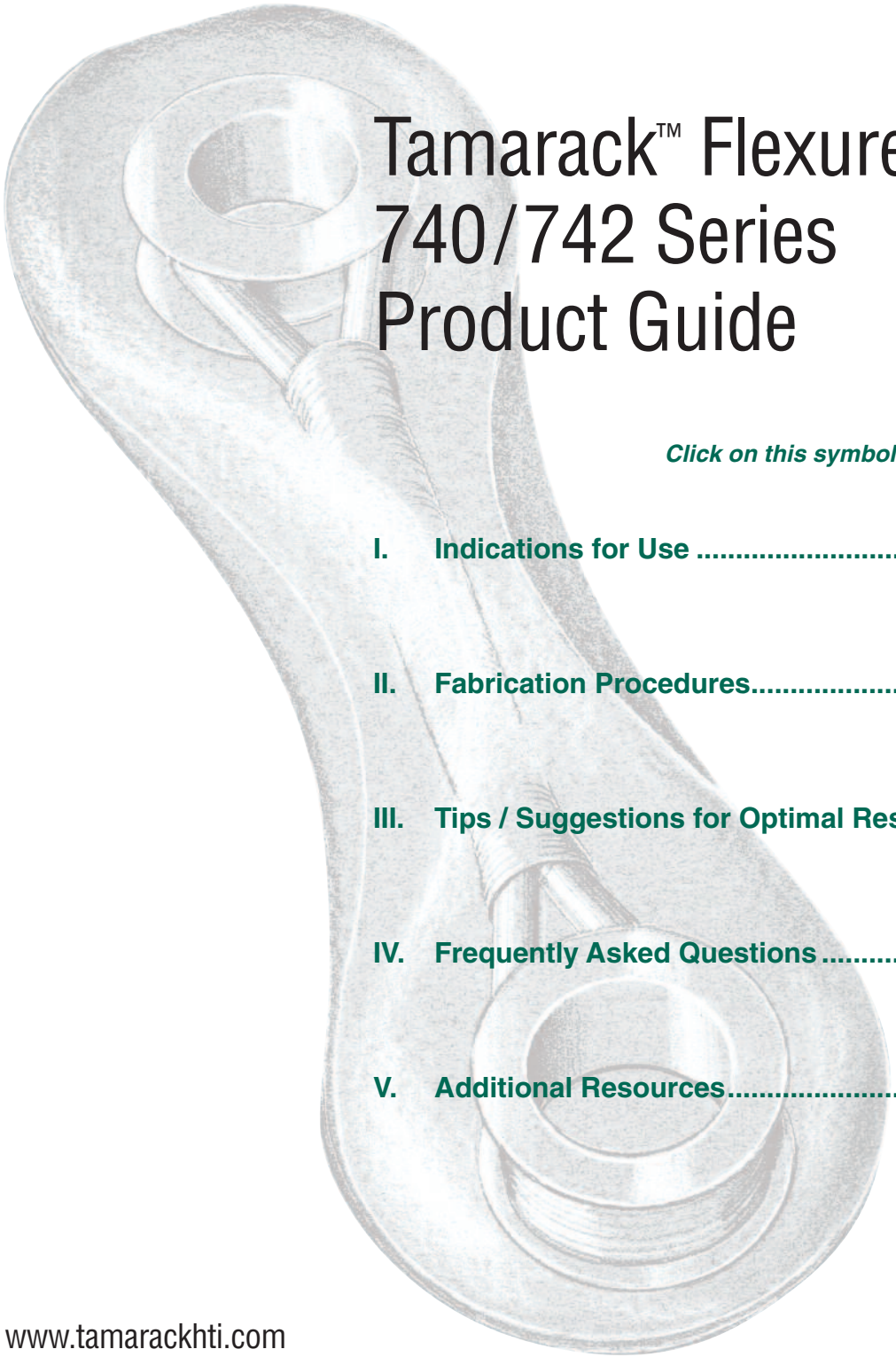
Tamarack™
HABILITATION TECHNOLOGIES, INC.



Tamarack™ Flexure Joint 740/742 Series Product Guide

Click on this symbol to jump to referenced page

Tamarack Flexure Joints™ 740 Series (Free Motion)

Fig. 1

740 Series Package Contents

- Free motion flexures
- Fasteners (screws and flange nuts)
- Cosmetic patches (ShearBan®)
- Silencer patches
- Assembly / installation instructions

Tamarack Flexure Joints™ 742 Series (Dorsiflexion Assist)

Fig. 2

742 Series Package Contents

- Motion assist flexures (typical application is for assisting dorsiflexion)
- Fasteners (standard size screws and flange nuts)
- Cosmetic patches (ShearBan®)
- Limiter strap included in 742-L, M, and P-95 kits
- Assembly / installation instructions

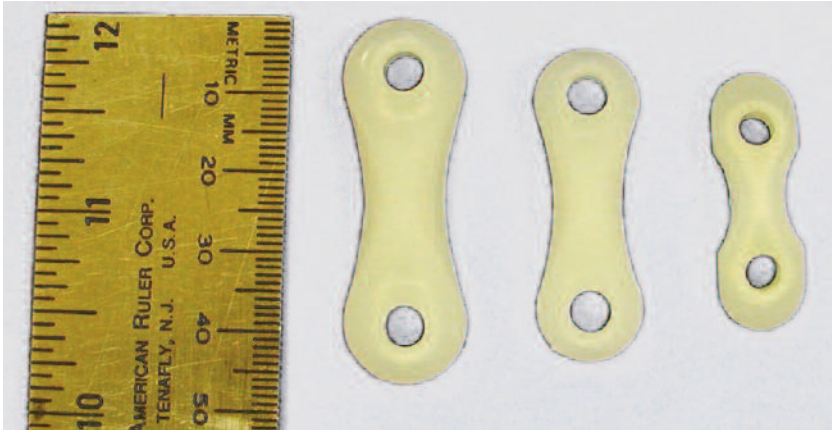


Fig. 3
Joint sizes – L-M-P
(740 Series shown)

Fig. 4

Tamarack™ Flexure Joint Family

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

B **Large, Medium and Pediatric Flexures** (740 Series)

C **Large, Medium and Pediatric Dorsi Assist Flexures** (742 Series)

Dorsi Assist Flexures are available in 3 durometers

- White collars designate 75 Durometer joints
- Black collars designate 85 Durometer joints
- Red collars designate 95 Durometer joints

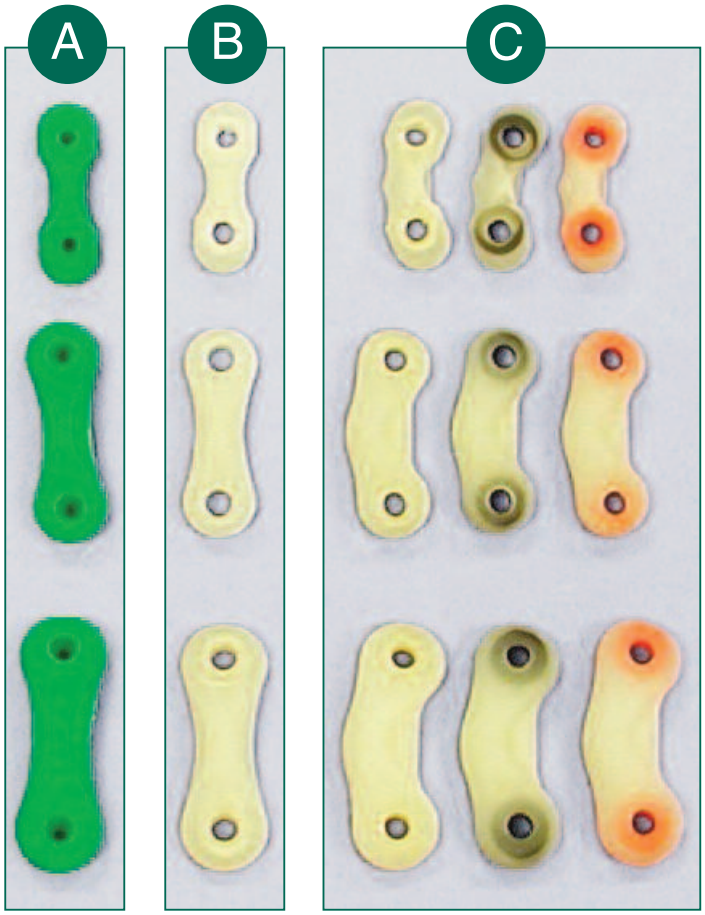


Fig. 5

Note about Tamarack Flexure Joint Product Identification

All Tamarack Flexure Joints are made exclusively by Tamarack Habilitation Technologies, Inc. and are subjected to continual rigorous testing and inspections to assure the highest quality and performance. There are other products that resemble the TFJ – in appearance but not performance! Confirm the authenticity of the joint by looking for the Tamarack name and LOGO on the joint and in the package.

I. Indications for Use

Tamarack™ Flexure joints are ideal for articulating joints in lower and upper extremity orthoses made using thermo-formable and thermo-set 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 HTI continually monitors durability and pays close attention to this product. Tamarack HTI 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 are famous for the degree of tension control they provide – they bend readily but do not elongate when under tension. They allow free dorsi and/or plantar flexion depending on how the orthosis is fabricated. The 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.

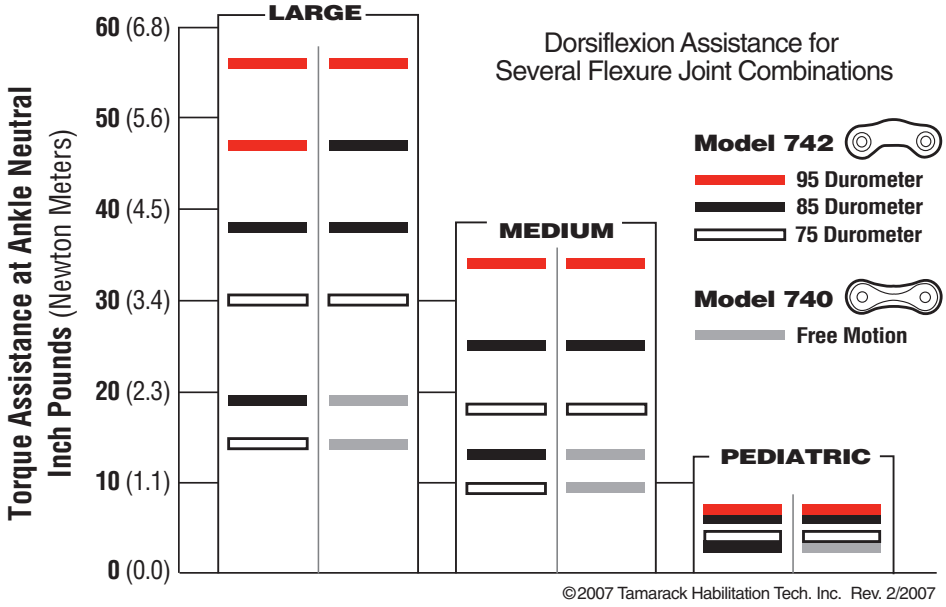


Fig. 6

Moment Chart
Note the interchangeability possibilities in each size range.

The moment of assist value shown on this chart indicates the amount of force generated when the ankle is at 90˚.

II. Fabrication Procedures

1. Cavities that optimize the function of the TFJ's should be generated using Tamarack™ 741-L, M, or P molding dummies. The molding dummies are designed to eliminate the material gap caused when making the separation cut with a **thin** blade saw.

   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. 2 (see "Note"), Fig. 23 in II.7, Fig. 30- 32 in II.8 and II.11.

Fig. 7

Molding Dummies
741-L (Large)
741-M (Medium)
741-P (Pediatric).

Fig. 8
741 Package Contents.

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

***Note: 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.

SEE FIGS. 39 – 44 IN SECTION III “TIPS / SUGGESTIONS FOR OPTIMAL RESULTS” FOR MORE INFORMATION ON PREPARING MOLD AND DUMMIES FOR VACUUM FORMING.

Fig. 10
Next, position the molding dummies so the mid-point is located on or near the desired axis of joint motion. Install using shoe tacks.

Note: Molding dummies will gradually “moosh” down with repeated use. They should be replaced after about 10 moldings or when you observe the stand off pads to have compressed.

SEE SECTION IV “FREQUENTLY ASKED QUESTIONS” “WHY SHOULD I USE MOLDING DUMMIES”

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

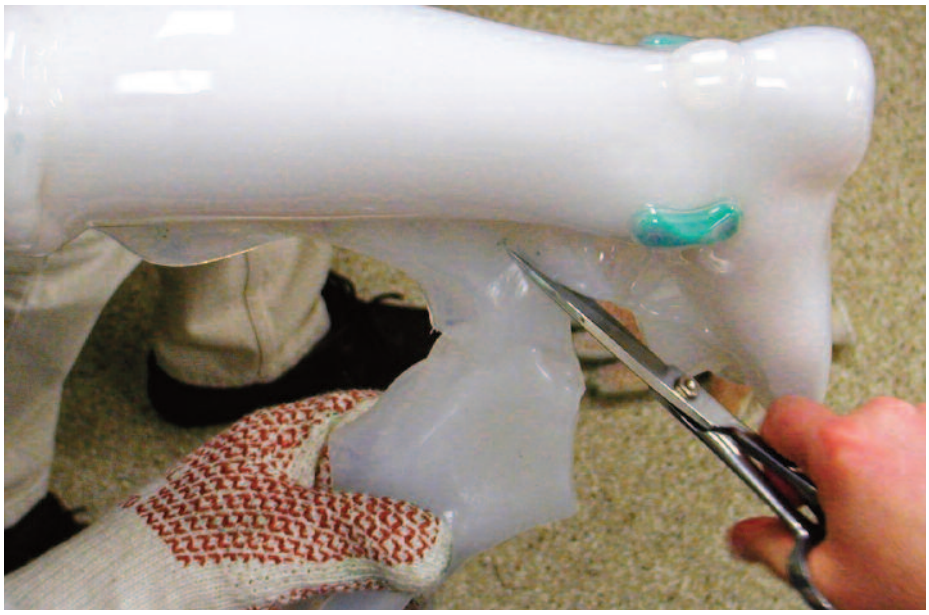


Fig. 11
Typical vacuum forming process.

Fig. 12
Good vacuum forming result (plastic is pulled tight around the mold and the molding dummy.)

SEE SECTION III "TIPS / SUGGESTIONS FOR OPTIMAL RESULTS" FOR MORE INFORMATION ABOUT CAVITY QUALITY

4. Allow thermosetting to occur (cooling). Remove the AFO shell from the mold in one piece. An ideal, well formed cavity is formed tightly to securely anchor the flexure joint.

SEE SECTION III "TIPS / SUGGESTIONS FOR OPTIMAL RESULTS" FOR MORE INFORMATION ABOUT DUMMY USE

Fig. 13
Rough cut AFO for removal from mold.

Fig. 14
Removal of AFO shell from mold.

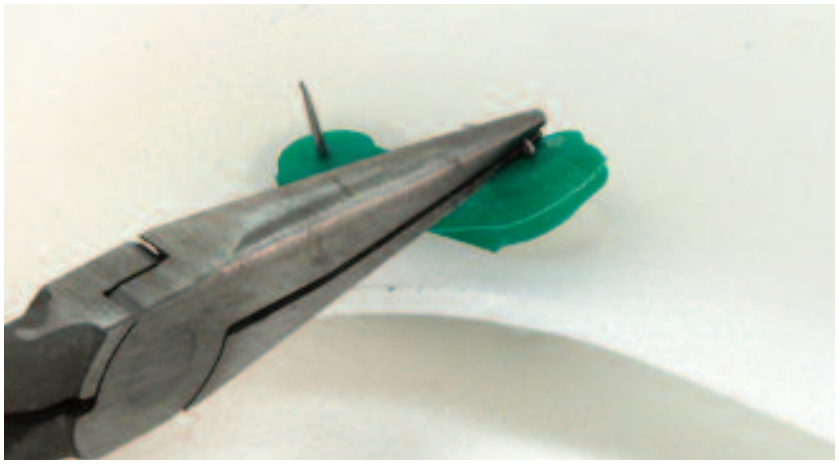


Fig. 15
It is easy to pull the dummy out of the cavity by grabbing the protruding tack with pliers.

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

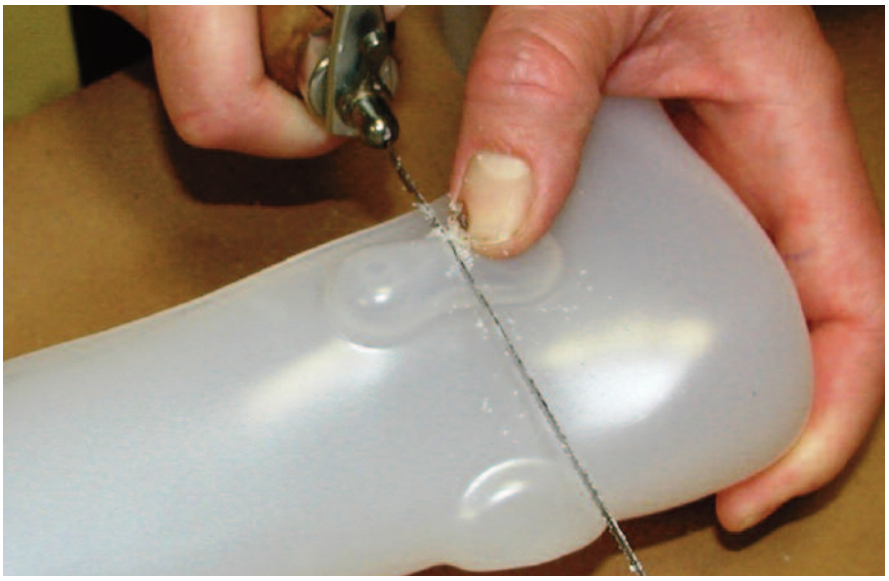


Fig. 16
For optimal results, use a fine tooth blade like a coping saw to make the separation cut. Begin by bisecting the joint cavity (center).

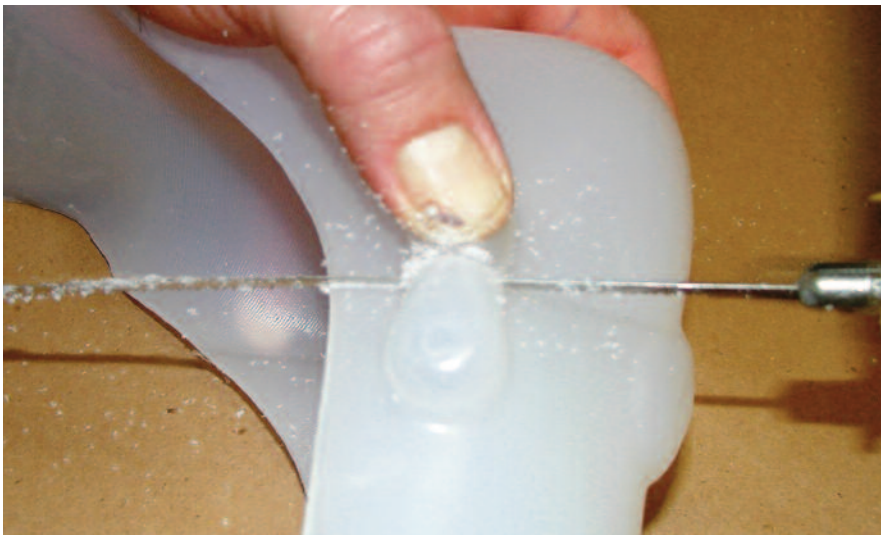


Fig. 17
Continue making the cut through the first cavity extending the cut forward through the anterior side of the AFO.

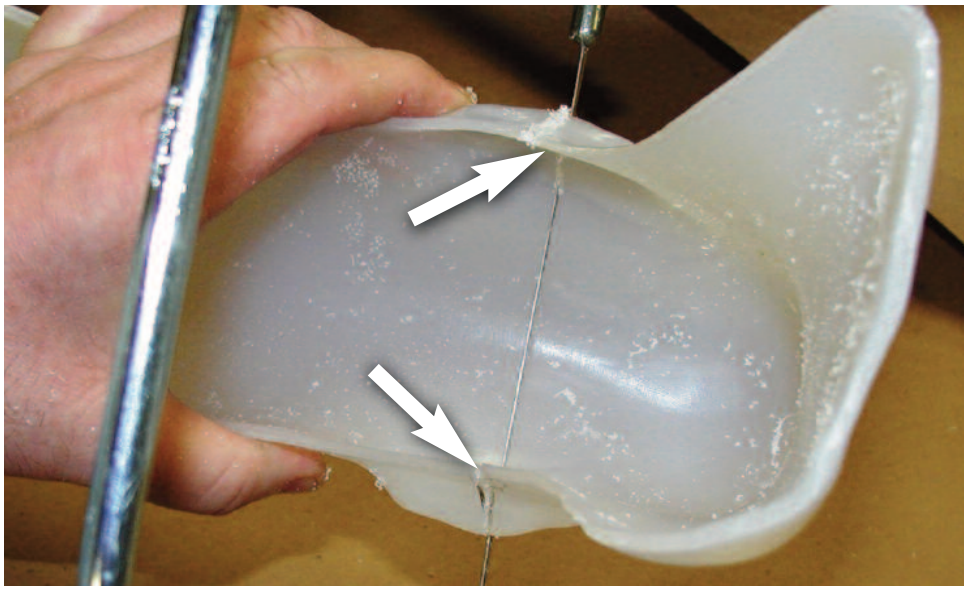


Fig. 18
Turn the AFO over and cut through the second cavity as you did the first.

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

Fig. 19
Keep cutting – the blade will continue to make one smooth line connecting the joint cavities.

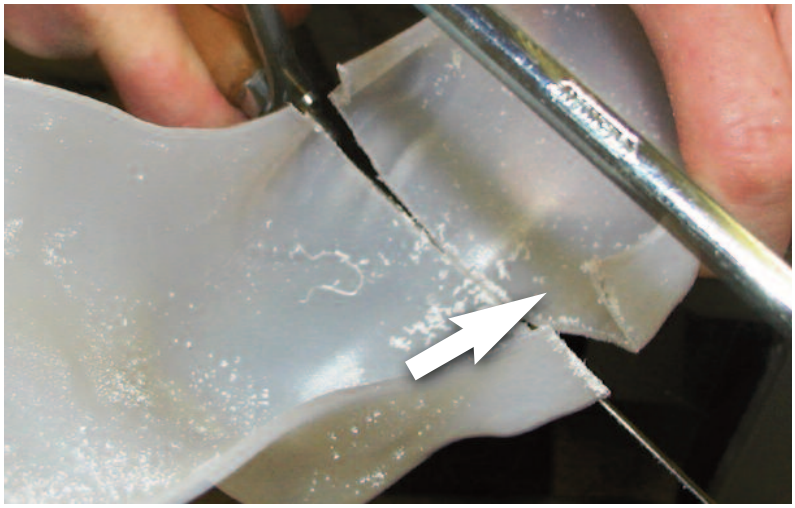


Fig. 20
Nearly completed separation cut.

6. Make holes for attachment screws.

SEE SECTION III ““TIPS / SUGGESTIONS FOR OPTIMAL RESULTS” FOR MORE INFORMATION ABOUT HOLE PUNCHING AND DRILLING

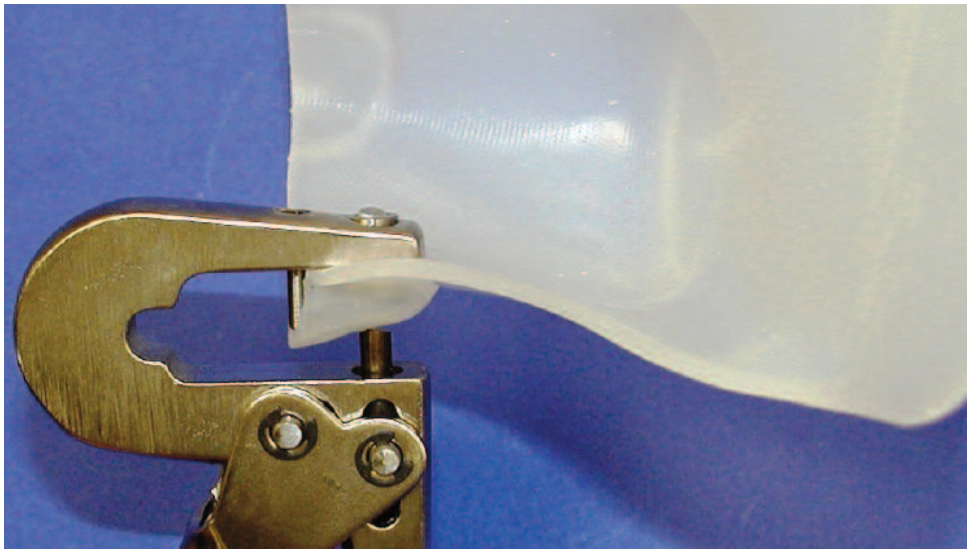


Fig. 21
We suggest using the Tamarack™ Hand Punch Tool to make the screw holes sized and precisely located for mounting the flexure joint into the cavity in the AFO.

Free Motion and Dorsi Assist Joints screw hole sizes:

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

Hand Punch Tool Part Numbers:

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

Note: Punch holes before trimming out the cavity to assure a place for the guide pin to rest.

7. 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).

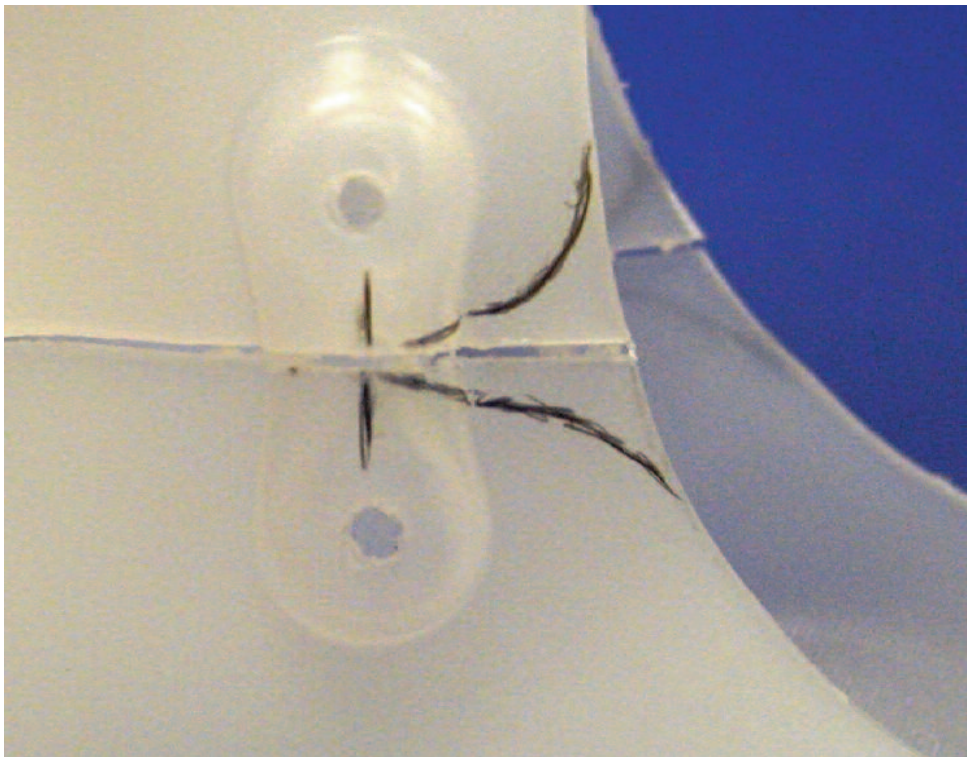


Fig. 22

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.

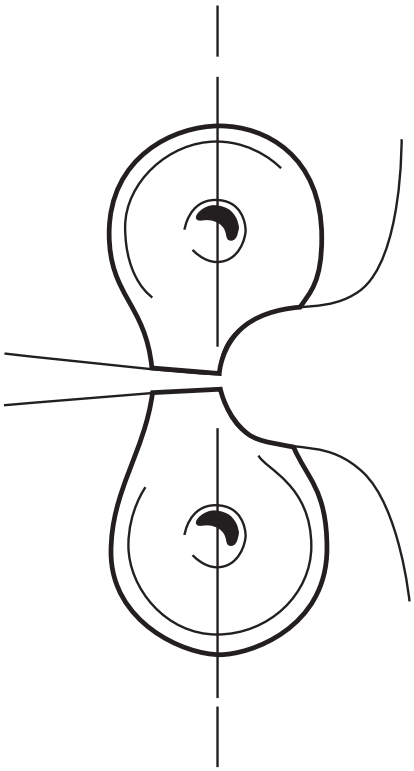


Fig. 23

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 towards one side of the joint to maximize the energy storing/loading capability of the joint.

Figs. 30 and 31 show the final trim-line appearance.

The joint functions best when the rear portion of the cavity is retained.

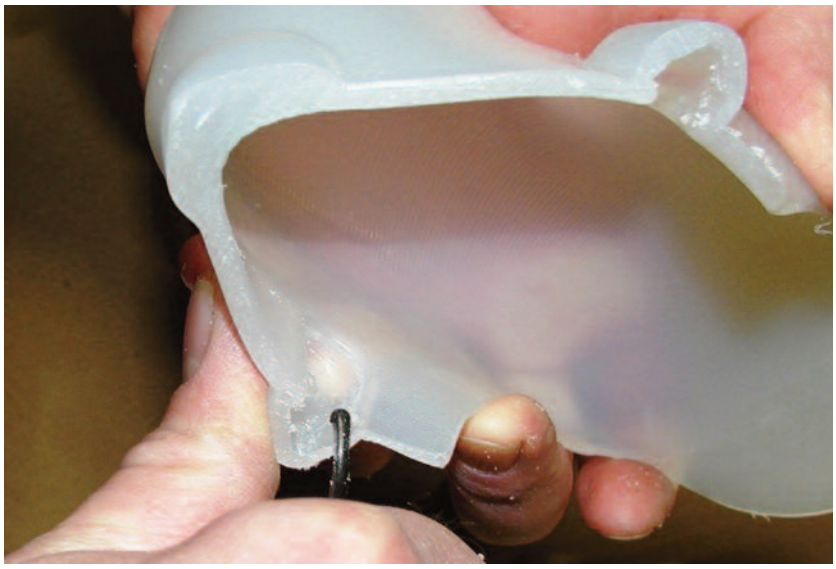


Fig. 24
Use a de-burring tool to smooth the edges in the cavity area. Grinding the plastic removes too much plastic to optimally anchor the joint.

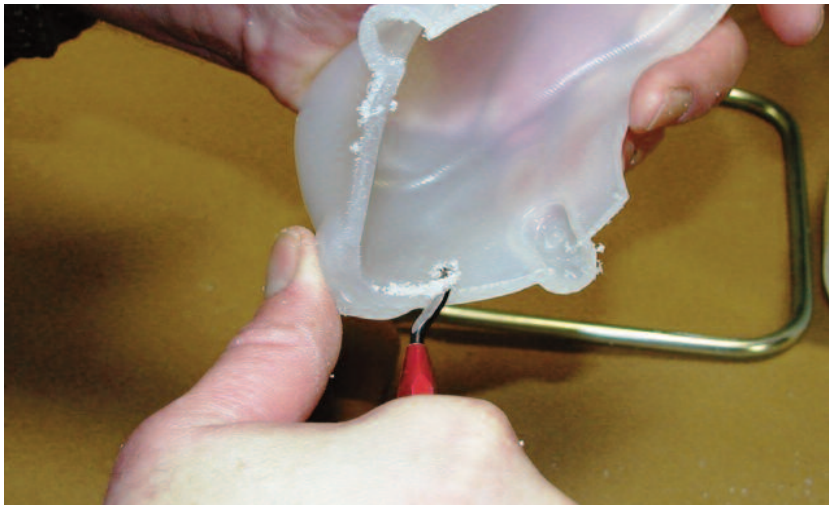


Fig. 25
Use a de-burring tool to smooth the edges of the back section if plantar flexion control is required. Do not grind.

8. Install the joints into the cavities with the hardware supplied with the package.

SEE SECTION III "TIPS / SUGGESTIONS FOR OPTIMAL RESULTS" FOR MORE INFORMATION ABOUT HARDWARE SPECIFICATIONS

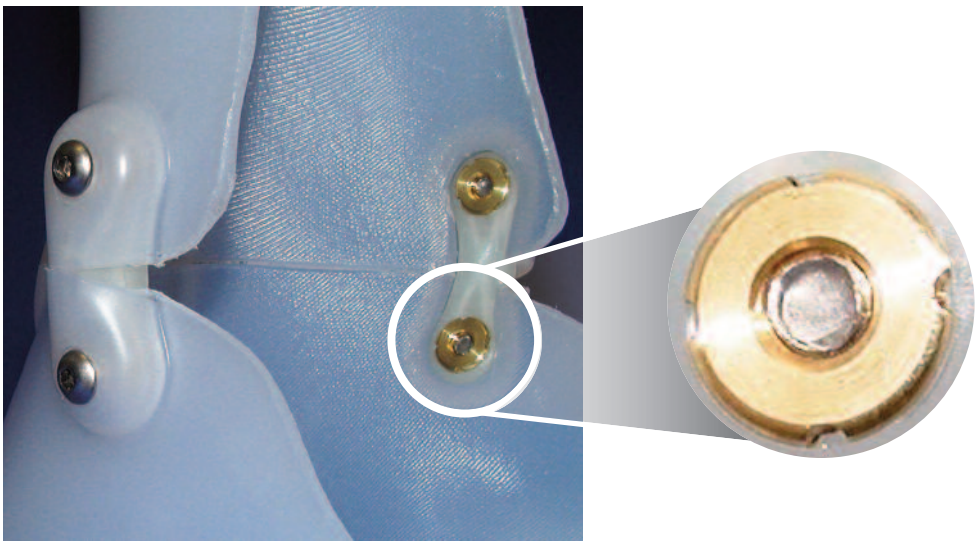


Fig. 26
Use a thread locker to prevent the hardware from loosening. Loctite® 242 removable is recommended. (740 Series shown)

Fig. 27 (exploded view)
Make sure that the screw does not protrude into the orthosis, but is at least half way through the flange nut.

Fig. 28 & 29

Views of a completed 740 Series (free motion) Joint installation

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

SEE SECTION III "TIPS / SUGGESTIONS FOR OPTIMAL RESULTS" FOR MORE INFORMATION ABOUT ASSEMBLY AND FINAL PERFORMANCE

Fig. 30 & 31

Views of a completed 742 Series Joint installation (Dorsiflexion assist)

Note maximum joint coverage when fully loaded shown in right photo.

View when ankle is dorsi flexed

View when ankle is plantar flexed

Fig. 32

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.

Set the length of the strap to just less than the patient's ROM. A Dacron strap is supplied in all sizes of 742-95 joint packages for this optional purpose.

9. Install cosmetic patches

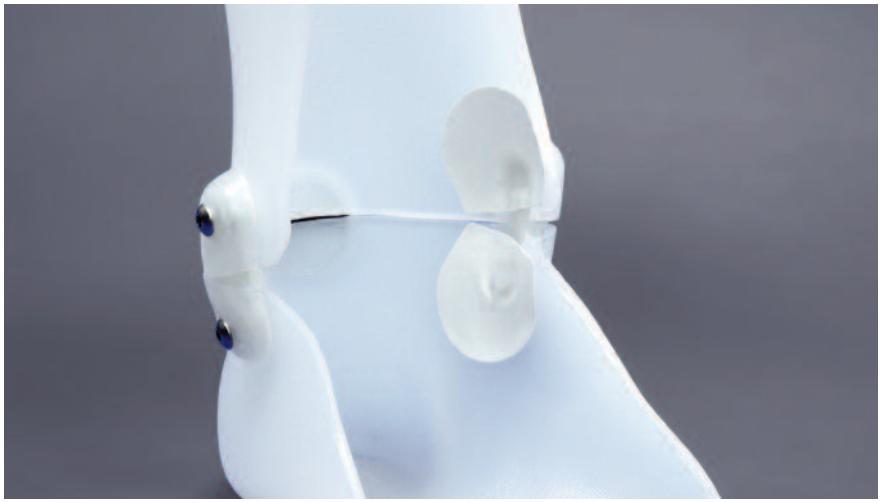


Fig. 33
Cosmetic patches made with ShearBan® make excellent covers to keep the orthosis and joint area clean.

10. If the AFO limits plantar flexion, apply the “Tamarack Silencer” pad to reduce clicking noise during gait when the planter stop surfaces contact each other.

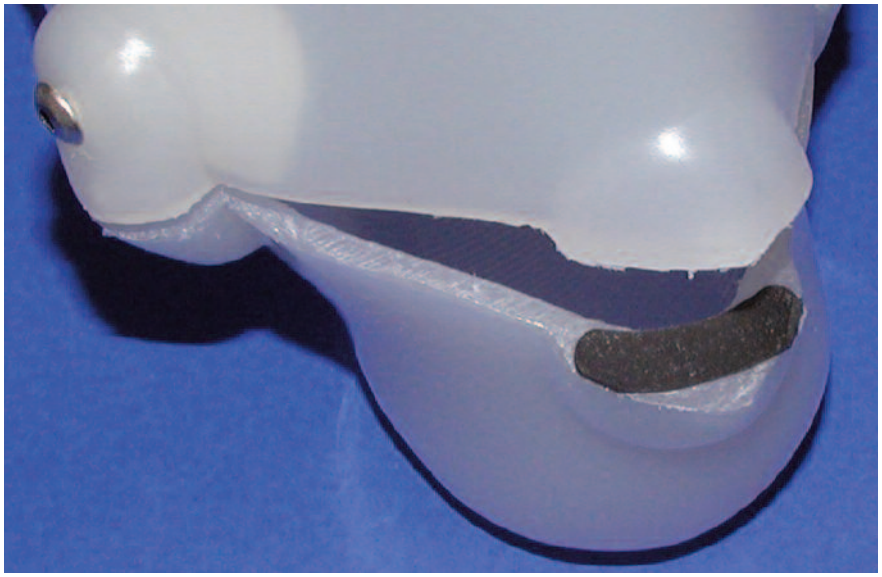


Fig. 34
These simple pads can be adhered to either the calf or foot section.

Fig. 35
Replacement pads are included.

11. 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).

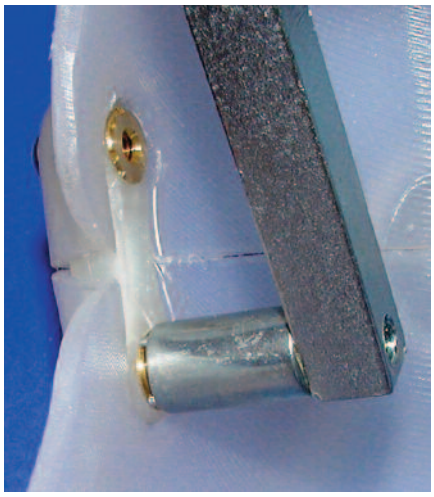


Fig. 36
Spanner Tool prongs match with the flange nut functioning as a wrench against the flange nut to easily loosen the screw.

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.

The Spanner tool is very helpful when installing dorsi assist joints into an AFO design that limits motion.

Spanner Tool Part Numbers:
Large and Medium Joints:
T-740-3LM
Pediatric joints:
T-740-3P

SEE "SECTION III TIPS / SUGGESTIONS FOR OPTIMAL RESULTS FOR, SPANNER TOOL TIPS AND ALTERNATIVE APPLICATION EXAMPLES FIG 67-72).

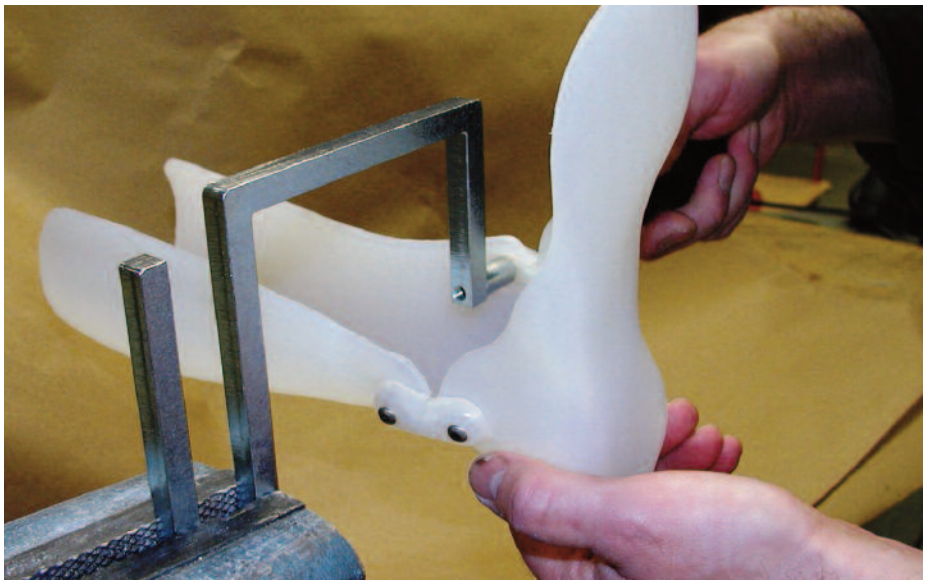


Fig. 37
The Spanner Tool can be hand held, but it is most useful when mounting it in a vice as shown, providing good visibility and leverage.

The hex driver being used is hidden by the foot section of the AFO.

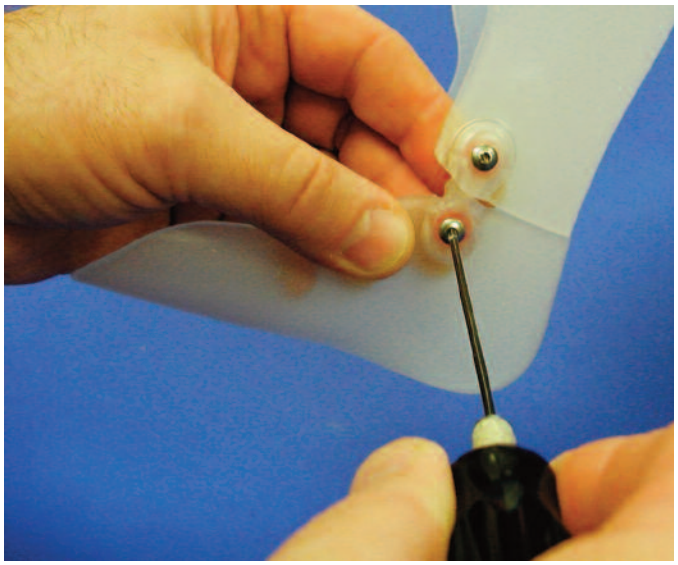


Fig. 38
Large handled hex drivers are available to assist assembly (shown here).

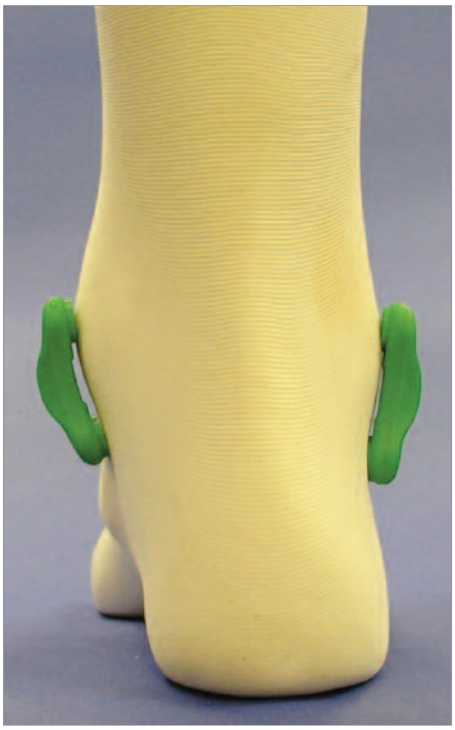
Hex Drivers Part Numbers:
Large and Medium joints:
T-740-4LM
Pediatric joints:
T-740-4P

III. Tips/Suggestions for Optimal Results

Preparing Mold and Dummies for Vacuum Forming

1. It is possible to choose the ankle joint axis - mechanical or anatomical - because the Tamarack Flexure Joints automatically co-align to a single axis of motion. A thin bladed coping saw is especially helpful when making the separation cut of an AFO using the anatomical joint axis – the blade easily bends to match each side.

SEE FIGS. 16-20 IN SECTION II FABRICATION PROCEDURES



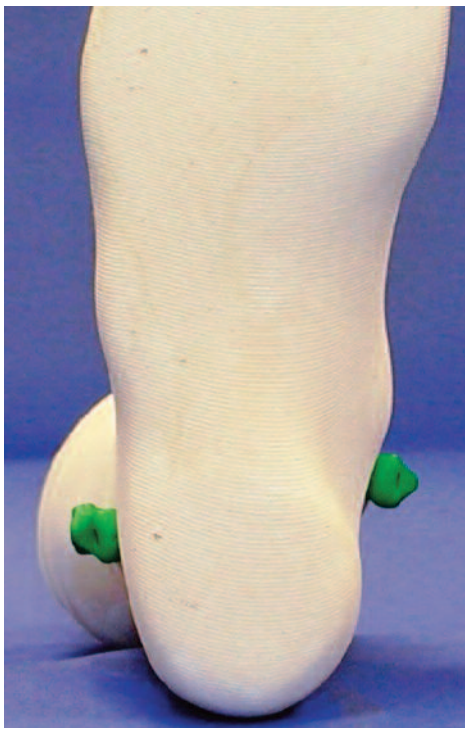


Fig. 39 (left photo)
Fig. 40 (right photo)

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.

2. Use very thin or sheer stockinet if you choose to pull one over the molding dummies. 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. 41
Stockinet placed over the dummy may make too large a cavity.

Stockinet drawn too tightly over the mold may prevent the plastic from forming adequately around the molding dummies.

3. 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. 42
It is quick and easy to roll a skinny “worm” of putty and place it around the joint heads.

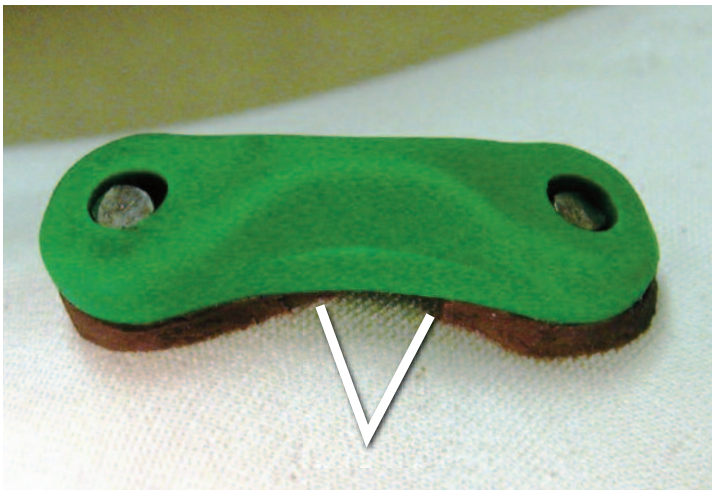


Fig. 43
The center area can be left clear (for the best joint anchorage).

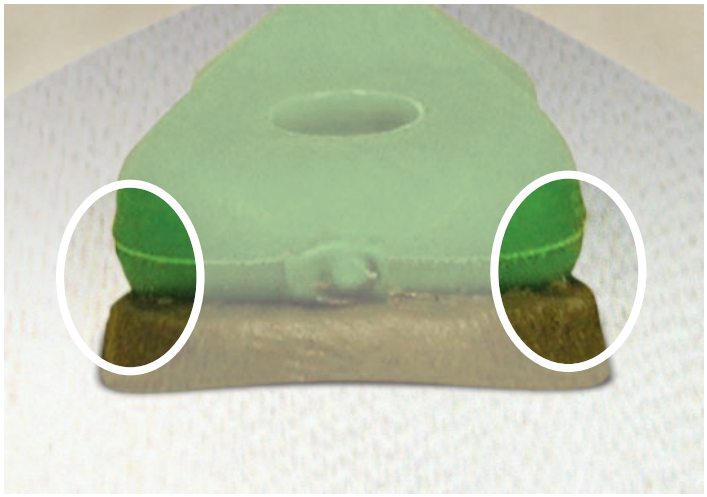


Fig. 44
Allow the inner contours of the dummy to be exposed to allow some plastic to wrap around the dummy.

4. You can form an optimal cavity using a molding dummy. A nice, snug cavity will “hold onto” the dummy, but it is easy to remove by grabbing the protruding tack with a pliers and twisting it out the dummy.

SEE “WHY SHOULD I USE MOLDING DUMMIES?” IN SECTION IV FREQUENTLY ASKED QUESTIONS

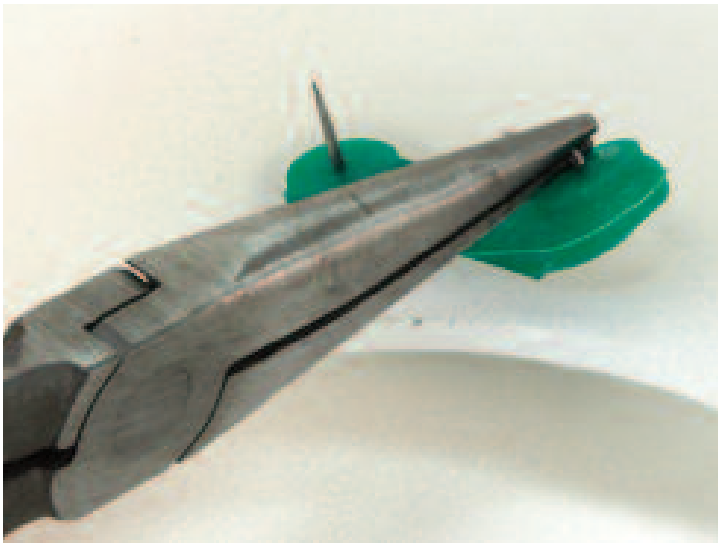


Fig. 45
It is easy to pull the dummy out of the cavity by grabbing the protruding tack with pliers.

Cavity Quality

1. 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.

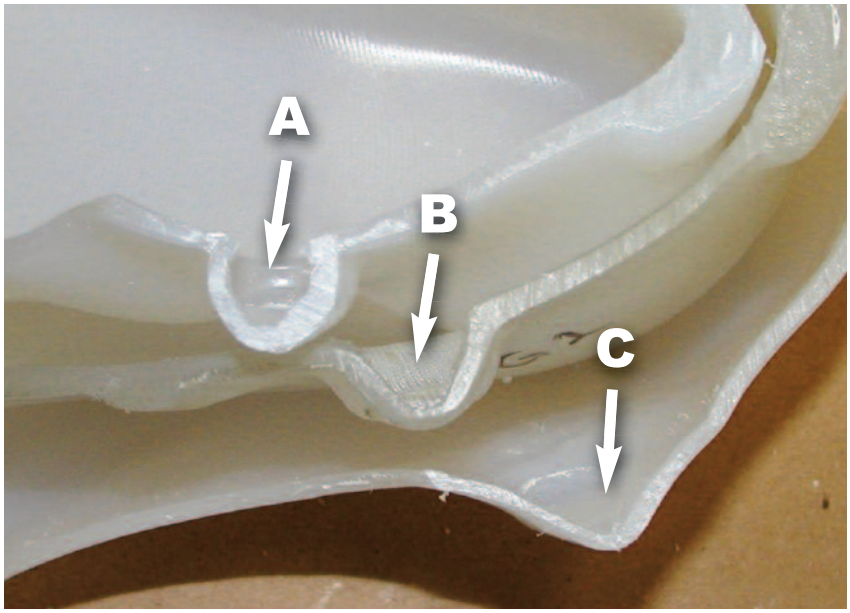


Fig. 46
Cavity formation comparisons

A. Optimal cavity formation.

B. Adequate cavity.

C. Poor cavity.

Fig. 47

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.

Note: View of a 740 Series joint installed in cavity "A" from Fig. 46.

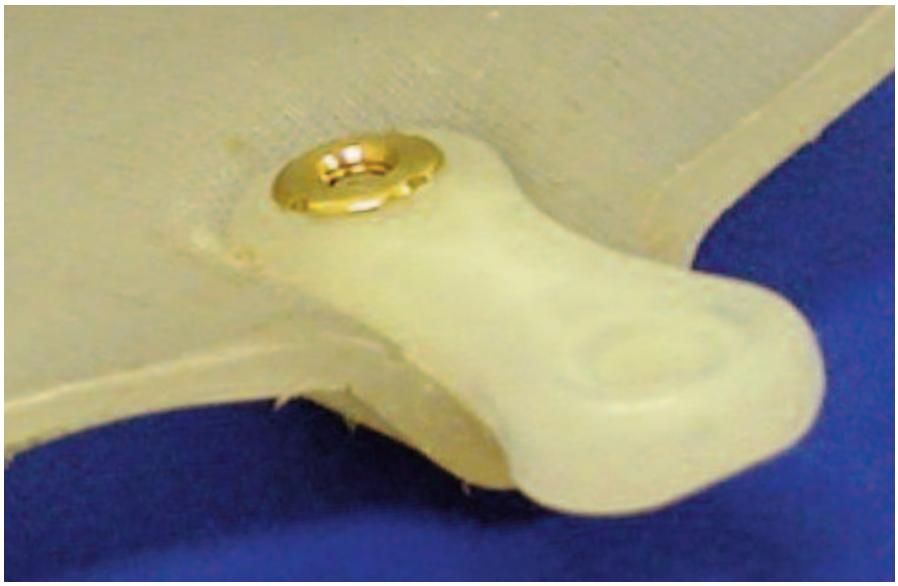


Fig. 48

Adequate cavity formation

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

Note: View of a 740 Series joint installed in cavity "B" from Fig. 46.

Fig. 49

Poor cavity formation

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

Note: View of a 740 Series joint installed in cavity "C" from Fig. 46.

Poor Anchoring Conditions

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

SEE FIGS. 16-32 IN SECTION II, FABRICATION PROCEDURES

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

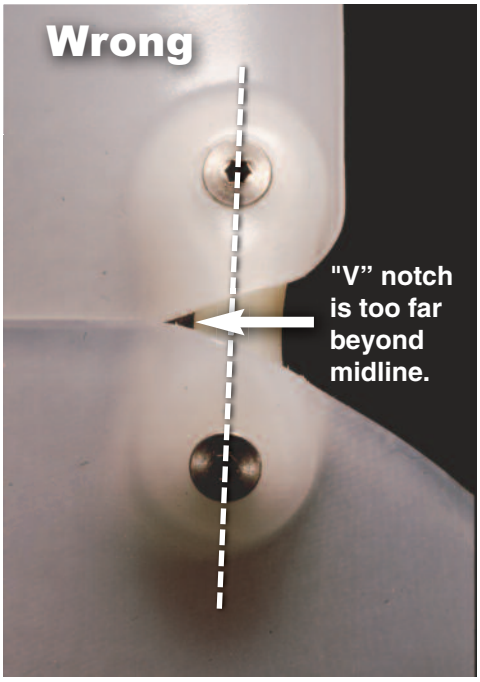


Fig. 50 (left photo) "V" notch goes posterior to the cavity midline.

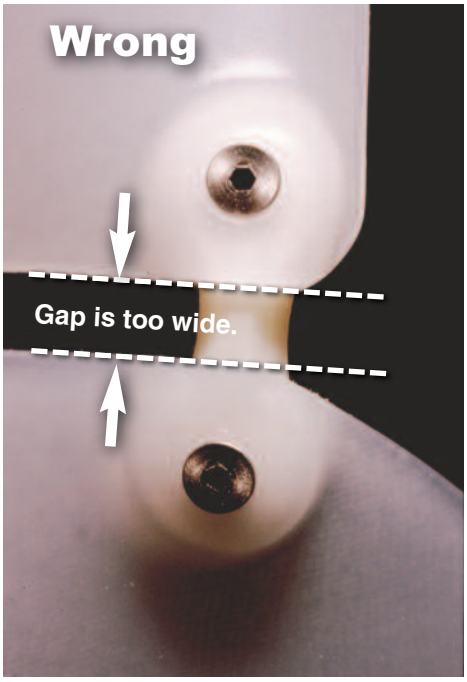


Fig. 51 (right photo) Too wide a gap between foot and calf sections.

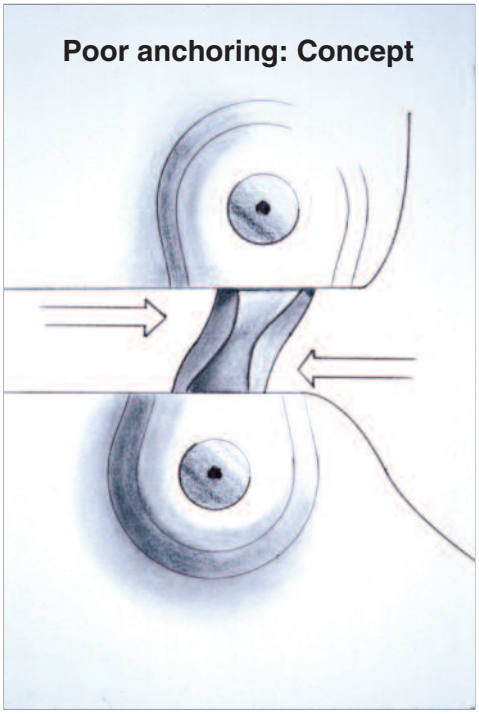


Fig. 52 (left illustration) Illustrates rotational forces being placed on the joint.

Fig. 53 (right photo) Demonstrates this effect in an AFO (the joint is not elongating).

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

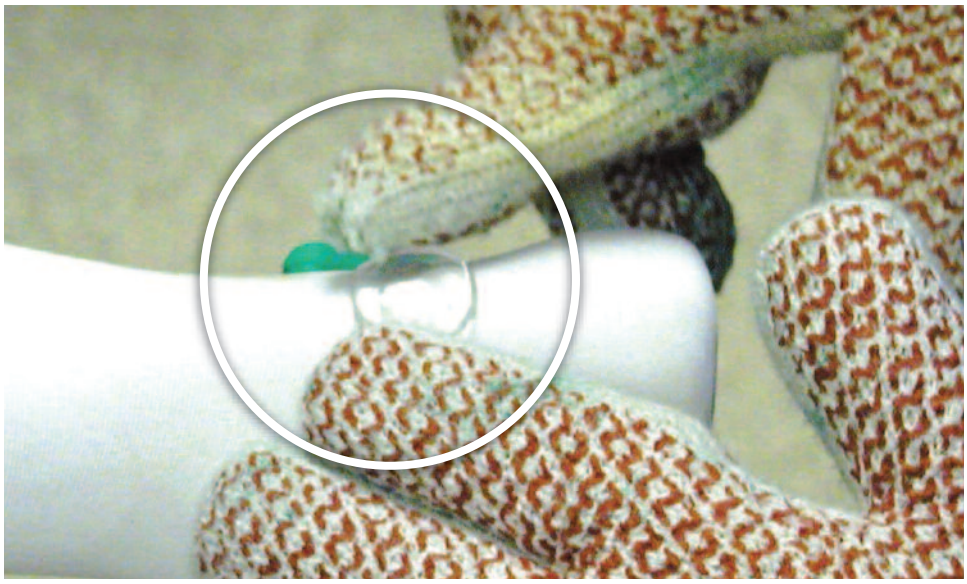


Fig. 54
Place a bar or disk of hot plastic across the area where the separation cut will be made, centered on the posterior aspect of the AFO.

Fig. 55
Vacuum form as usual – avoid shifting the pre-placed bar or disk out of position while pulling the plastic over the AFO.

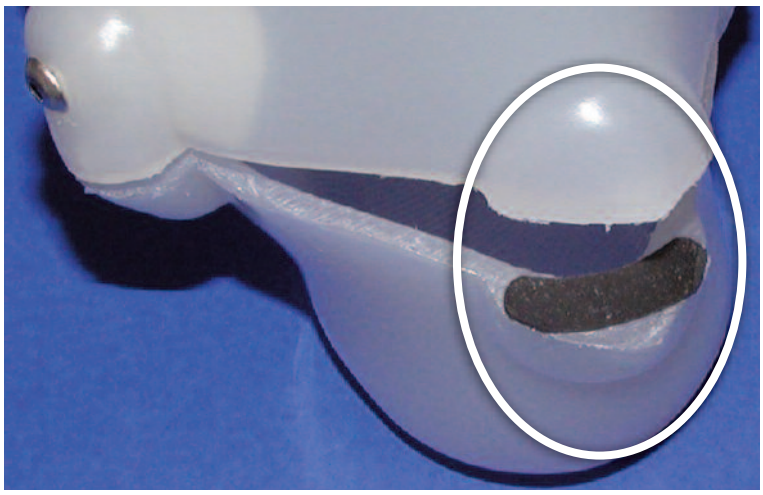


Fig. 56
Final results showing the plantar-stop extension.

The Tamarack Silencer pad is shown here.

Note: Becker Orthopedic offers motion limiting hardware options (not shown) that can also be used in your AFO design (755 and 795 Motion Limiter).

8. 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. 57
Tamarack™ Hand Punches are available from Becker Orthopedic.

Tool part numbers:
T-740-2L
T-740-2M
T-740-2P

These tools have unique dies for each joint size and are matched up with the correct punch diameter.

Hole specifications:
Large: 4.5mm (3/16, #15)
Medium: 4.5mm (3/16, #15)
Pediatric: 4.0mm (5/32, #25)

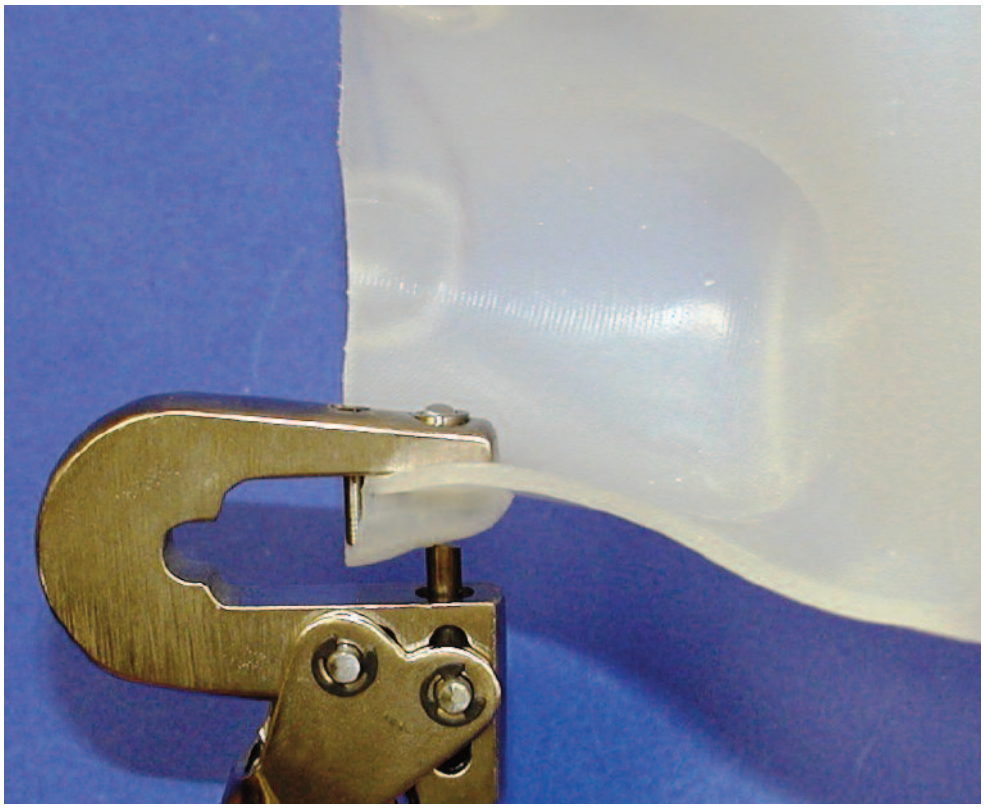


Fig. 58
We suggest using a Tamarack™ hand punch tool to make the screw holes sized and precisely located for mounting the flexure joint into the cavity in the AFO. Punch holes before trimming out the cavity to assure a resting point for the guide pin.

Fig. 59
The cavity is trimmed to show the die and guide pin functions – it is recommended to punch holes **prior** to finishing the cavity.

Fig. 60 (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.

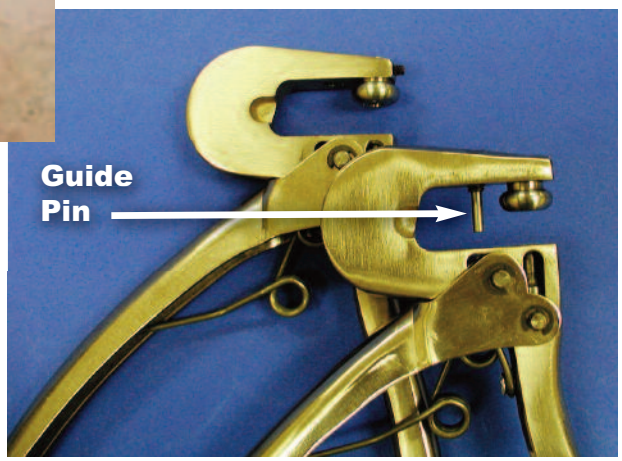
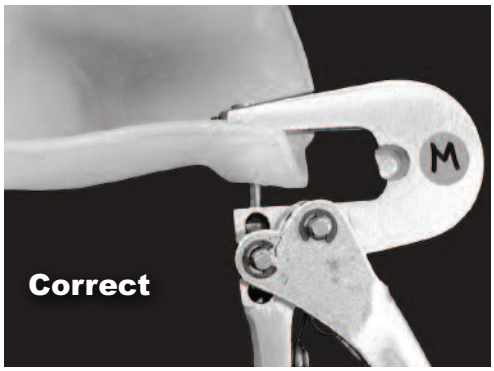


Fig. 61 & 62
The jaw of the punch is aligned parallel to the inside of the AFO when correctly positioned (the early punch versions shown here do not have an angle guide pin).



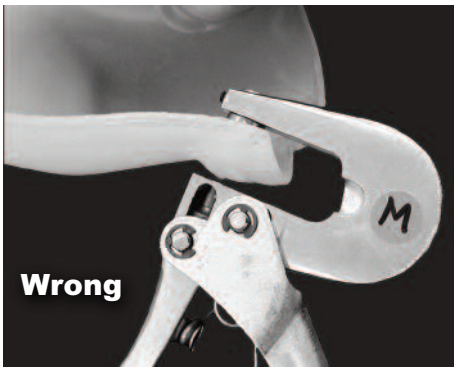


Fig. 63
Make sure the drill bit alignment (angle /direction) is perpendicular to the INSIDE of the AFO.

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

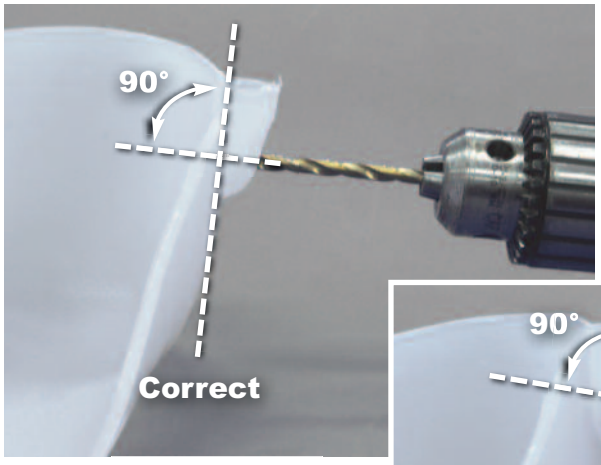
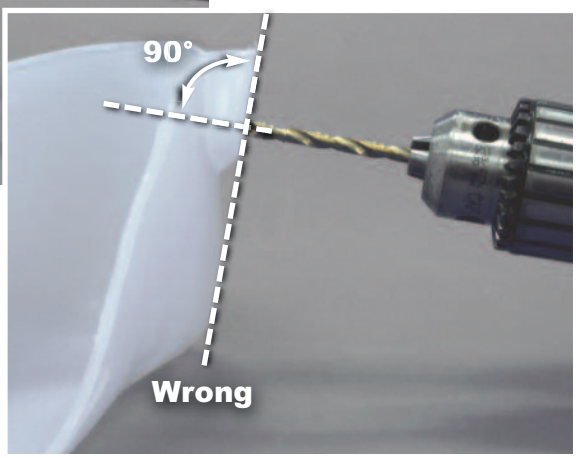


Fig. 64 (right photo)
This shows the WRONG way – the drill is perpendicular to the OUTSIDE surface.

The screw holes will not line up well.



9. **Hardware cautions:** The screws must not protrude into the AFO in order to avoid contact with the ankle. Optional screw hardware is available (**SEE FIG. 73**).

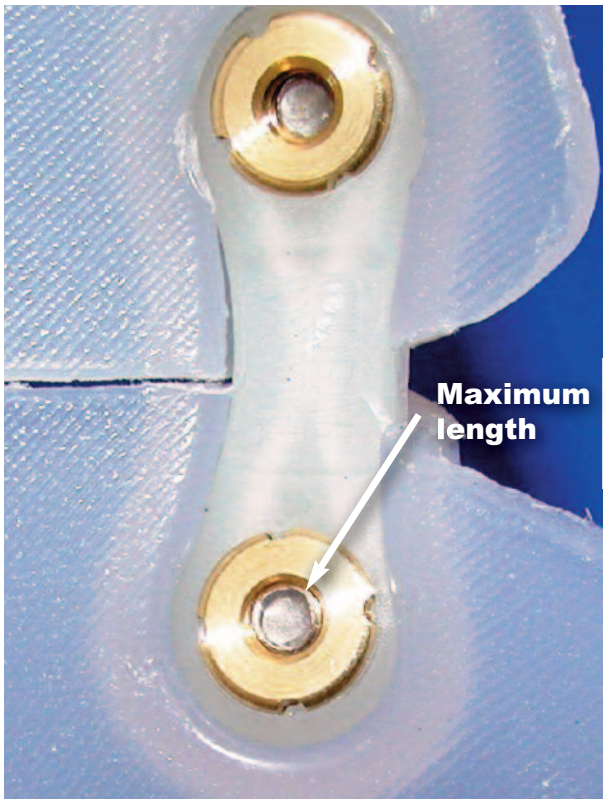


Fig. 65
The screw must not protrude into the AFO (risk of damaging the skin).

The screw should pass at least half way into the flange nut for adequate thread contact.

(740 Series application shown)

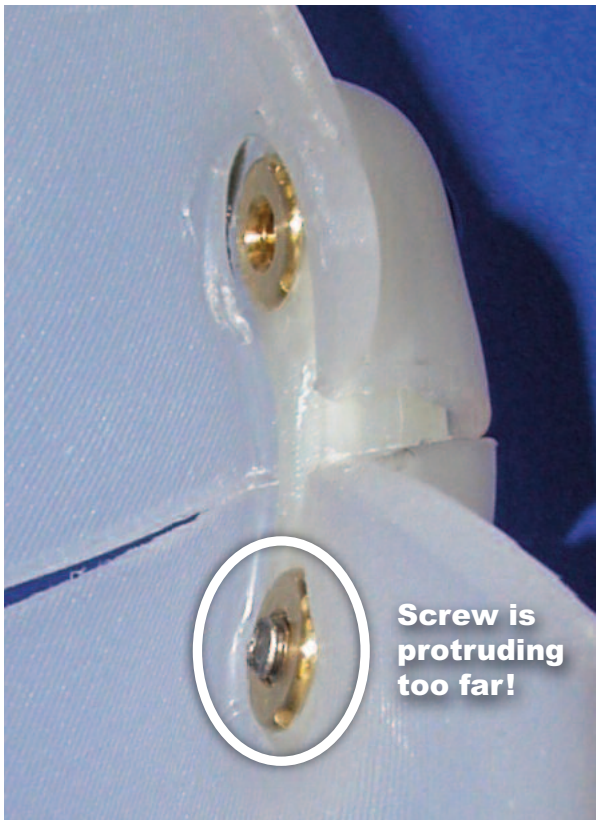


Fig. 66
This screw is **too long** and could cause injury to the skin (a longer screw would be even more hazardous!)

(740 Series application shown)

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

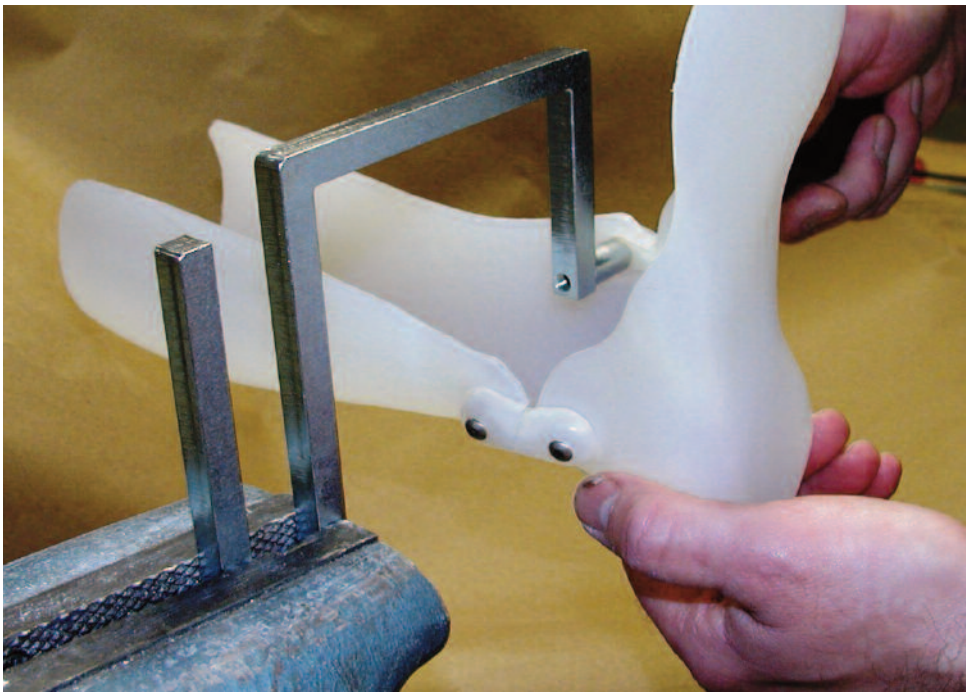


Fig. 67
The Spanner tool can be hand held, but it is most useful when mounting it in a vice as shown, providing good visibility and leverage.

The Spanner Tool is especially helpful when installing joints into AFO's where the joint must be installed partially loaded. Fig. 68 demonstrates a technique for this kind of installation. Figures 69-73 illustrate application examples.

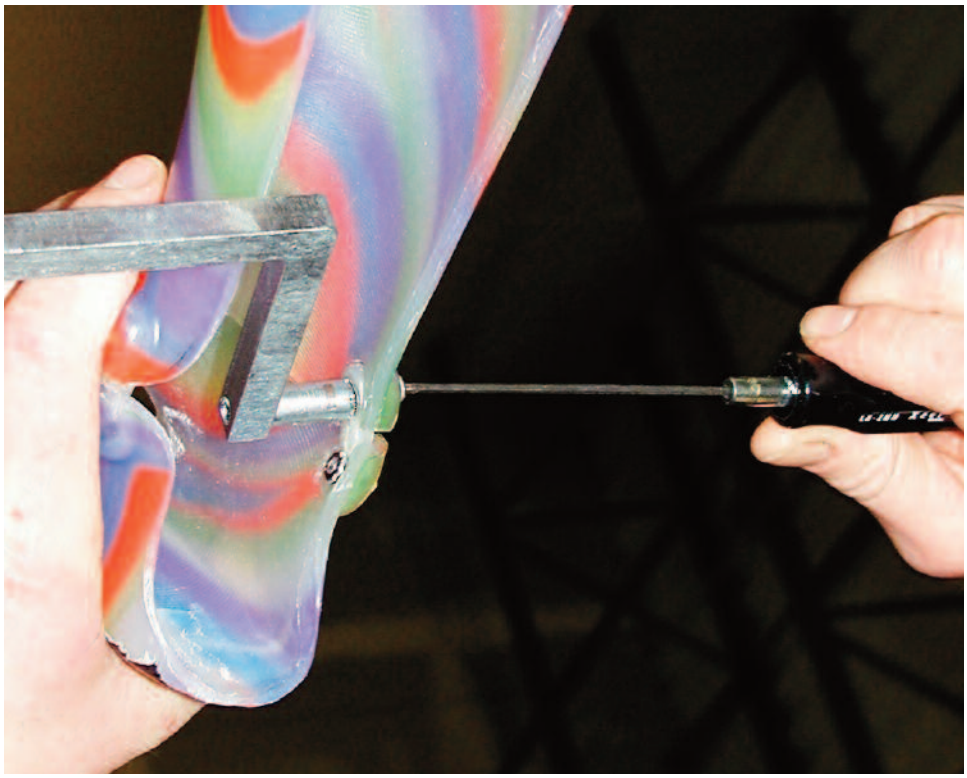


Fig. 68
Install the joints in either the foot section or the calf section. When installing the remaining side, it is very difficult to get the screw started by hand because the joint needs to be "preloaded".

This process is made much easier by using the spanner tool. Mount the Spanner tool in a vice as shown in Fig. 67.

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.

Alternative Application Example #1

Fig. 69 (left photo)
742 Series joints installed in "reverse" of typical dorsiflexion assist application

Fig. 70 (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. 68 if plantar flexion motion is limited (the joints will be loading slightly during installation)

Alternative Application Example #2

Fig. 71 (left photo)
The rigid anterior stop delivers a firm knee extension moment (floor reaction force). Dorsiflexion assist (shown in Fig. 71) or free motion joints can be used as needed, and are capable of withstanding the tension forces present during 2nd and 3rd rocker.

Fig. 72 (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. 68 when dorsiflexion range is limited (if using 742 Series joints, they will be loading slightly during installation).

Fig. 73 Hardware for all Tamarack Flexure Joints (740 and 742 Series joints)

STANDARD HARDWARE			
Screw Hardware	**SPECIFICATION**	**QUANTITY**	**PART NUMBER**
For Large and Medium Joints	M4x0.7x9mm Button Hd Hex Socket Cap Screw	100 / Pack	740-1LM-9
Pediatric Joints	M3.5x0.6x7mm Button Head Hex Socket Cap Screw	100 / Pack	740-1P-7
Flange Nut Hardware	**SPECIFICATION**	**QUANTITY**	**PART NUMBER**
For Large and Medium Joints	M4x0.7 Brass Flange Nut Barrel Dia: .205 Length .245	100 / Pack	740-2LM
Pediatric Joints	M3.5x0.6 Brass Flange Nut Barrel Dia: .178 Length .195	100 / Pack	740-2P
Cosmetic Patches	**SPECIFICATION**	**QUANTITY**	**PART NUMBER**
For Large and Medium Joints	Cosmetic Patch: 1-up	12 Patches / Pack	749-740
Pediatric Joints	Rivet Cover Patches	120 Patches / Box	749-7
OPTIONAL HARDWARE			
Longer/Shorter Button Head Screw Lengths	**SPECIFICATION**	**QUANTITY**	**PART NUMBER**
For Large and Medium Joints	M4x0.7x7mm Button Hd Hex Socket Cap Screw	100 / Pack	740-1LM-7
For Large and Medium Joints	M4x0.7x12mm Button Hd Hex Socket Cap Screw	100 / Pack	740-1LM-12
For Large and Medium Joints	M4x0.7x14mm Button Hd Hex Socket Cap Screw	100 / Pack	740-1LM-14
Pediatric Joints	M3.5x0.6x8mm Button Hd Hex Socket Cap Screw	100 / Pack	740-1P-8
Pediatric Joints	M3.5x0.6x10mm Button Hd Hex Socket Cap Screw	100 / Pack	740-1P-10
Pediatric Joints	M3.5x0.6x12mm Button Hd Hex Socket Cap Screw	100 / Pack	740-1P-12
Truss Head Screws (used when attaching strap with joint fastener)	**SPECIFICATION**	**QUANTITY**	**PART NUMBER**
For Large and Medium Joints	M4x0.7x9.0mm Truss Head Screw	100 / Pack	740-1LM-9-TR
Pediatric Joints	M3.5x0.6x7.0mm Truss Head Screw	100 / Pack	740-1P-7-TR

IV. Frequently Asked Questions

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

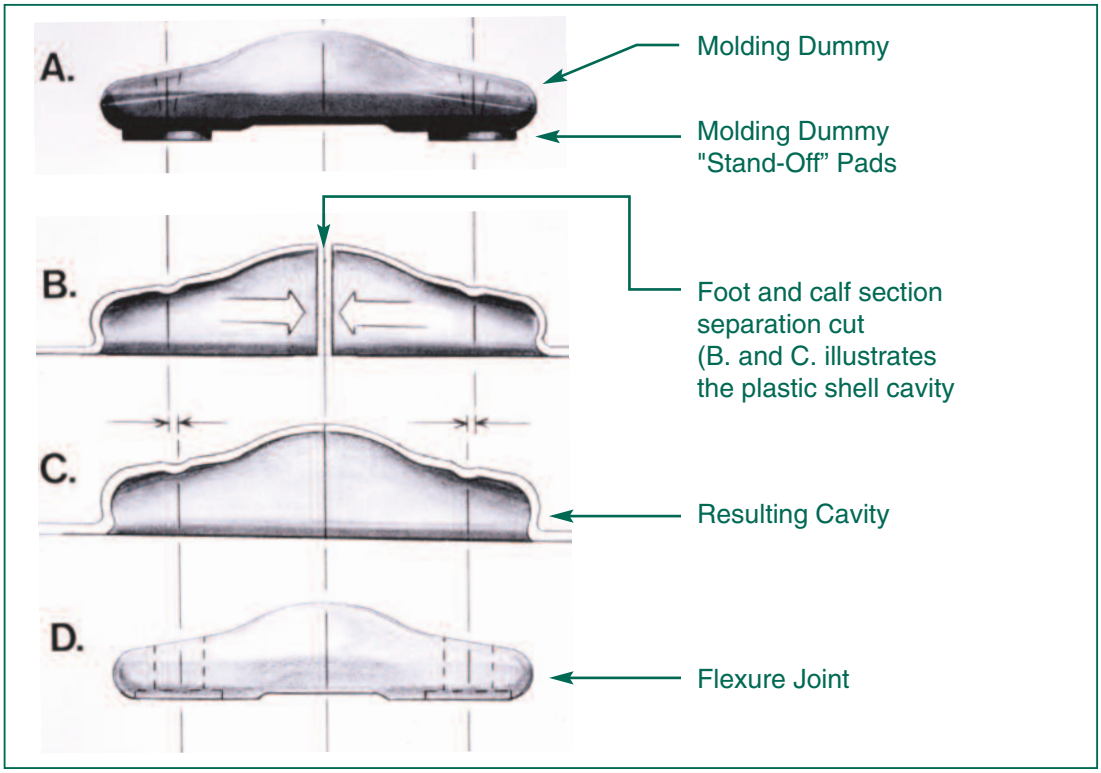
A: L - code suggestions for providers in the US can be found on our website.

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. 74



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. 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. The moment chart shown in **FIG. 6** shows the amount of assistance the different joints provide. 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. 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. 33** to see an example.

6. 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 69 – 72** show two examples.

FIG'S 67 AND 68 provide tips on installing joints when they must be "pre-loaded" in these types of applications while being installed.

7. 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 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. 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. 23** and **Fig's. 30 & 31**)

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. 69 -72**) because the joints must be "loaded" during installation. **Fig's. 67 and 68** 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 calcaneous (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 A:2.

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.

V. Additional Resources

Website: www.tamarackhti.com

E-mail: info@tamarackhti.com

Tamarack™ Blog: http://insidetamarack.wordpress.com

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