. The 742 Series joints are available in the same three sizes as 740 Series (free motion joints), each with three levels of assistance – 75, 85, and 95 durometer. The joints are easy to distinguish – joints with white collars are 75 durometer, black collars are 85 durometer, and red collars are 95 durometer. The same molding dummy (per size) is used to form the cavity for free motion or motion assist joints. This makes it very easy to interchange the joints to get the desired amount of assist for your patient.

740 and 742 Series joints also work well at knee, elbow and wrist joint locations. The specific motion assist direction is also flexible, so the joints can be used to assist (or resist) flexion or extension of the joint being supported. A good example is when 742 Series joints are used in “reverse” for a dorsiflexion “resist” (plantarflexion assist) moment – Orthotists have reported this to work very well to encourage knee extension (most commonly for children with mild crouch gait conditions).

Another viable application for 742 Series joints is to apply a dynamic contracture resisting force in lower and upper extremity applications.



Example of traditional free motion AFO, featuring Tamarack Plantarflexion Limiter Kit



Example of unilateral Tamarack Flexure Joint installed medially in conjunction with a lateral dorsiflexion/plantarflexion control metal ankle joint.

Photo Courtesy of Coyote Designs



Example of pediatric AFO, in laminated carbon fiber construction, featuring dorsiflexion assist Tamarack Flexure Joints.



Example of anterior stop, posterior entry AFO (used for crouch gait management)

III. Fabrication Procedures

Cavities that optimize the fit and function of the TFJ's should always be fabricated using Tamarack Molding Dummies. The Molding Dummies are designed to eliminate the material gap caused when making the separation cut with a thin blade saw. (See Frequently Asked Questions, #2)

The same Molding Dummy (per size) is used to form the cavity for any Free Motion and any durometer Dorsiflexion Assist Flexure Joints. 742 Series specific fabrication procedure are discussed in Section II.

Fig. 8

Molding Dummies

741-L (Large)

741-M (Medium)

741-P (Pediatric)



NOTICE:

Using the Tamarack Flexure Joints to form the joint cavities is **NOT** recommended.



Preparing Mold and Dummies for Vacuum Forming

1. The mold should be rectified as necessary for orthopedic support and provide needed clearances.



A small additional clearance allowance at the malleoli is recommended when using 742 Series joints (Dorsiflexion Assist) because the joint body bulges slightly as the joint is compressed during loading.

Fig. 9
Pull thin stockinet
over the mold.



2. Pull a thin stockinet over the mold.
3. Determine joint locations and attach molding dummies. Position the molding dummies so the mid-point is located on or near the desired axis of joint motion. Install using shoe tacks. Either mechanical (line of progression) or anatomical joint alignment can be chosen for dummy placement. One of the advantages gained by using the TFJ is that these joints automatically co-align to a single joint axis. This expedites fabrication, allows for design variations (joint axis location), enhances durability, and delivers “no bind” free movement of the articulation.

Fig. 10
Molding dummies will gradually
deform with repeated use. They
should be replaced after about
a half dozen moldings to ensure
consistent joint cavity formation.



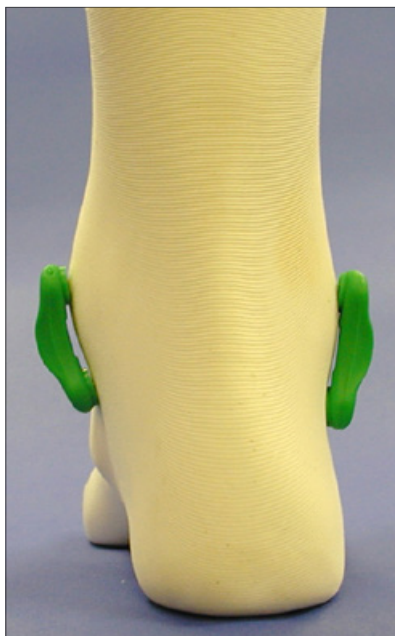


Figs. 11 & 12

Molding dummies can be positioned wherever you prefer to locate the joint axis.

These photos demonstrate the placement for an anatomical joint axis.

These photos show the thin stockinet pulled over the mold before attaching the molding dummies. This method delivers the optimal cavity shape.



Posterior View



Plantar View



Adding plaster or putty around the joint head(s) will help transition between the dummy and the mold in order to prevent plastic from being pulled too far around the dummy during vacuum forming.

Fig. 13 (left photo)

It is quick and easy to roll a skinny “worm” of putty and place it around the joint heads.

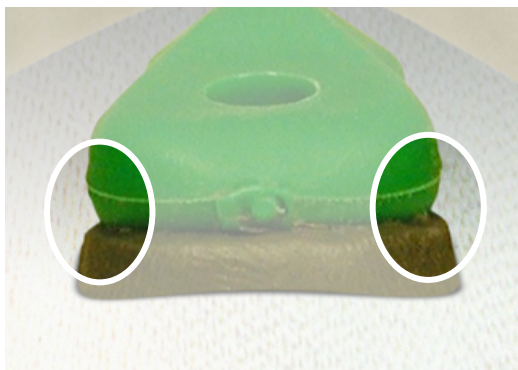
Fig. 14 (right photo)

The center area can be left clear (for the best joint anchorage).



Fig. 15

Allow the inner contours of the dummy to be exposed to allow some plastic to wrap around the dummy.



Stockinet placed over the dummy may make too large a cavity.

If you choose to pull the stockinet over the molding dummies, use very thin or sheer stockinet. Keep the stockinet loose enough to allow it to be pulled down closely where the molding dummy meets the mold (so it does not cause a malformed cavity where the plastic “bridges” reducing anchorage of the joint).



Fig. 16
Typical vacuum
forming process.

4. Vacuum form or laminate to form the orthosis shell.



Fig. 17
Good vacuum forming result
(plastic is pulled tight around
the mold and the molding
dummy.)



**SEE FIGS. 27 – 30 FOR
MORE INFORMATION
ABOUT CAVITY QUALITY**



When plantar flexion control is desired, adding extra material on the posterior of the AFO improves the contact surface.

Fig. 18
Place a bar or disk of hot
plastic across the area
where the separation cut
will be made, centered on the
posterior aspect of the AFO.





5. Allow thermoplastic to cool and harden. Remove the AFO shell from the mold in one piece. An ideal, well formed cavity is formed tightly to securely anchor the flexure joint.

Fig. 19
Rough cut AFO for
removal from mold.



Fig. 20
Removal of AFO shell
from mold.



Fig. 21
It is easy to pull the dummy out
of the cavity by grabbing the
protruding tack with pliers.

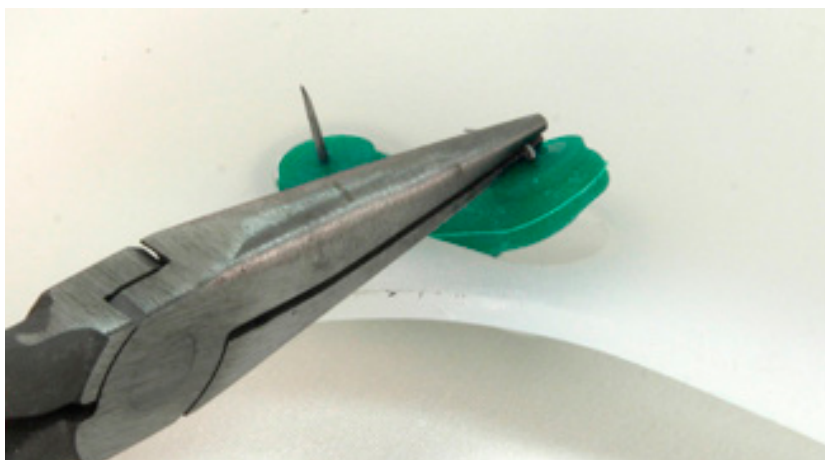




Fig. 22

For optimal results, use a fine tooth blade like a coping saw to make the separation cut. Begin by bisecting the joint cavity.

6. Separate the foot section from the calf section using a thin bladed saw, such as a fine toothed coping saw.

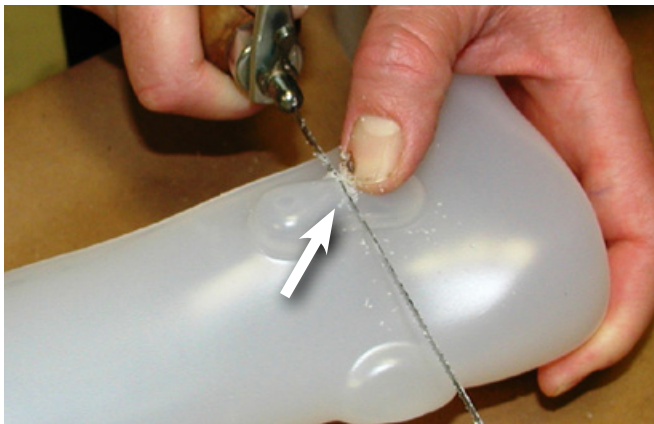


Fig. 23

Continue making the cut through the first cavity extending the cut forward through the anterior side of the AFO.



Fig. 24

Turn the AFO over and cut through the second cavity as you did the first.

Then place the blade into the cuts on both sides and continue to cut to the posterior.

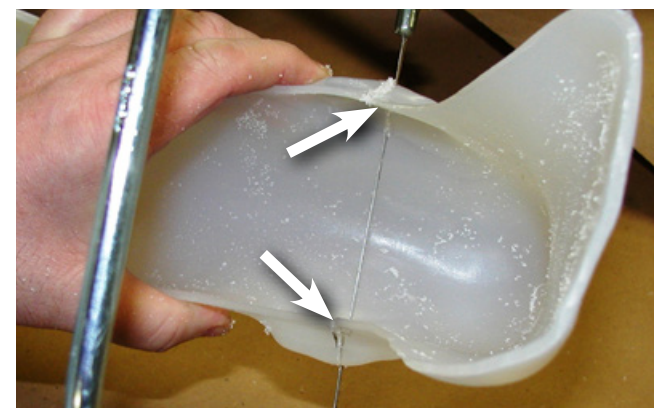


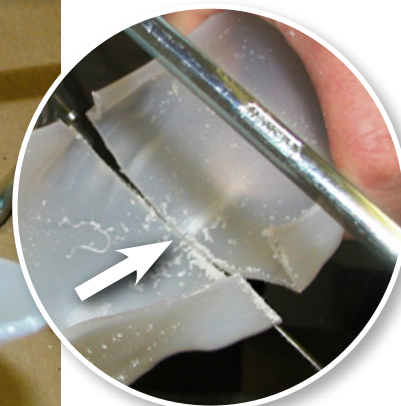
Fig. 25 (left photo)

Keep cutting – the blade will continue to make one smooth line connecting the joint cavities.

As you proceed posteriorly with the cut, make sure to bisect the posterior plantarflexion stop "lump".

Fig. 26 (right photo)

Nearly completed separation cut.





Evaluate Cavity Quality – A snug, well formed and trimmed out cavity optimizes joint function by providing better support and anchorage of the joints in the orthosis. The benefit most noticeable is better control of rotational forces in the transverse plane.

Fig. 27
Cavity formation comparisons

- A. Optimal cavity formation.
- B. Marginal cavity.
- C. Poor cavity.

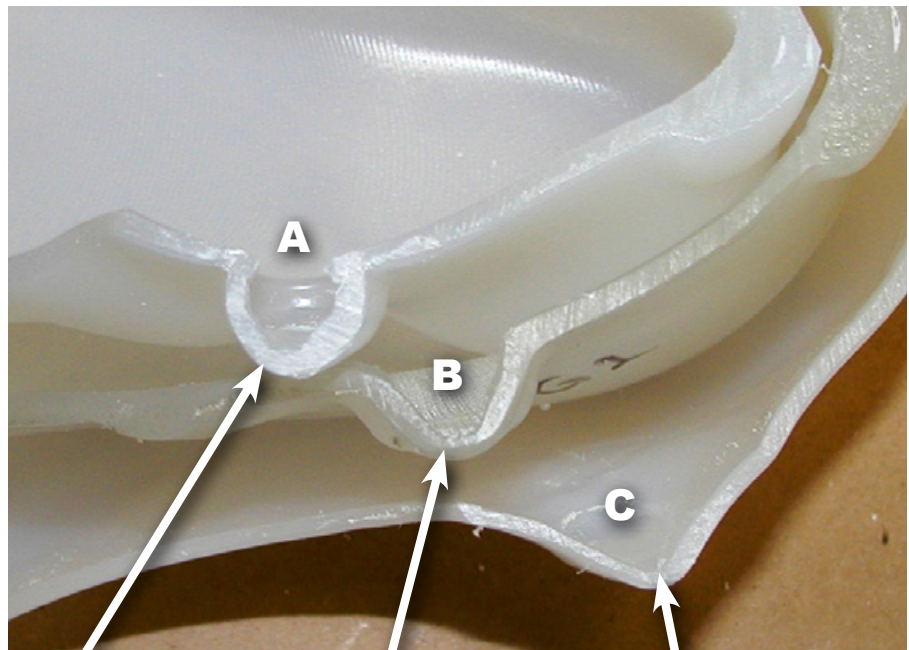


Fig. 28
Optimal cavity formation

There is superior coverage surrounding the joint body giving it maximum support and anchorage in the orthosis. This cavity will maximize the ability of the TFJ to provide the best rotational control.

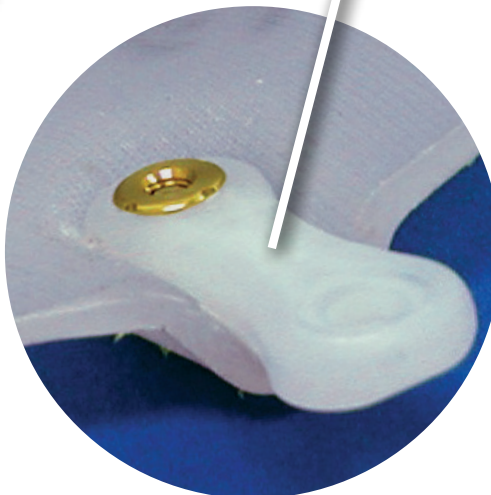


Fig. 29
Marginal cavity formation

Will likely work OK for most applications, but may allow more rotational motion than desired.

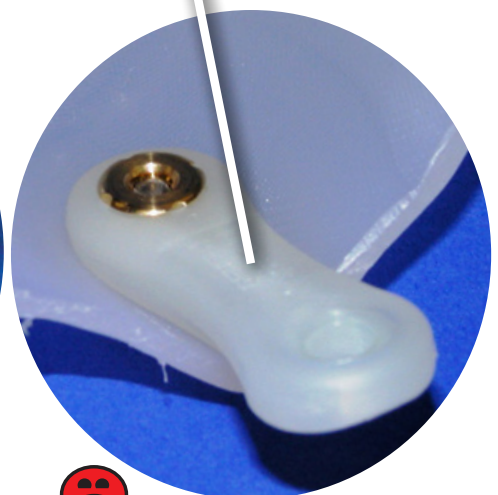


Fig. 30
Poor cavity formation

This cavity will not support or control the flexure joint and is not recommended.



7. Make holes for attachment screws.

The Tamarack Flexure Joint is best anchored when the holes are no larger than necessary for the screws – that means they must line up well. Using a Tamarack Hand Punch allows you to quickly punch the right size hole in the exact location for a perfect fit. Current hand punch tools have an angle guide pin installed to assist with punch orientation.

Fig. 31

We suggest using the Tamarack Hand Punch Tool to make the screw holes sized and precisely located for mounting the flexure joint into the cavity in the AFO.

Free Motion and Dorsi Assist Joints screw hole sizes:

- L = 4.5mm (3/16")
- M = 4.5mm (3/16")
- P = 4.0mm (5/32")



Punch holes before trimming out the cavity to assure a resting point for the guide pin.

Fig. 32

Hand Punch Tool

Part Numbers:

- T-740-2L
- T-740-2M
- T-740-2P



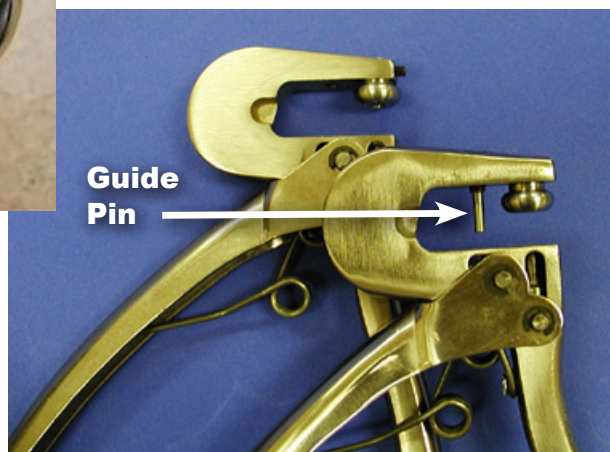

Fig. 33

The cavity is trimmed to show the die and guide pin functions – it is recommended to punch holes **prior** to finishing the cavity.

Fig. 34 (right photo)

Early and current versions of the hand punch. Both work well.

If you have an early version (does not have a guide pin) you need to hold the punch at the correct angle.


Fig. 35 & 36

The jaw of the punch is aligned parallel to the inside of the AFO when correctly positioned (the early punch versions shown here do not have an angle guide pin).

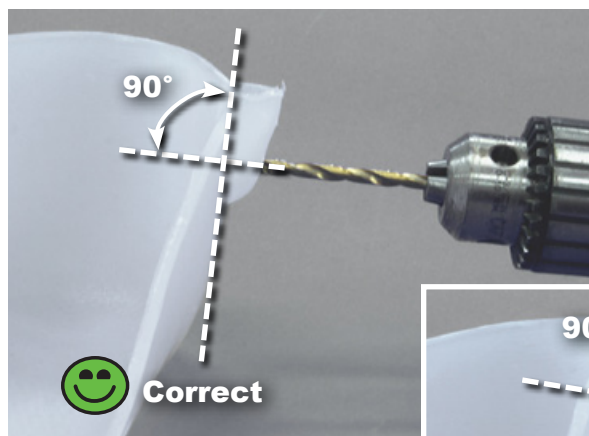


The Tamarack Hand Punch is the quickest, easiest way to make the mounting holes. Use a drill only if the punch is not available.

Fig. 37

Make sure the drill bit alignment (angle/direction) is perpendicular to the **INSIDE** of the AFO.

A detent is formed when molding to assist locating the correct spot.


Fig. 38 (right photo)

This shows the **WRONG** way – the drill is perpendicular to the **OUTSIDE** surface.

The screw holes will not line up well.

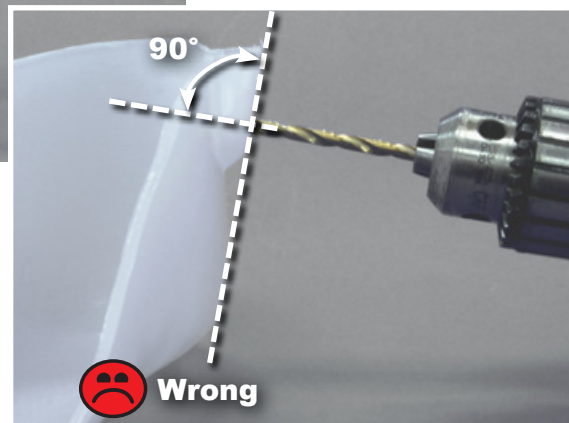


**Fig. 39****740 Series cavity trim-lines**

Grind or sand to round off the four anterior corners forming a small “V” anterior to the midline of the joint cavity to allow dorsiflexion motion.

Make sure the “V” does not extend behind the centerline of the joint cavity.

If plantarflexion motion is desired, the posterior aspect of the cavity can be trimmed like the anterior side, but remove as little plastic (in a wedge) as necessary to allow the calf and foot sections to move without impinging.

SEE FIGS. 47 & 48 TO SEE THE FINAL TRIM-LINE APPEARANCE AFTER ASSEMBLY.

Fig. 40**742 Series cavity trim-lines showing the typical dorsiflexion assist application**

Grind/form a “U” shaped anterior clearance. This makes room for the tension load bearing element of the dorsi assist joint. The tension element is oriented toward one side of the joint to maximize the energy storing/loading capability of the joint.

SEE FIGS. 49 & 50 TO SEE THE FINAL TRIM-LINE APPEARANCE AFTER ASSEMBLY.

8. Trim out the cavity based on free motion (740 Series shown in Fig. 22) or motion assist (742 Series shown in Fig. 23) joints used. For either joint, begin by bisecting the cavity vertically (screw hole to screw hole).

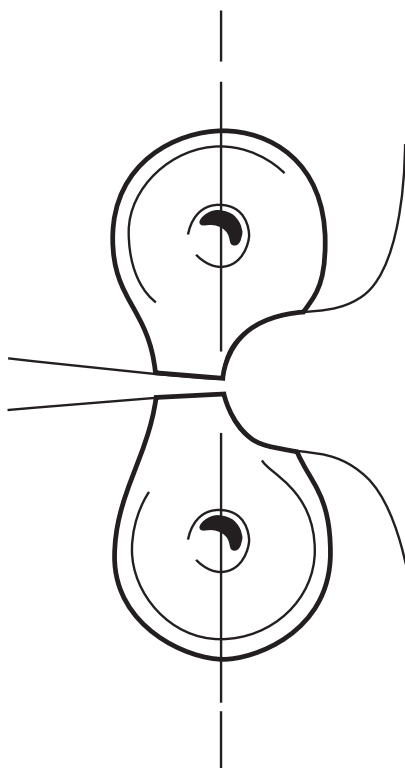
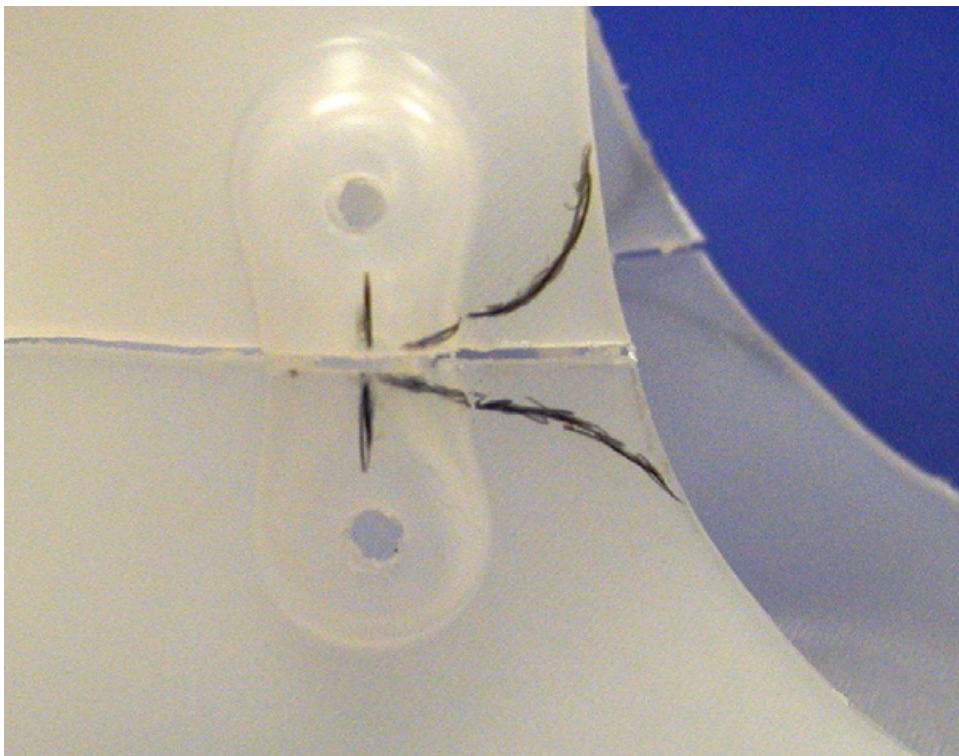




Fig. 41

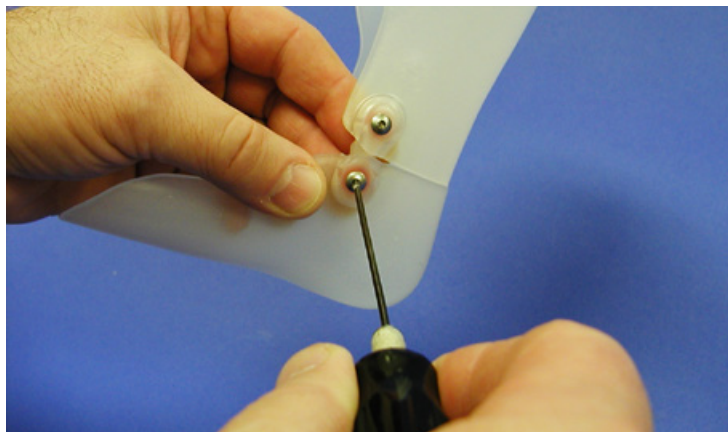
Large handled hex drivers are available to assist assembly (shown here).

Hex Drivers Part Numbers:

Large and Medium joints:
T-740-4LM

Pediatric joints:
T-740-4P

9. Install the joints into the cavities with the hardware supplied with the package. Use a thread locker to prevent the hardware from loosening. Loctite® 242 removable is recommended.



Hardware cautions: The screws must not protrude into the AFO in order to avoid contact with the skin. Optional screw hardware is available (**SEE FIG. 63**).

Fig. 42 (exploded view)

Make sure that the screw does not protrude into the orthosis, but is at least half way through the flange nut.



Screw is properly installed



Fig. 43

This screw is **too long** and could cause injury to the skin (a longer screw would be even more hazardous!)

(740 Series application shown)



Screw is protruding too far!

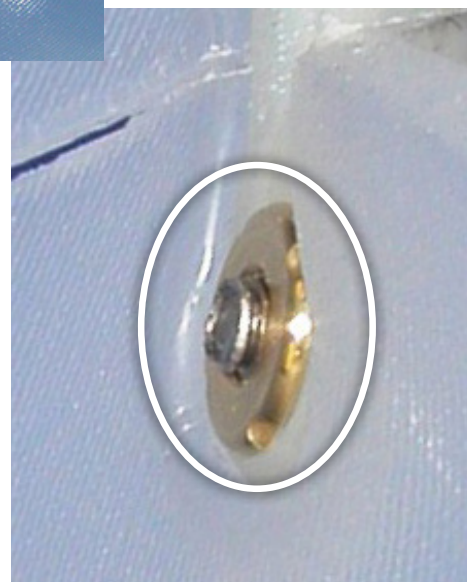



Fig. 44

Spanner Tool prongs match with the flange nut functioning as a wrench against the flange nut to easily loosen the screw.

The Spanner Tool is not usually needed during installation. Check to make sure the threads have not crossed if the screw is hard to turn.

Spanner Tool Part Numbers:

Large and Medium joints:
T-740-3LM
Pediatric joints:
T-740-3P

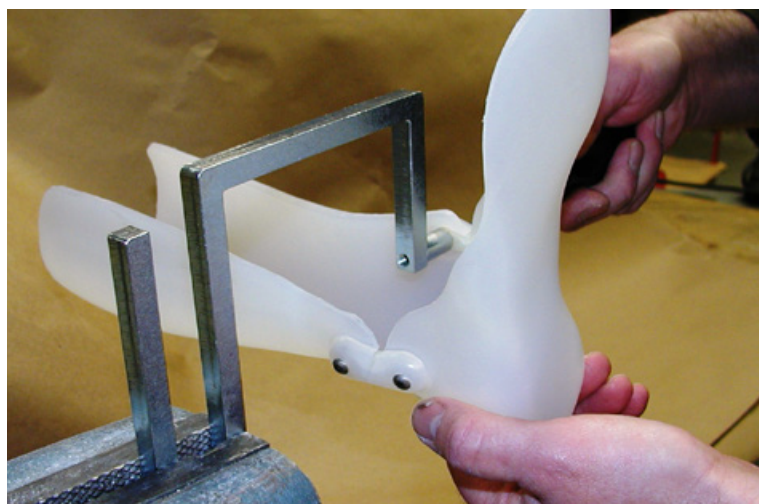
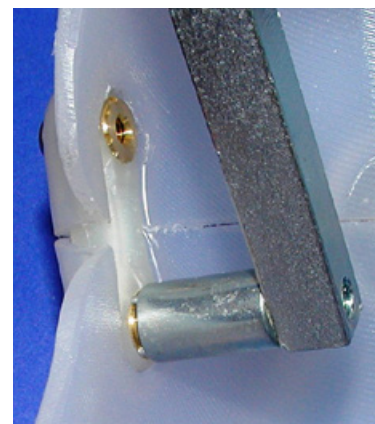
**SEE FIGS. 59-62 FOR
ALTERNATIVE APPLICATION
EXAMPLES.**

Fig. 45

The Spanner Tool can be hand held, but it is most useful when mounting it in a vice as shown, providing good visibility and leverage.

The Hex Driver being used is hidden by the foot section of the AFO.

The **Spanner Tool** is a wrench developed specifically to match up with the Tamarack Flexure Joint flange nut (same for 740 and 742 Series joints). There is one sized for Large and Medium joints (T-740-3LM) and another for Pediatric joints (T-740-3P).



The Spanner Tool is especially helpful when installing dorsi assist joints into an AFO design that limits motion. (See Fig. 46 & Figs. 59-62)

Fig. 46

Install the joints in either the foot section or the calf section. When installing the remaining side, it is very difficult to get the screw started by hand because the joint needs to be "preloaded".

With the Spanner Tool held in a vice, it will back up and hold the flange nut as you firmly push the AFO and screw against it as shown.

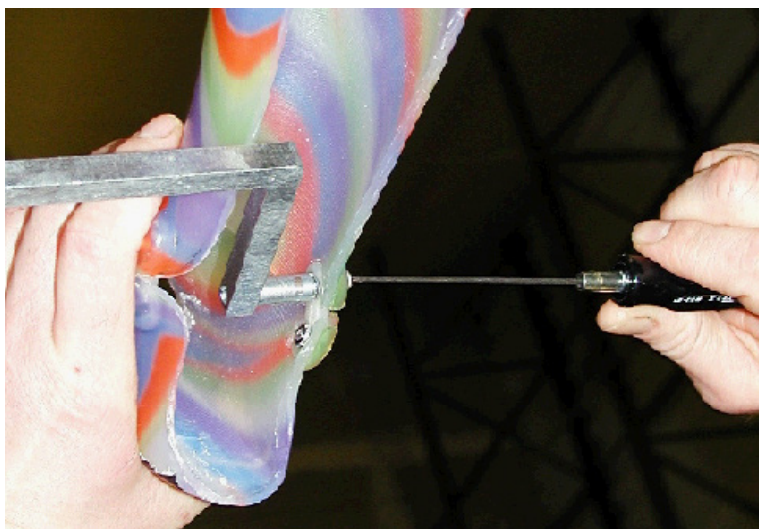




Fig. 47 & 48

Completed free motion (740 Series) joint installation

Properly installed 740 Series joints will show no gapping along the separation cut except for the “V” shaped anterior clearance area.

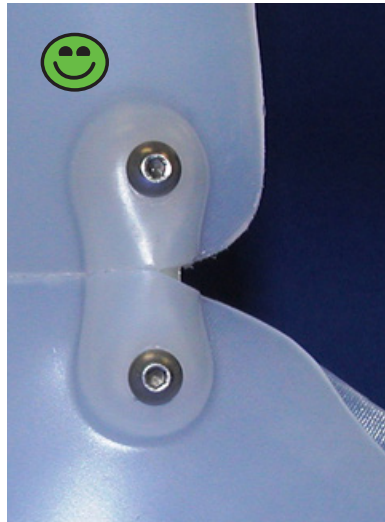


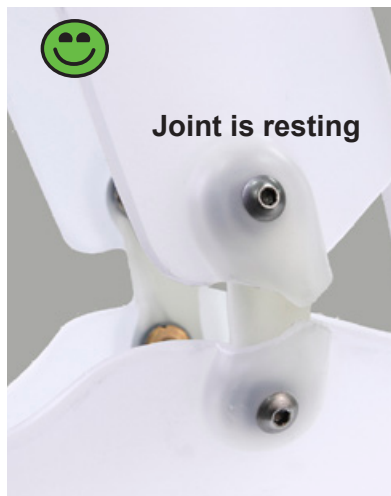
Fig. 49

Completed dorsiflexion assist (742 Series) joint installation.

Anterior portion of cavity trimmed properly to allow for the tension load bearing element in the joint.

Fig. 50

Posterior portion of cavity fully covers the dorsiflexion assist joint when it is fully loaded.



View when ankle is dorsiflexed



View when ankle is plantarflexed



TIP

We recommend installing a strap to limit dorsiflexion to avoid excessive dorsiflexion power acting at the end of anatomical dorsiflexion range, especially when joints with high moments of assist are used.

Fig. 51

If you use a limiting strap, set the length of the strap to just less than the patient's ROM. A Dacron strap is supplied in all sizes of 95 durometer motion assist packages for this optional purpose.



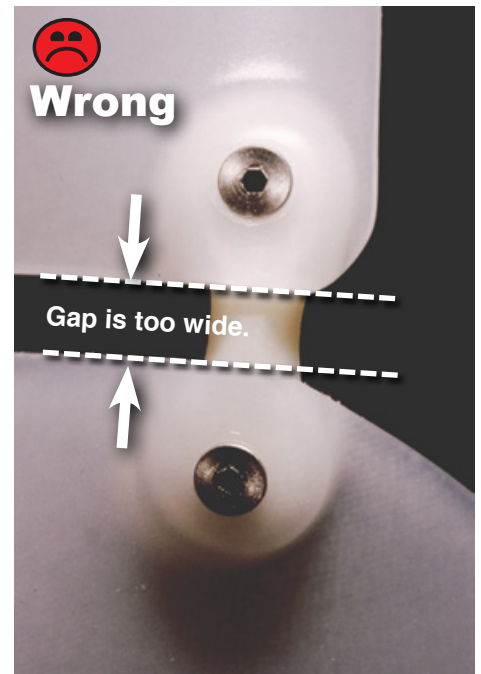
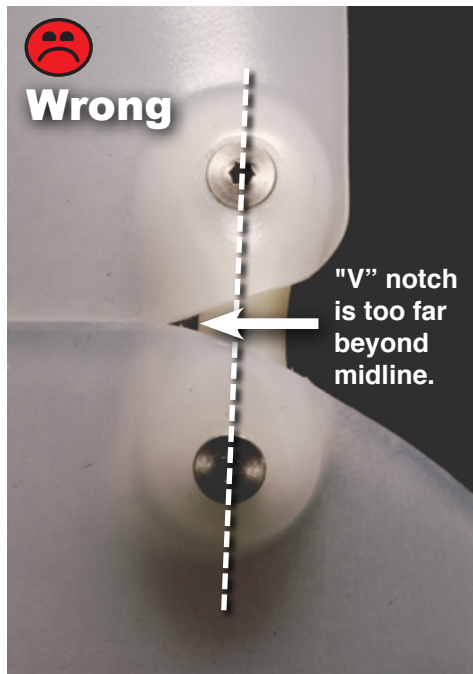


Poor Anchoring Conditions

Too much material has been removed reducing joint anchorage in these examples.

Fig. 52 (left photo)
"V" notch goes posterior to the cavity midline.

Fig. 53 (right photo)
Too wide a gap between foot and calf sections.



Fabrication of the joint cavity area is simple, but optimal results are possible if only a minimal amount of material is removed during fabrication

Fig. 54 (left illustration)
Illustrates rotational forces being placed on the joint.

Fig. 55 (right photo)
Demonstrates this effect in an AFO (the joint is not elongating).

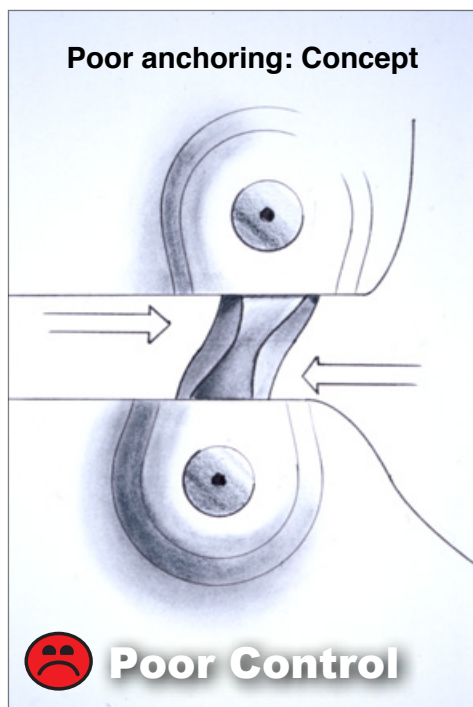




Fig. 56

Cosmetic patches made with ShearBan® make excellent covers to keep the orthosis and joint area clean.

Now available in black color option.

10. Install cosmetic patches



11. If the AFO limits plantarflexion, apply the Tamarack silencer pad to reduce clicking noise during gait when the planter stop surfaces contact each other.

Fig. 57

These simple pads can be adhered to either the calf or foot section.



Fig. 58

Replacement silencer pads are included.





Alternative Application Example #1

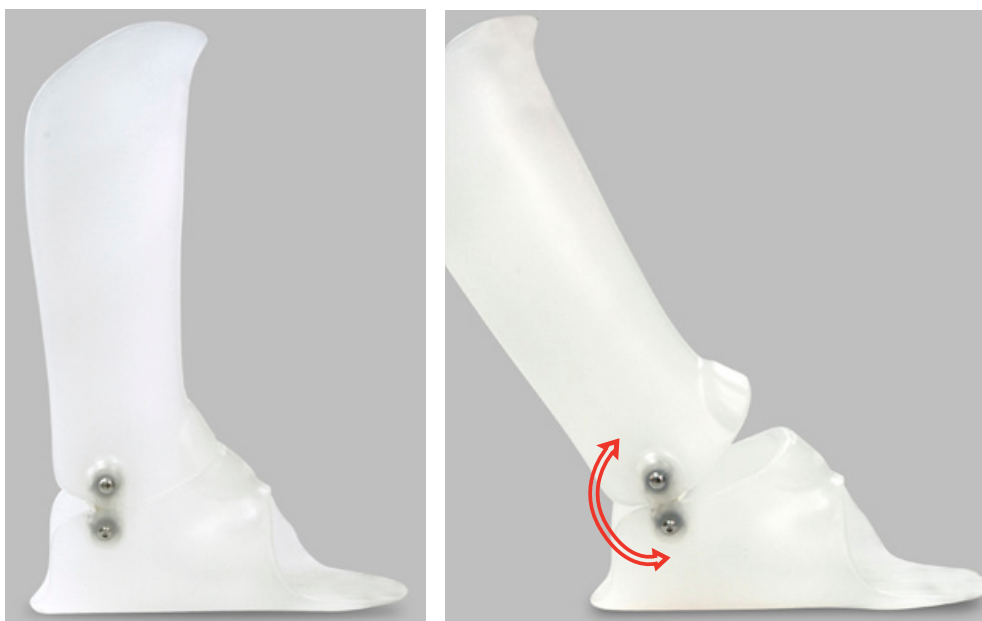
Fig. 59 (left photo)

The rigid anterior stop delivers a firm knee extension moment (floor reaction force). Dorsiflexion assist (shown in Fig. 59) or free motion joints can be used as needed, and are capable of withstanding the tension forces present during 2nd and 3rd rocker.

Fig. 60 (right photo)

Dorsiflexion assist joints load during plantarflexion. As the gait cycle progresses into swing phase the energy is released assisting ankle dorsiflexion.

Use the installation technique shown in Fig. 46 when dorsiflexion range is limited (if using 742 Series joints, they will be loading slightly during installation).



Dorsiflexion Assist (rigid anterior stop)

Alternative Application Example #2

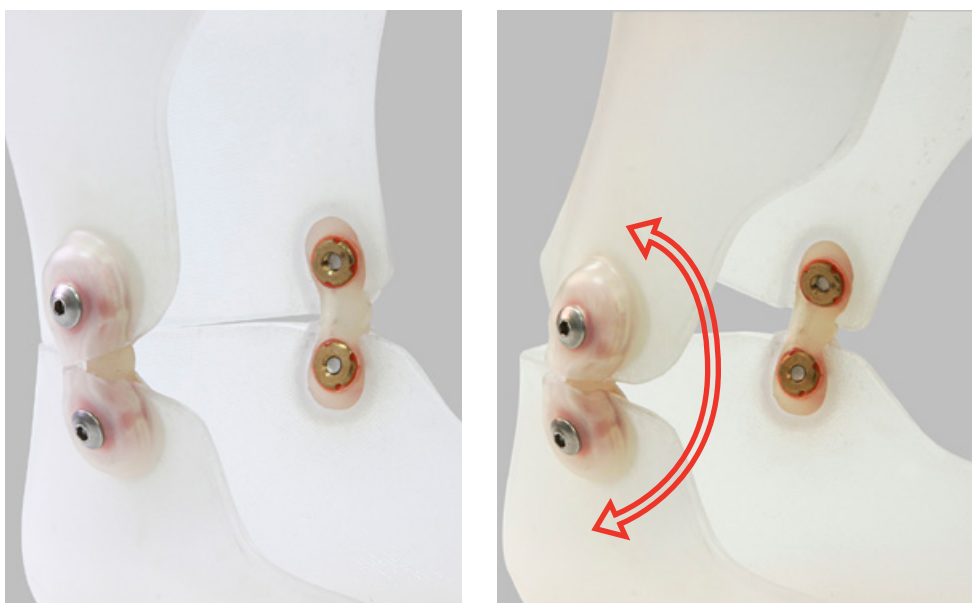
Fig. 61 (left photo)

742 Series joints installed in “reverse” of typical dorsiflexion assist application

Fig. 62 (right photo)

The joints provide a gentle knee extension moment. This design is reported to be very useful when working with children that have mild CP “crouch gait” conditions.

Use the installation technique shown in Fig. 46 if plantar flexion motion is limited (the joints will be loading slightly during installation)



Dorsiflexion Resist



IV. Retrofit Articulating AFO Fabrication using Tamarack Flexure Joint Caps

Tamarack Flexure Joint Caps (Part No. 741-CAP) provide the ability to convert an existing solid AFO to articulating by securing externally mounted joint cavities to the brace, eliminating time and expense associated with fabricating an entirely new articulating AFO. Each package contains a drill guide and mounting hardware to make fabrication and joint installation easy.

Tamarack Flexure Joint Caps can be used with both free motion and dorsi-assist Tamarack Flexure Joints and are available in two models.

Adjustable Assist Tamarack Flexure Joint Caps provide orthotists the opportunity to further increase dorsiflexion forces (by up to 20%), either during initial patient fitting or at a future time; enhancing the dorsiflexion forces delivered by Dorsiflexion Assist Tamarack Flexure Joints.



Fig. 63 Standard Model

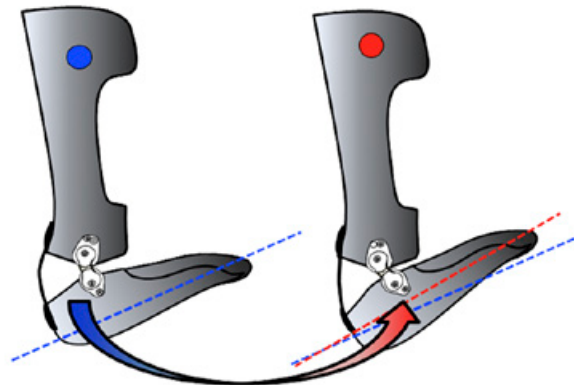


Fig. 64 Adjustable Assist Model



Fig. 65 Drill Guide Template

V. Tamarack® Plantarflexion Motion Limiter Kit

New from Tamarack, the Plantarflexion Motion Limiter Kit features a unique, dual side-mount design which eliminates shoe fit concerns associated with posterior-mounted motion limiters. Continuous adjustability is provided through a pair of stainless steel set screws formed medially and laterally, adjacent to the joint cavities.

The Tamarack Plantarflexion Limiter Kit has been tested to exceed 2 million steps; ensuring the same long-lasting durability you've come to expect from Tamarack Flexure Joints.

Fig. 66

The Tamarack Plantarflexion Limiter Kit can be used with either thermoplastic or laminated materials.

Each kit includes a pair of Tamarack Flexure Joint Molding Dummies, reusable up to approximately six times.

Joints sold separately.



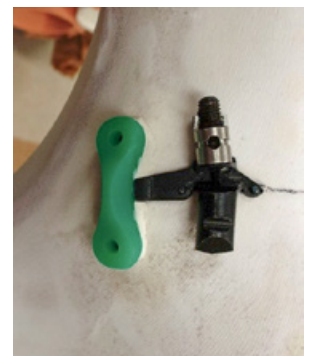
Fig. 67

Included in each kit, the plantarflexion limiter assembly mounts immediately posterior to the joint dummy on the plaster cast prior to thermoforming or lamination. The plantarflexion limiter assembly is designed to establish the necessary distance away from the molding dummy to ensure proper placement.

Once the orthosis is removed from the cast, remove the molding dummies as usual; leaving the plantarflexion limiter assembly in place. Separate the calf and footplate segments of the orthosis as usual, keeping the plantarflexion stop assembly in place.

Utilize the threaded screw to adjust the plantarflexion stop angle to the desired position.

Refer to the Tamarack Plantarflexion Limiter Kit Instructions for Use for comprehensive step-by-step instructions and photos.





VI. Tamarack® AFO Component Ordering Guide

5 PACKS CONTAIN 5 PAIR OF JOINTS AND
ONE SET OF REUSABLE MOLDING DUMMIES

TAMARACK FLEXURE JOINT / FREE MOTION

PART NUMBER	DESCRIPTION	SIZE	BODY COLOR	COLLAR COLOR	DUROMETER	UNIT
740-L	Tamarack Flexure Joint - Free Motion	Large	Natural or Black	White	85	Pair or 5 Pack
740-M	Tamarack Flexure Joint - Free Motion	Medium	Natural or Black	White	85	Pair or 5 Pack
740-P	Tamarack Flexure Joint - Free Motion	Pediatric	Natural or Black	White	85	Pair or 5 Pack

TAMARACK FLEXURE JOINT / MOLDING DUMMIES

PART NUMBER	DESCRIPTION	SIZE	BODY COLOR	COLLAR COLOR	DUROMETER	UNIT
741-L	Tamarack Flexure Joint Molding Dummies	Large	Green	n/a	n/a	Pair or 5 Pack
741-M	Tamarack Flexure Joint Molding Dummies	Medium	Green	n/a	n/a	Pair or 5 Pack
741-P	Tamarack Flexure Joint Molding Dummies	Pediatric	Green	n/a	n/a	Pair or 5 Pack

TAMARACK FLEXURE JOINT CAPS / STANDARD MODELS

PART NUMBER	DESCRIPTION	SIZE	BODY COLOR	COLLAR COLOR	DUROMETER	UNIT
741-CAP-L	Tamarack Flexure Joint Caps - Standard Model	Large	Natural or Black	n/a	n/a	Set
741-CAP-M	Tamarack Flexure Joint Caps - Standard Model	Medium	Natural or Black	n/a	n/a	Set
741-CAP-P	Tamarack Flexure Joint Caps - Standard Model	Pediatric	Natural or Black	n/a	n/a	Set

TAMARACK FLEXURE JOINT CAPS / ADJUSTABLE ASSIST MODELS

NEW!

PART NUMBER	DESCRIPTION	SIZE	BODY COLOR	COLLAR COLOR	DUROMETER	UNIT
741-CAP-ADJ-L	Tamarack Flexure Joint Caps - Adjustable Assist Model*	Large	Natural or Black	n/a	n/a	Set
741-CAP-ADJ-M	Tamarack Flexure Joint Caps - Adjustable Assist Model*	Medium	Natural or Black	n/a	n/a	Set
741-CAP-ADJ-P	Tamarack Flexure Joint Caps - Adjustable Assist Model*	Pediatric	Natural or Black	n/a	n/a	Set

*Provides up to 20% additional assist per side, when used with dorsiflexion assist joints (sold separately)

TAMARACK PLANTARFLEXION LIMITER KITS

NEW!

PART NUMBER	DESCRIPTION	SIZE	BODY COLOR	COLLAR COLOR	DUROMETER	UNIT
741-ML-PFL	Tamarack Plantarflexion Limiter Kit	Large	n/a	n/a	n/a	Pair
741-ML-PFM	Tamarack Plantarflexion Limiter Kit	Medium	n/a	n/a	n/a	Pair

TAMARACK FLEXURE JOINT / DORSIFLEXION ASSIST

PART NUMBER	DESCRIPTION	SIZE	BODY COLOR	COLLAR COLOR	DUROMETER	UNIT
742-L-75	Tamarack Flexure Joint - Dorsiflexion Assist	Large	Natural or Black	White	75	Pair or 5 Pack
742-L-85	Tamarack Flexure Joint - Dorsiflexion Assist	Large	Natural or Black	Black	85	Pair or 5 Pack
742-L-95	Tamarack Flexure Joint - Dorsiflexion Assist	Large	Natural or Black	Red	95	Pair or 5 Pack
742-M-75	Tamarack Flexure Joint - Dorsiflexion Assist	Medium	Natural or Black	White	75	Pair or 5 Pack
742-M-85	Tamarack Flexure Joint - Dorsiflexion Assist	Medium	Natural or Black	Black	85	Pair or 5 Pack
742-M-95	Tamarack Flexure Joint - Dorsiflexion Assist	Medium	Natural or Black	Red	95	Pair or 5 Pack
742-P-75	Tamarack Flexure Joint - Dorsiflexion Assist	Pediatric	Natural	White	75	Pair or 5 Pack
742-P-85	Tamarack Flexure Joint - Dorsiflexion Assist	Pediatric	Natural	Black	85	Pair or 5 Pack
742-P-95	Tamarack Flexure Joint - Dorsiflexion Assist	Pediatric	Natural	Red	95	Pair or 5 Pack

TAMARACK FLEXURE JOINT / VARIABLE ASSIST

PART NUMBER	DESCRIPTION	SIZE	BODY COLOR	COLLAR COLOR	DUROMETER	UNIT
743-L	Tamarack Flexure Joint - Variable Assist	Large	Natural	Black	85	Pair
743-P	Tamarack Flexure Joint - Variable Assist	Pediatric	Natural	Black	85	Pair



TAMARACK FLEXURE JOINT / HARDWARE

PART NUMBER	DESCRIPTION	SIZE	METAL TYPE	LENGTH	QTY/PACK
740-1LM-6	Lg. & Med. Flexure Joint Screws (Shortest) - For part no. 741-CAP	M4 x 0.7	Stainless steel	6 mm.	20/50/100
740-1LM-7	Lg. & Med. Flexure Joint Screws (Short)	M4 x 0.7	Stainless steel	7 mm.	20/50/100
740-1LM-9	Lg. & Med. Flexure Joint Screws (Standard) - For part nos. 740 and 742	M4 x 0.7	Stainless steel	9 mm.	20/50/100
740-1LM-10	Lg. & Med. Flexure Joint Screws (Long) - For part no. 741-CAP	M4 x 0.7	Stainless steel	10 mm.	20/50/100
740-1LM-12	Lg. & Med. Flexure Joint Screws (Longer)	M4 x 0.7	Stainless steel	12 mm.	20/50/100
740-1LM-14	Lg. & Med. Flexure Joint Screws (Longest)	M4 x 0.7	Stainless steel	14 mm.	20/50/10
740-1P-5	Pediatric Flexure Joint Screws (Short) - For part no. 741-CAP	M3.5 x 0.6	Stainless steel	5 mm.	20/50/100
740-1P-7	Pediatric Flexure Joint Screws (Standard) - For part nos. 740 and 742	M3.5 x 0.6	Stainless steel	7 mm.	20/50/100
740-1P-10	Pediatric Flexure Joint Screws (Longer) - For part no. 741-CAP	M3.5 x 0.6	Stainless steel	10 mm.	20/50/100
740-1P-12	Pediatric Flexure Joint Screws (Longest)	M3.5 x 0.6	Stainless steel	12 mm.	20/50/100
740-1LM-9-TR	Lg. & Med. Flexure Joint Truss Head Screw	M4 x 0.7	Zinc-plated steel	9 mm.	20/50/100
740-1P-7-TR	Pediatric Flexure Joint Truss Head Screw	M3.5 x 0.6	Zinc-plated steel	7 mm.	20/50/100
740-2LM	Lg. & Med. Flexure Joint Flange Nut/Bushing	M4	Brass	n/a	20/50/100
740-2LM-Long	Lg. & Med. Flexure Joint Caps Flange Nut/Bushing - For part no. 741-CAP	M4	Black Brass	n/a	20/50/100
740-2P	Pediatric Flexure Joint Flange Nut/Bushing	M3.5	Brass	n/a	20/50/100

TAMARACK FABRICATION TOOLS

PART NUMBER	DESCRIPTION	SIZE	UNIT
T-740-2L	Tamarack Hand Punch	Large	Each
T-740-2M	Tamarack Hand Punch	Medium	Each
T-740-2P	Tamarack Hand Punch	Pediatric	Each
T-740-2LRK	Tamarack Hand Punch Refurbishing Kit	Large	Kit
T-740-2MRK	Tamarack Hand Punch Refurbishing Kit	Medium	Kit
T-740-2PRK	Tamarack Hand Punch Refurbishing Kit	Pediatric	Kit
T-740-3LM	Tamarack Spanner Wrench	Large/Medium	Each
T-740-3P	Tamarack Spanner Wrench	Pediatric	Each
T-740-4LM	Tamarack Hex Driver (2.5 mm)	Large/Medium	Each
T-740-4P	Tamarack Hex Driver (2.0 mm)	Pediatric	Each

Kit contains:
Replacement Punch • Die • Attachment Pins

TAMARACK CLEVISPHERE™ JOINT

PART NUMBER	DESCRIPTION	SIZE	BODY COLOR	UNIT
747-L	Tamarack Clevisphere Joint	Large	Stainless steel	Pair

AFO SILENCER PADS + SHEARBAN® SHEETS & PATCHES

PART NUMBER	DESCRIPTION		QUANTITY	DIMENSIONS	COLOR	UNIT
740-SIL	AFO Silencer Pad		20 pack	n/a	Black	Pack
749-740	ShearBan Cosmetic Patches		12 patches	1.25" round	Beige	Pack
749-740-BLK	ShearBan Cosmetic Patches New Color!		12 patches	1.25" round	Black	Pack
749-7	ShearBan Rivet Cover Patches	Standard	138 patches	3/4" round	Beige	Pack
749-7-BLK	ShearBan Rivet Cover Patches New Color!	Standard	138 patches	3/4" round	Black	Pack
749-7-XL	ShearBan Rivet Cover Patches New Size!	Extra Large (XL)	84 patches	15/16" round	Beige	Pack
749-7-XL-BLK	ShearBan Rivet Cover Patches New Size + Color!	Extra Large (XL)	84 patches	15/16" round	Black	Pack
749-BE	ShearBan Sheets		5 pack	8" x 12"	Beige	Box
749-BL	ShearBan Sheets		5 pack	8" x 12"	Blue	Box
749S-BE	ShearBan Single Sheet		1 pack	8" x 12"	Beige	Box
749S-BL	ShearBan Single Sheet		1 pack	8" x 12"	Blue	Box
749-OV12-BE	ShearBan Pre-Cut Large Oval Patch Box	Large	12 pcs.	1.75" x 2.75"	Beige	Box
749-OV12-BL	ShearBan Pre-Cut Large Oval Patch Box	Large	12 pcs.	1.75" x 2.75"	Blue	Box



VII. Frequently Asked Questions

1. Q: What L-codes should I use for billing?

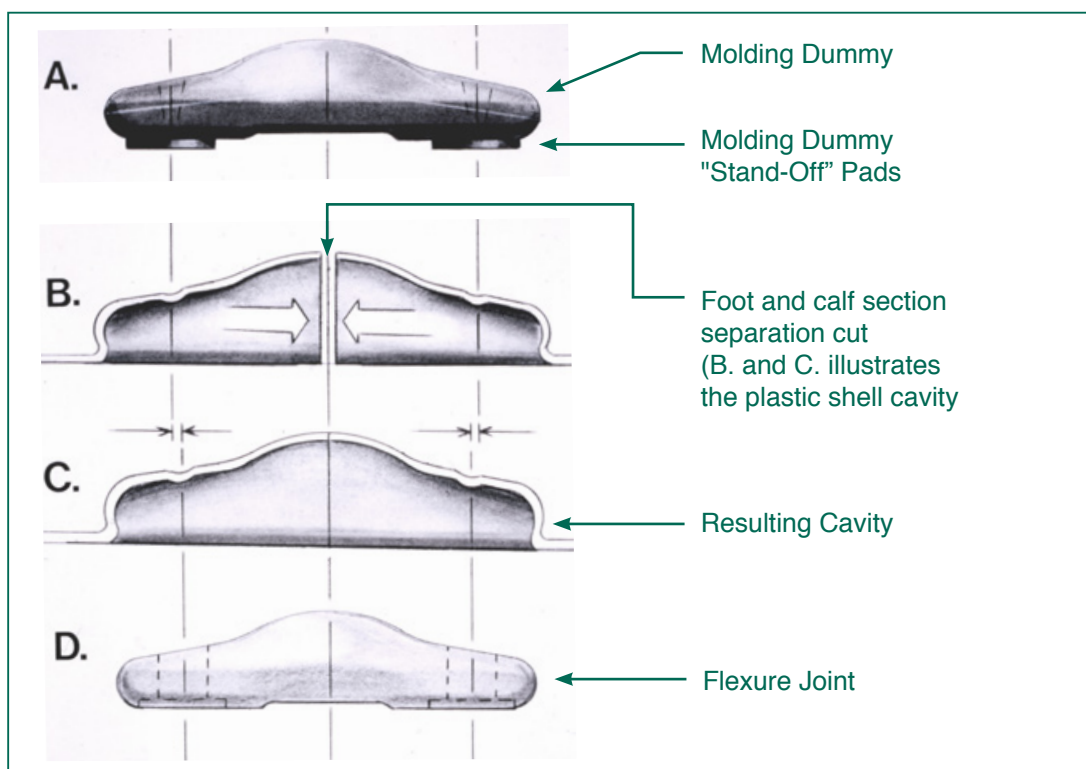
A: L - code suggestions for providers in the US can be found at www.tamarackhti.com.

2. Q: Why should I use molding dummies?

A: It does not damage the Tamarack Flexure Joint to use it in the vacuum forming process. However, plastic forming (either vacuum forming or lamination) with the actual joint creates risks and sacrifices you may not be willing to make – the net result is reduced product performance, especially in the transverse plane (rotational forces);

- The molding dummy stand-off pads allow the hot plastic to pull in around the flexure for best support.
- The stand-off pads also ensure that the joint and its mounting hardware will be recessed for better skin clearance.
- The molding dummies accommodate the material that is removed when cutting the foot and calf sections apart during AFO fabrication (see diagram below). Using a thick or jagged blade (like a cast saw) removes more material than what the dummies are designed to accommodate.
- There is some chance that you could damage the joint when prying it out of the cavity, or knick it when doing trimming processes.

Fig. 68



3. Q: How do I select the joint size for my client? Is weight the determining factor?

A: There are no weight guidelines because Tamarack Flexure Joints are not weight bearing joints (such as some prosthetics components) and there are multiple variables (activity level and functional requirements) that have little to do with body weight. When the AFO is controlling motion (e.g.; limiting plantar flexion) tension loading is the highest force that will be placed on the ankle joints. While body weight is a factor, functional activities and activity level will influence tension loading more than body weight alone. The tension load bearing element within the joint is designed to be so strong that the plastic shell will fracture before the Tamarack Flexure Joint will pull apart. A good rule of thumb is to select the joint size and AFO plastic thickness based on the activity level while considering the physical size of the client.



4. Q: How do I select the durometer of dorsi assist?

- A. This is something that takes some practice since there is no cookbook answer. Gait analysis (clinical observation) and muscle strength are two primary factors to help guide durometer selection. Within each size range, all durometers and free motion joints can be combined for a wide range of assist. Other factors that will guide you include patient size and flexibility /range of the ankle joint.

5. Q: My patient complains of Achilles tendon soreness when using dorsi assist joints - Why?

- A. If dorsiflexion range is not limited the dorsi assist function may place an excessive stretch on the Achilles tendon. Try installing a limiter strap on the orthosis at, or just short of, the limit of the patient's range of motion. Doing this will not affect gait and will prevent the stretch from becoming painful. **SEE FIG. 51** to see an example.

6. Q: Can I use 742 Series joints installed “backwards”?

- A. Sure. They can assist motion in either flexion or extension as you need or want - these joints allow you to be creative. **FIG'S 61-62** show an example.

FIG'S 44-46 provide tips on installing joints when they must be “pre-loaded” in these types of applications while being installed.

7. Q: I notice that my dorsi assist joints seem to lose power after a while – Why?

- A. There is a property called “cold flow” that occurs in all materials, and is very evident in polyurethanes, which Tamarack Flexure Joints are made of. As the joint is compressed the material gradually moves away from the compression resulting in what you notice as a loss of power over time. The initial loss occurs very rapidly (within 1 or 2 dozen gait cycles) – we consider this a normal “break-in of the dorsi assist joints. After break in, the joints stabilize with assistance reduction continuing very slowly. It may make sense to use a slightly stronger moment of assistance.

We are studying the “cold flow” phenomenon using a machine we designed and built at Tamarack. Using this machine, we continue to look for the best materials and processing methods to improve the joints performance.

8. Q: I cannot get the 742 Series (dorsiflexion assist) joint to fit into the cavity; is there something wrong with the molding dummy or with the joint?

- A1. If you are using the “typical” dorsiflexion assist application, it may help to remove more material from the “U” shaped anterior cavity opening. (See the “U” section trim line referred to in **Fig. 40 and Fig's. 49 & 50**)
- A2. It is very difficult to install 742 Series joints if you are incorporating them into an “alternative application” (See examples shown in **Fig's. 59-62**) because the joints must be “loaded” during installation. **Fig's. 44-46** describe a technique using the Spanner Tool that makes this much easier.

9. Q: How do I modify the AFO to make it wider in the ankle area? (e.g.; widen the area to relieve for malleolus contact or to make a growth adjustment)

- A1. If the medial malleolus is contacting the medial aspect of the Tamarack Flexure Joint or other parts of the AFO shell, here is a simple solution to try before heating and bulging; place a medial wedge under the calcaneus (inside the AFO) – this will often relieve the medial malleolus. If this does not work, or you need to make the AFO shell wider for other reasons, try option A2.
- A2. Leave the Tamarack Flexure Joints mounted in the AFO. Heat the surrounding area (except for directly on the cavity area) and push outwards as though it is a solid ankle AFO.



10. Q: Is there a Tamarack joint option to provide adjustable dorsi assistance?

A: Yes, with a product called the “Tamarack Variable Assist™” (model numbers 743-L and 743-P). The Tamarack Variable Assist (TVA) allows a practitioner or therapist to easily adjust the assist moment while the individual is wearing the orthosis. The joint can be set to decrease the assist moment to almost zero (nearly free motion) or to increase the assist moment up to nearly double the assist moment power provided by the 85 durometer dorsi assist joint alone.

The adjustability and variety of assist moments available makes the TVA joint a good candidate to consider for contracture applications, as well as for dynamic, changing conditions requiring fine tuning to optimize gait. More information about the Tamarack Variable Assist joint can be found on the Tamarack website: (http://www.tamarackhti.com/joints/variable_assist.asp).

11. Q: I’ve found it difficult to form a good cavity when using molding dummies to fabricate a carbon fiber orthosis– are there other options?

A: Our new Tamarack Flexure Joint Caps™ make it very easy to articulate an orthosis when using carbon or other layup processes to form the shell. The caps are “perfect cavities” that anchor the Tamarack Flexure Joints (free motion or dorsi assist models) to the side of the orthosis shell. More information about the Tamarack Flexure Joint Caps can be found on the Tamarack Website: (<http://www.tamarackhti.com/joints/caps.asp>).

12. Q: Is it possible to articulate an existing solid ankle orthosis?

A. Yes, the Tamarack Flexure Joint Caps™ also make it easy to articulate an existing AFO (see previous question).

13. Q: Can Tamarack joints be used for pet orthotics and prosthetics?

A: Yes! The regular line of Tamarack Flexure Joints is well known as being excellent choices for use in animal orthotic and prosthetic devices. Because of the need for increased flexibility for some animal applications, Tamarack has developed a line of veterinary Tamarack Flexure Joints, designed specifically for animal orthotics and prosthetics. See www.animaloandp.com for more information about veterinary orthotic and prosthetic applications.

Veterinary Tamarack Flexure Joints are not recommended for a human lower extremity orthosis because of the enhanced torsional flexibility. However, there may be unusual human situations or requirements where additional flexibility is desired. In such cases, there is nothing about the design or materials which would contraindicate use of Veterinary Tamarack Flexure Joints for human use. Veterinary Tamarack Flexure Joints are available from Becker Orthopedic and other O&P distributors.

VIII. Additional Resources

Website: www.tamarackhti.com

E-mail: info@tamarackhti.com

Phone: 1.763.795.0057 (Toll free in the continental USA is 1.866.795.0057)

Fax: 1.763.795.0058

Publications/Journals Authored by Marty Carlson, CPO, FAAOP: www.martycarlson.com

Additional Tamarack Product Guides: ShearBan Product Guide, Clevisphere Product Guide



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