

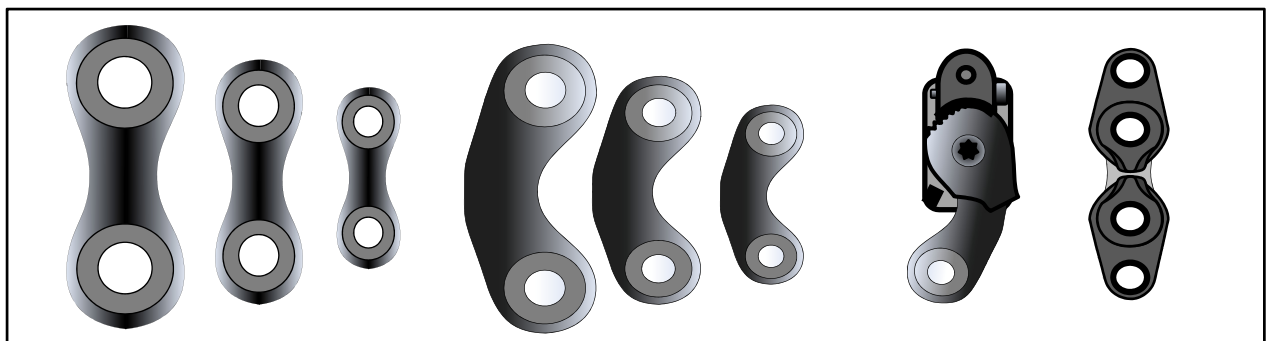
# Tamarack Flexure Joint®

## Indications for Use Guide

*A clinical reference for Custom AFO Fabrication*



*Tamarack Habilitation Technologies Inc., August 2013*





# Tamarack Flexure Joint® Indications for Use Guide

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### Acronyms and Terminology used:

**IFU:** Instruction for Use

**AFO:** Ankle Foot Orthosis

**M-L:** Medio-Lateral

**Plantarflexion** – the motion of the foot toward distal (forefoot down)

**Dorsiflexion** – the motion of the foot toward proximal (forefoot up)

**Plantarflexion stop:** Device disallowing partial or full plantarflexion

**Dorsiflexion stop:** Device disallowing partial or full dorsiflexion

**Durometer:** A unit of measure to describe the level of assist or resistance offered by a specific material hardness. Application of various durometers in the Flexure Joint® allows for a wide range of assistive and resistive response to gait forces.

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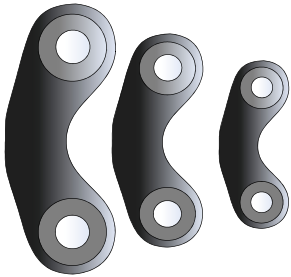
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## Tamarack Flexure Joint® Product Line Overview



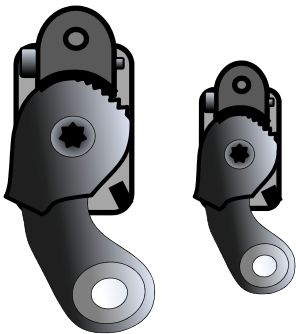
### **Free Motion (Model 740)**

*Standard Tamarack Flexure Joint® in 3 sizes, and 2 colors. All Tamarack Flexure Joints® are tested for tensile flexural durability in cyclic shock application for > 3 Million cycles.*



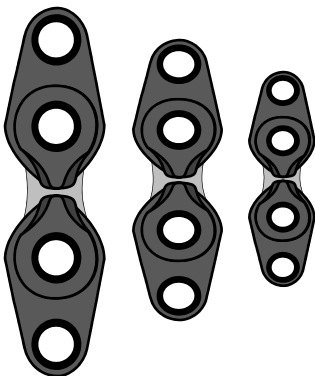
### **Dorsiflexion Assist (Model 742)**

*Forefoot lift; in 3 sizes, 2 colors and 3 durometers. Allows for a wide range of assistive/resistive responses to gait forces. Choose from light (75-Shore A), medium (85-Shore A) or, strong (95-Shore A).*



### **Variable Assist (Model 743)**

*Adjustable forefoot lift, available in 2 sizes. The Variable Assist consists of a Dorsiflexion Assist type joint and an adjustment gear drive. It allows for fine-tuning of assistive/resistive force by angular pre-tensioning.*



### **Tamarack Flexure Joint® Caps (Model 741-CAP)**

*Alternative prefab joint cavity in 3 sizes and 2 colors. Designed for external mounting at initial fabrication or retrofit device articulations for both thermoplastic and thermoset AFOs.*

# Tamarack Flexure Joint® Indications for Use Guide

## Free Motion AFO

Joint Selection: *Free Motion (Model 740)*



### Options:

- Proximal closures are required (hook & loop straps or similar ).

### AFO Design:

- Thermoplastic/fiber/hybrid designs.
- **Free Motion (Model 740)** with full dorsiflexion and plantarflexion.
- Varying footplate lengths.
- All components are waterproof.

### Functional considerations:

- Allowing full plantarflexion and dorsiflexion.
- Frontal plane talar and subtalar joint alignment control.

### Clinical Indications:

- Posterior tibial tendon dysfunction
- Frontal plane instabilities of the subtalar and/or talar joint.

### Clinical Contraindications:

- Weak quadriceps
- Significant sagittal plane ankle weakness/instability
- High impact sports

*Drawings do not suggest a particular length of footplate. Footplate length and shoe features have a significant effect on gait safety and gait efficiency.*

# Tamarack Flexure Joint® Indications for Use Guide

## Plantarflexion Stop AFO

Joint Selection: *Free Motion (Model 740)*



### Options:

- Proximal closures are required (hook & loop straps or similar ).
- Instep strap may be required
- Motion Control: Plantarflexion stop at desired angle – to be modified by careful grinding.

### AFO Design:

- Thermoplastic/fiber/hybrid designs.
- **Joint: Free Motion (Model 740)**
- Plantarflexion stop at desired angle.
- Varying footplate lengths.
- All components are waterproof.

### Functional considerations:

- Prevents unwanted plantarflexion while permitting free dorsiflexion
- Provides M-L stabilization, talar and subtalar joint stabilization.

### Clinical Indications:

- Weak dorsiflexors / drop foot
- Tight plantarflexors
- Cerebral palsy
- CVA
- Peroneal nerve paralysis
- Knee hyperextension
- Frontal plane instabilities of the subtalar and/or talar joint.

### Clinical Contraindications:

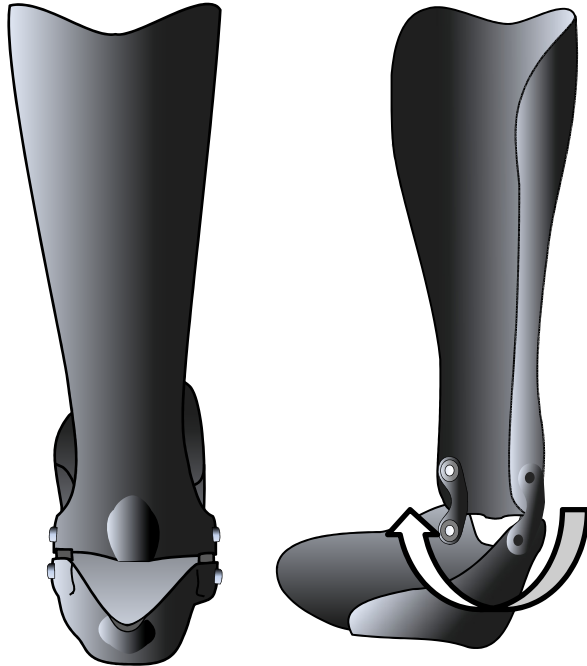
- Weak quadriceps
- Knee flexion contractures
- High impact sports

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## Tamarack Flexure Joint® Indications for Use Guide

### Dorsiflexion Assist AFO

Joint Selection: *Dorsiflexion Assist (Model 742)*



#### **AFO design:**

- Thermoplastic/fiber/hybrid designs.
- ***Dorsiflexion Assist (Model 742)***
- Varying footplate lengths.
- All components are waterproof.

#### **Functional considerations:**

- Providing dorsiflexion assist with or without plantarflexion stop.
- W/O plantarflexion stop: facilitates more natural first rocker
- Provides a significant dorsiflexion moment.
- Support of ligament instabilities.

#### **Options:**

- Joint durometers should be selected/exchanged to provide required resistance/assistance .
- Three durometer choices are available for this purpose.
- Optional motion control: Plantarflexion stop at desired angle – to be modified by careful grinding.
- Proximal closures are required (hook & loop straps or similar ).

#### **Clinical Indications:**

- CP, CVA, weak dorsiflexors
- Frontal plane instabilities of the subtalar and/or talar joint.
- Peroneal Palsy

#### **Clinical Contraindications:**

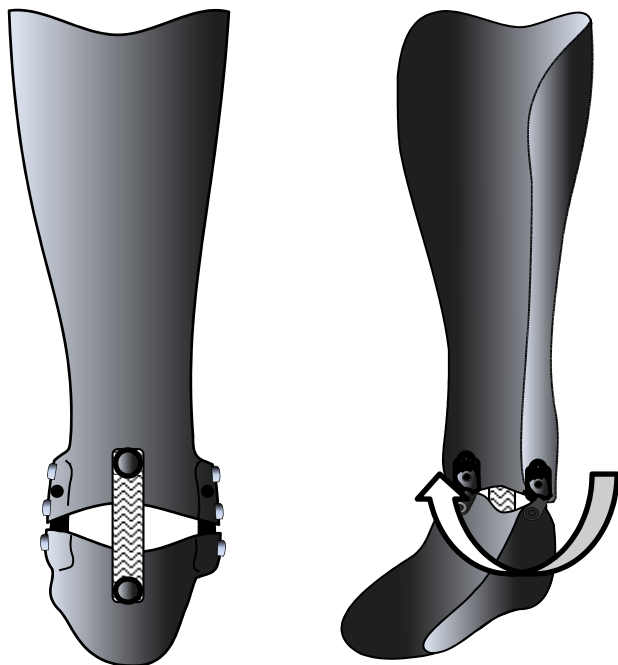
- Weak Quadriceps
- Spastic plantarflexors
- Knee flexion contracture
- High impact sports

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# Tamarack Flexure Joint® Indications for Use Guide

## Variable Assist AFO

Joint Selection: *Variable Assist (Model 743)*



### Options:

- Joint is continuously adjustable to increase/decrease assistive force
- Proximal closures are required (hook & loop straps or similar).
- With or without dorsiflexion restraint strap
- Model 743 may be paired with 740 or 742.

### AFO design:

- Thermoplastic/fiber/hybrid designs.
- **Variable Assist (Model 743)**
- Varying footplate lengths.
- All components are waterproof. Metal parts are stainless steel and bronze.

### Functional considerations:

- Lifts foot to prevent foot drop.
- Assistive force for forefoot lift is continuously adjustable
- Hyper-Dorsiflexion restraint strap

### Clinical Indications:

- CP, CVA, weak dorsiflexors
- Mild SCI
- Peroneus paralysis
- Pathomechanics of ALS, MD, MS
- Frontal plane subtalar and talar joint as well as ligament instabilities.

### Clinical Contraindications:

- Weak quadriceps
- Un-controlled fluctuating edema.
- High impact sports

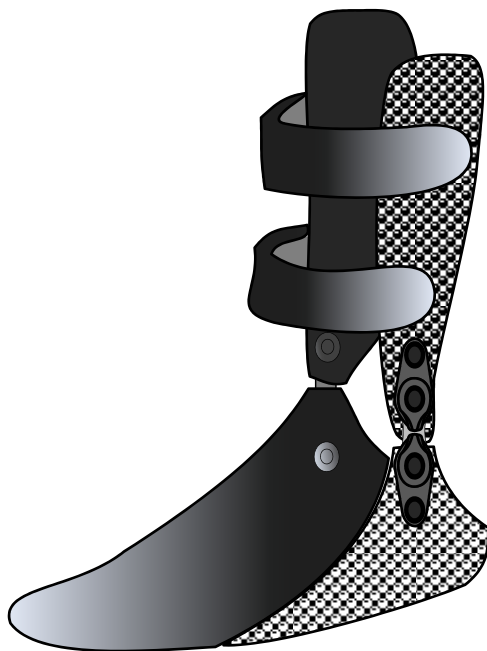
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# Tamarack Flexure Joint® Indications for Use Guide

## PTTD/Stirrup Style AFO

With custom footplate - Joint Selection: *Variable*



### AFO Design:

- Free Motion (Model 740) with optional Model 741 Tamarack Flexure Joint Caps
- Or: w. *Dorsiflexion Assist* Flexure Joints
- Or: w. Tamarack Flexure Joint® Caps
- Composite or hybrid designs.
- Full range of dorsi/plantarflexion.
- All components are waterproof .

### Functional considerations:

- Provides mild M-L stabilization
- Permits free dorsi/ plantarflexion.
- Moderate torsion control.
- Footplate should stabilize subtalar alignment.

### Clinical Indications:

- Posterior tibial tendon dysfunction
- Mild or moderate frontal plane instabilities of talar/subtalar joints.

### Options:

- Depending on required resistance/ assistance , joints may be selected/exchanged for various durometers.
- Tamarack Flexure Joint Caps

### Clinical Contraindications:

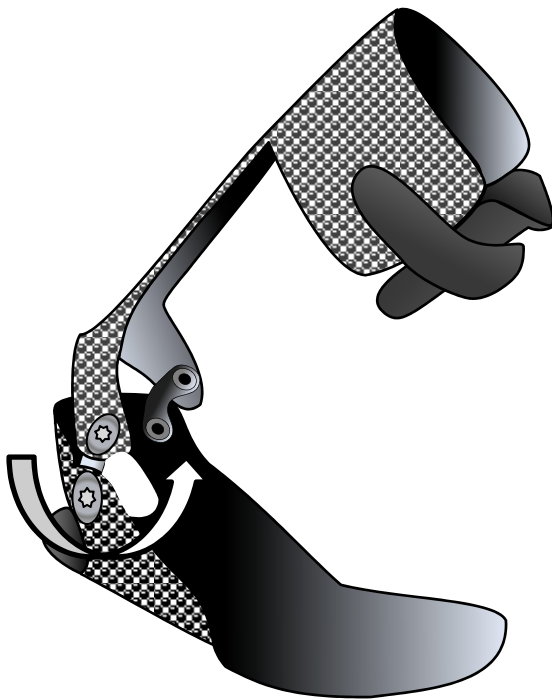
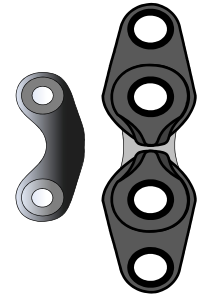
- Weak quadriceps
- Knee flexion contractures
- Spastic plantar flexors
- High impact sports

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# Tamarack Flexure Joint® Indications for Use Guide

## Dorsiflexion-Assist Carbon Fiber AFO

Joint Selection: *Dorsiflexion Assist (Model 742)*



### Options:

- Depending on required resistance/assistance joints may be selected/exchanged for various durometers.
- Tamarack Flexure Joint Caps

### AFO Design:

- **Free Motion (Model 740) with optional Model 741 Tamarack Flexure Joint Caps**
- Composite design.
- Assisted dorsiflexion
- Resisted plantarflexion.
- All components are waterproof

### Functional considerations:

- Provides dorsiflexion assist with resisted plantarflexion.
- Heavy duty /lightweight design.
- Open frame design (improved air circulation & heat dissipation).

### Clinical Indications:

- Weak dorsiflexors
- Frontal plane subtalar and talar joint and ligament instabilities.
- Need for high strength, low profile , lightweight design.

### Clinical Contraindications:

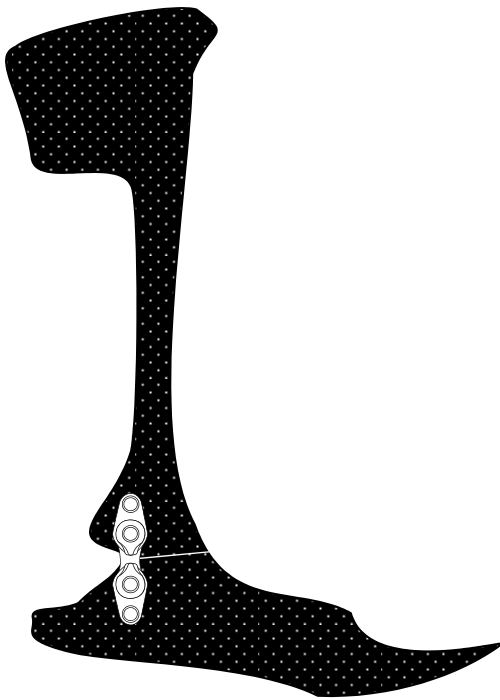
- Weak quadriceps
- Knee flexion contractures

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# Tamarack Flexure Joint® Indications for Use Guide

## Floor Reaction AFO

Joint Selection: *Free Motion (Model 740)*



### AFO Design:

- **Free Motion (Model 740) with optional Model 741 Tamarack Flexure Joint Caps**
- Ground Reaction Force AFO
- Reinforced carbon fiber AFO with posterior entry.
- Dorsiflexion-stop built in
- All components are waterproof

### Functional considerations:

- Heavy duty - lightweight design.
- Open frame design (air exchange).
- Control of knee joint instabilities via rigid, long forefoot lever arm.
- Joint permits plantar flexion
- Normalizes gait cycle from heel strike to mid-stance.

### Clinical Indications:

- Mild quadriceps weakness as is typical of ambulatory post-polio

### Options:

- Proximal closures are required (hook & loop straps or similar ).
- Tamarack Flexure Joint Caps

### Clinical Contraindications:

- Knee flexion contracture
- Complete quadriceps paralysis
- Un-controlled fluctuating edema.

*Drawings do not suggest a particular length of footplate. Footplate length and shoe features have a significant effect on gait safety and gait efficiency.*

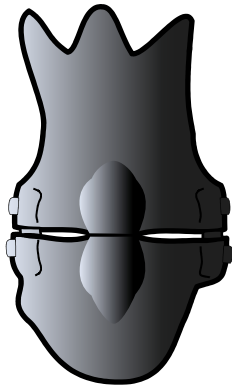
# Tamarack Flexure Joint® Indications for Use Guide

## Custom Fab. Joint Stops

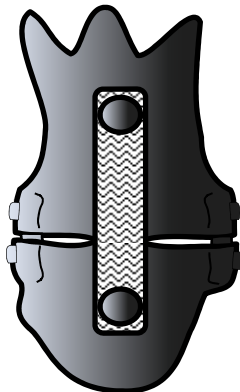
Joint Selection: *Free Motion or Dorsiflexion Assist*



A.



B.



### Options:

- The dorsiflexion control strap is frequently used to avoid overstretch of the Achilles tendon.
- Tamarack Flexure Joint® Caps

### AFO Design:

- A. Reinforced shell with plantarflexion stop in posterior trim line.
- B. Posterior strap as dorsiflexion control/stop.

### Functional considerations:

#### Use of stops to limit motion:

- A. The plantarflexion stop provides foot drop control.
- A. The stop can be adjusted (by grinding) to fine tune joint angle.
- B. The dorsiflexion control strap provides sagittal stabilization of the knee (assisting knee extension).

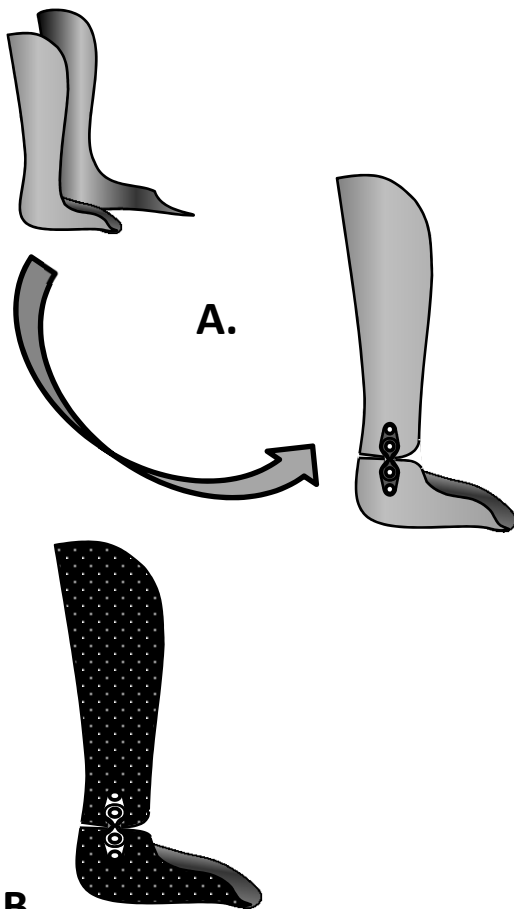
### Clinical Indications:

- A. Drop foot
- A. CVA and flaccid paralysis
- B. Moderate weakness of the quadriceps muscle and related knee instabilities.
- B. When adjustable range of dorsiflexion is required.

# Tamarack Flexure Joint® Indications for Use Guide

## Tamarack Flexure Joint® Caps

Joint Selection: *Free Motion or Dorsiflexion Assist*



**B.**  
Caps as a joint  
cavity option for:  
**Carbon fiber or  
Pre-Preg-AFO**

### AFO design:

- **A.** Rigid (non-articulated) AFO for the early phase treatment protocol.
- External Flexure Joint® Caps can be used to transform a non-articulated (solid) AFO into an articulated design. (Requires Tamarack Flexure Joints)
- **B.** Facilitating installation of Flexure Joints® in composite materials.

### A. Functional consideration:

- Easy conversion of a non-articulated AFO into an articulated one.

### B. Functional considerations:

- Caps for Composite AFOs
- Eliminates necessity for dummy
- Facilitates manufacturing processes

### Clinical Indications:

- When the rehabilitation process allows for/requires increased ROM.
- Articulated version when use of dummy and/or vacuum forming is difficult.

### Clinical Contraindications:

- Weak quadriceps
- Un-controlled fluctuating edema
- High impact sports

*Drawings do not suggest a particular length of footplate. Footplate length and shoe features have a significant effect on gait safety and gait efficiency.*

# Tamarack Flexure Joint® Indications for Use Guide

## Acknowledgements



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Gary Bedard, CO  
Daniel Brams, CPO  
Charles Kuffel, CPO  
Nick LeCursi, CO  
Peter Poetsma, CPO  
Wilfried Raab, CPO  
Phil Stevens, CPO  
Heinz Trebbin, CPO



# Tamarack Flexure Joint® Indications for Use Guide

## Disclaimer

The Tamarack Flexure Joint® Indications for Use Guide was designed by Tamarack Habilitation Technologies Inc. and was clinically edited by external professional peers.

The Guide cannot be considered the sole determinant of the optimal solution for any specific individual with a disability, pathology or trauma-related orthotic problem. Individual cases may vary greatly from any norm. Departures from componentry and other design features suggested in this document may therefore be appropriate in such cases.



**Tamarack®**  
HABILITATION TECHNOLOGIES, INC.

1670 - 94<sup>th</sup> Lane NE, Minneapolis, MN 55449 USA

Tel: ++ 763-795-0057 Toll-Free: 1-866-795-0057

Visit our website: [www.tamarackhti.com](http://www.tamarackhti.com)