METALCRAFT

SUBASIS BAR HANDBOOK

Everything you need to know about subasis bars and more!

METALCRAFT INDUSTRIES, INC.

P.O. Box 75 • 399 North Burr Oak • Oregon, WI 53575

Telephone: (608) 835-3232 • FAX: (608) 835-9180 • Email: Customer-Service@Metalcraft-Industries.com

HISTORY/BACKGROUND

The subasis bar was developed by the University of Wisconsin Hospital's Department of Rehabilitation Engineering. The first publication on the subasis bar was in the 1985 RESNA eight annual conference proceedings. This paper is reprinted at the end of this handbook with RESNA's permission. Since 1985, the subasis bar has been used successfully with thousands of clients.

Metalcraft Industries was the first commercial source for the subasis bar. It is still the only source for the original subasis bar. Other manufacturers have offered alternatives, but none have proven as popular.

THE THEORY BEHIND WHY THE BAR WORKS

The subasis bar was designed for individuals with very high tone, especially those for whom a more flexible device such as a "seat" belt does not work. The concept behind the subasis bar is to first position the client in sufficient hip flexion to break up the excessive extensor tone. The subasis bar then holds the client in this posture. The bar should be mounted just below the Anterior, Superior Illiac Spine (A.S.I.S.) of the pelvis (Figure 2, Page 6). The effectiveness of the subasis bar is greatly enhanced by a seat with anterior thigh support, such as an anti-thrust seat, and a back providing posterior support to the pelvis such as a biangular back. Subasis bars are especially effective whin combined with Metalcraft's AS5000 Contoured Modular seating system.

The subasis bar is also effective in controlling pelvic rotation. One side of the subasis bar limits the side of the pelvis that is attempting to rotate forward. The other side of the subasis bar has little effect, since that side of the pelvis is attempting to rotate posteriorly.

POTENTIAL PROBLEMS/CONCERNS

1. The bar must be positioned below the A.S.I.S. For very small individuals, the A.S.I.S. may not be sufficiently above the top of the thigh for this location to be achieved. If a larger individual is lacking in hip flexion, the A.S.I.S will be rotated both posteriorly and inferiorly thus positioning the A.S.I.S. at or below the top of the thigh.

2. Attempting to reduce pressure on the bar by mounting it more anteriorly will actually increase the pressure between the client and the subasis bar. Remember that the theory behind the subasis bar was to hold the individual in a posture with reduced extensor tone. When the bar is positioned too far anteriorly, the individual can rotate his pelvis posteriorly and slide forward thus increasing extensor tone.

3. If the client wears diapers, the number or thickness of the diapers must be consistent in order for the subasis bar to fit properly. This thickness problem does not apply to winter coats, since the coat would go over the bar.

4. Long time users of a subasis bar may develop a thickening or toughening of the skin near the bar. This appears to be nothing more than a callous, albeit in an unusual location.

YOU WANT TO USE A SUBASIS BAR, WHAT EQUIPMENT DO YOU NEED?

In general you need 3 separate items:
The Bar Itself, the ***Interface Hardware*** and the ***Mounting Brackets.*** See pages 3 and 4 for more information on these individual components.

Metalcraft offers many options so that you can meet any need. In order to simplify ordering, we have ***Commonly Used Prepackaged Kits***. See page 2 for more information on these kits. These kits let the dealer order all three items, bar, interface hardware and mounting hardware with one part number.

If you're ordering a Metalcraft seating system with a subasis bar, just check off the subasis bar on the seating system order form and the correct interface and mounting hardware will be included and installed.

Metalcraft Industries, Inc. • P.O. Box 75 • 399 North Burr Oak • Oregon, WI 53575
Telephone: (608) 835-3232 • FAX: (608) 835-9180 • Email: Customer-Service@Metalcraft-Industries.com

Commonly Used Prepackaged Kits

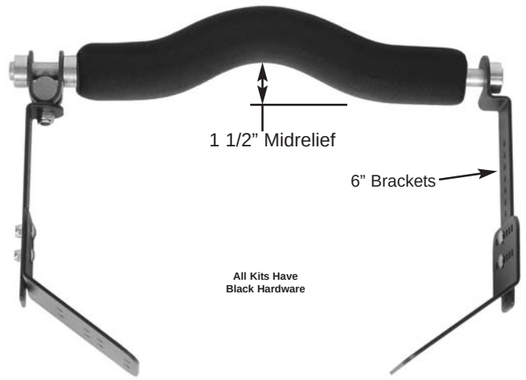
Metalcraft Modular Seating (MMS) Kits

This kit has all the components to mount a subasis bar to a Metalcraft Modular seat cushion.

Information we need for your order:
1. Part number from below.
2. Wheelchair size

5230 Swingaway Subasis Bar, RLH, MMS
5231 Swingaway Subasis Bar, FLH, MMS

RLH = Rear Latching Hardware
FLH = Front Latching Hardware



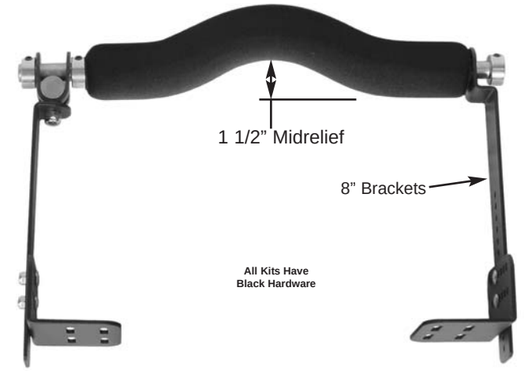
Flat Full-Width Seat (FFWS) Kits

This kit has all the components to mount a subasis bar to a flat bottom full width seat cushion.

Information we need for your order:
1. Part number from below.
2. Wheelchair size

6230 Swingaway Subasis Bar, RLH, FFWS
6231 Swingaway Subasis Bar, FLH, FFWS

RLH = Rear Latching Hardware
FLH = Front Latching Hardware



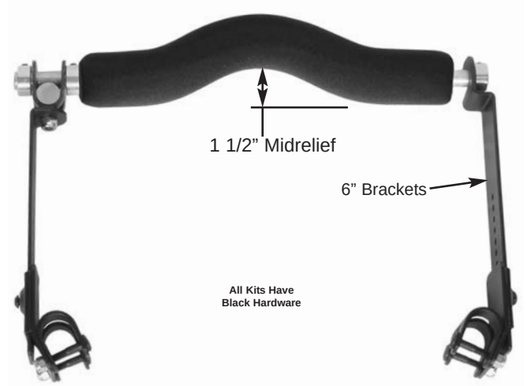
Flat Drop-In Seat (FDIS) Kits

This kit has all the components to mount a subasis bar to the seat tubes when using a drop-in seat.

Information we need for your order:
1. Part number from below.
2. Wheelchair size
3. Seat Mounting Tube Size.

6233 Swingaway Subasis Bar, RLH, FDIS
6234 Swingaway Subasis Bar, FLH, FDIS

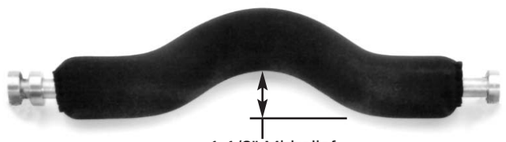
RLH = Rear Latching Hardware
FLH = Front Latching Hardware

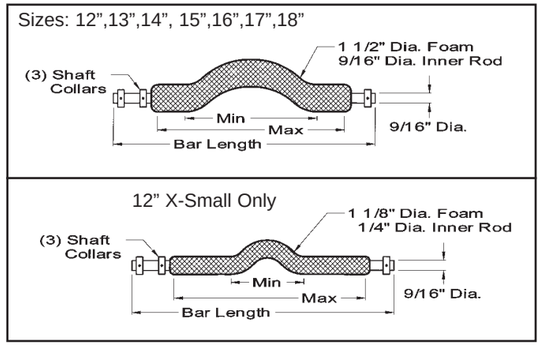


Metalcraft Industries, Inc. • P.O. Box 75 • 399 North Burr Oak • Oregon, WI 53575
Telephone: (608) 835-3232 • FAX: (608) 835-9180 • Email: Customer-Service@Metalcraft-Industries.com

The Bar Itself

Metalcraft offers standard sized subasis bars to fit 12”, 13”, 14”, 15”, 16”, 17” and 18” wheelchairs. An extra small size with reduced diameter is available for 12” wheelchairs. The bar size refers to the wheelchair seat width that the bar is designed to fit not the length of the bar. For example, a 16” subasis bar is designed to fit wheelchairs with a seat width of 16”. The bar is actually 17 1/4” long. The “extra” length is needed for the interface hardware. The bars contain a standard sized mid-relief with a depth of 1 3/8”. Custom lengths, straight bars, off-set mid-relief and an extra deep (2 7/8”) mid-relief are available. Contact our customer service department for details.





WHEELCHAIR WIDTH	BAR LENGTH	ASIS MAX LENGTH	ASIS MIN LENGTH
12” X-Small	12” to 15”	8”	3 1/2”
12”	13 1/4”	9”	6”
13”	14 1/4”	9”	6”
14”	15 1/4”	11”	7”
15”	16 1/4”	11”	7”
16”	17 1/4”	13”	8”
17”	18 1/4”	13”	8”
18”	19 1/4”	15”	9”

Custom Options

Straight Subasis Bars
Custom Offset Subasis Bars
Custom Extra Deep Subasis Bars

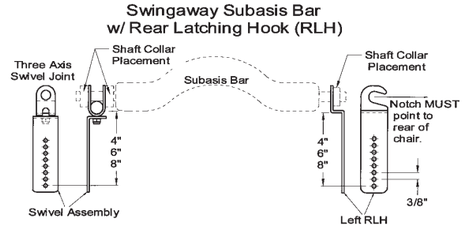
Metalcraft Industries, Inc. • P.O. Box 75 • 399 North Burr Oak • Oregon, WI 53575
Telephone: (608) 835-3232 • FAX: (608) 835-9180 • Email: Customer-Service@Metalcraft-Industries.com

Interface Hardware

Interface hardware is the link between the mounting brackets and the subasis bar. Interface brackets are offered in three designs, swingaway with rear latching hooks (RLH), swing-away with front latching hooks (FLH) and stationary with rear latching hooks. All of the interface hardware brackets can be used with any of the mounting brackets thus many different mounting combinations can be created to fit your needs. The interface hardware is available in either 4”, 6” or 8” lengths. The length needed is determined by the combination of the seat thickness, the thigh thickness and the mounting bracket location. Custom lengths are also available.

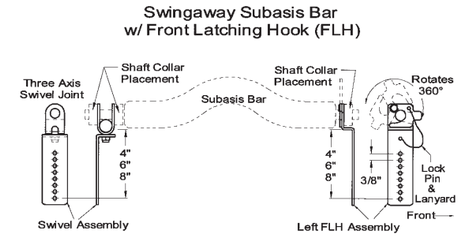
Swingaway Mounting w/Rear Latching Hook (RLH)

With the swingaway interface hardware, the subasis bar is attached to a swivel assembly, which allows the bar to pivot. The bar is held against the client by a hook on the opposite side. When the client transfers into or out of the seating system, the bar is pivoted alongside the armrest or hip pad. When the client is in the seating system, the subasis bar is latched in place by a hook on the side opposite the swivel assembly. For rear latching bracket, the hook points towards the rear of the seating system, The bar is latched or released, by pushing it against the client. Many clients can release the subasis bar and transfer out of the chair. Some customers have mentioned that individuals unfamiliar with subasis bars did not realize that the bar released by pushing posteriorly on the bar.



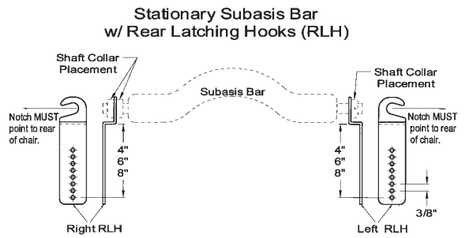
Swingaway Mounting w/Front Latching Hook (FLH)

With the swingaway interface hardware, the subasis bar is attached to a swivel assembly, which allows the bar to pivot. The bar is held against the client by a hook on the opposite side. When the client transfers into or out of the seating system, the bar is pivoted alongside the armrest or hip pad. When the client is in the seating system, the subasis bar is latched in place by a hook on the side opposite the swivel assembly. For front latching brackets, the hook points towards the front of the seating system. Swinging the bar into the hook and rotating the latch over the bar secures the bar in place. A securement pin reduces the possibility of the bar being disengaged accidentally. The front latching interface hardware (FLH) requires fine motor skill in order to remove the securement pin, but it does not require pushing the bar against the client to be released.



Stationary Mounting w/Rear Latching Hooks (RLH)

This alternative has a hook on either side of the seat. The hooks point toward the rear of the seating system. The subasis bar is latched by pushing it into the client and letting it come forward against the hooks. This interface is the least expensive option with a hook on each side. However, since the subasis bar itself is not attached to either side, the bar may be misplaced when it is removed.

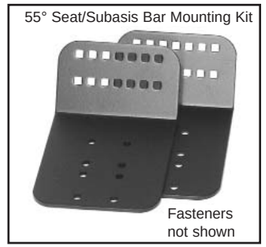


Mounting Brackets

Mounting brackets are used to securely mount the interface hardware to either the seat bottom or the wheelchair frame. The type of mounting brackets needed will be determined by the mounting location. We have five different mounting brackets available that fit into one of the following three categories: angled seat pans, flat bottom seats and tube frame mounting.

Mounting To Seats With Angled Pans

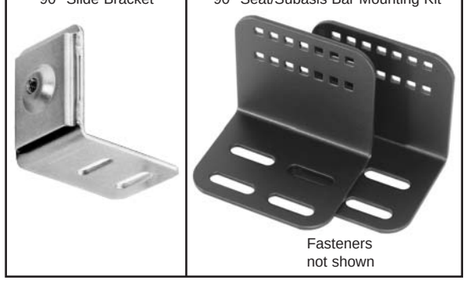
If you’re using a seating system with angled pans that allow the seat to be dropped, such as the Metalcraft Modular Seating System, you can use the 55° Seat/Subasis Bar Mounting Kit. The brackets have an array of holes for adjustability. The kit comes complete with the fasteners needed to mount the brackets to the bottom of the seat pan and the fasteners to attach the Interface Hardware. The brackets are fabricated of high strength 1/8” aluminum for long term use and are only available in black.



Mounting To Flat Bottom Seats

If you’re using a seating system with flat bottom, such as the Metalcraft Plywood & Foam Seating System, you can use either the 90° Seat/Subasis Bar Mounting Kit or two (2) of the 90° Slide Brackets.

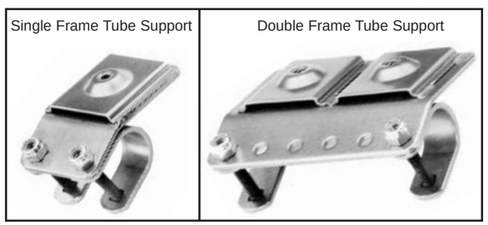
The 90° Seat/Subasis Bar Kit comes with two (2) brackets and the fasteners needed to attach the interface hardware. The brackets have an array of holes for adjustability. The brackets are fabricated of high strength 1/8” aluminum for long term use and are only available in black.



The 90° Slide Brackets mount to the bottom of your seat using the slots. The interface hardware brackets slip into the slide portion of the bracket. The brackets are fabricated from stainless steel and are sold individually. The brackets are available in either a stainless steel finish or a black powder coated finish.

Mounting To The Wheelchair Seat Tubes

If you need to mount to the seat tube of the wheelchair, use the single or double frame tube supports. The brackets are available for tubing sizes 3/4”, 7/8” and 1” and are sold individually. The brackets are available in either a stainless steel finish or a black powder coated finish. The single frame tube support will work in most mounting cases, but for those cases where a cross frame or other hardware is in the way, the double frame tube support is useful to solve the problem. The interface hardware brackets slip into the slide portion of the bracket.



Metalcraft Industries, Inc. • P.O. Box 75 • 399 North Burr Oak • Oregon, WI 53575
Telephone: (608) 835-3232 • FAX: (608) 835-9180 • Email: Customer-Service@Metalcraft-Industries.com

THE SUBASIS BAR: AN EFFECTIVE APPROACH TO PELVIC STABILIZATION IN SEATED POSITIONING

Simon A. Margolis, C.O., Robert M. Jones, Ph.D., Benjamin E. Brown, Ed.D., Department of Rehabilitation Engineering, Rehabilitation Center, University Hospital and Clinics, University of Wisconsin-Madison

ABSTRACT

The components commonly designed to control posterior pelvic tilt (PPT) and increased extensor tone causing "pelvic thrusting" are often inadequate in insuring appropriate, consistent, comfortable, and objectively reproducable seated positioning. The authors have developed a system designed to apply a posterior/inferior force, inferior to the anterior superior iliac spine. The direction and point of application of this force effectively reduces PPT and virtually eliminates positioning problems caused by increased extensor tone at the hips.

INTRODUCTION

One of the most difficult, and universal problems facing the professionals involved in the seated positioning of non-ambulatory individuals is posterior pelvic tilt. For purposes of this presentation, posterior pelvic tilt (PPT) is measured with the client/patient in a seated position with hips in 90 degrees of flexion, or to the degree of flexion allowed by passive range of motion. Using this position as neutral; PPT is described as a deviation in which the posterior superior iliac spines move posteriorly and inferiorly.

NOTE: In describing and measuring flexion angle at the hips for purposes of determining seat-to-back angle in the design of seated positioning orthoses; it is critical to differentiate between true hip flexion occuring in the acetabulum, and apparent hip flexion occurring at the lumbosacral junction or even more superiorly in the lumbar region of the spine.

BACKGROUND

Etiology

The etiology of PPT are myriad. In our experience many cases of PPT are unfortunately caused by, or at the very least exacerbated by, inept attempts at providing seated positioning equipment. A common example of this is illustrated in Figure 1. To successfully reduce PPT it is essential to apply a posteriorly directed force inferior to the anterior superior iliac spine (ASIS). If the force is applied superior to the ASIS, it will actually increase the problem, and increase the attendant spinal deformities.

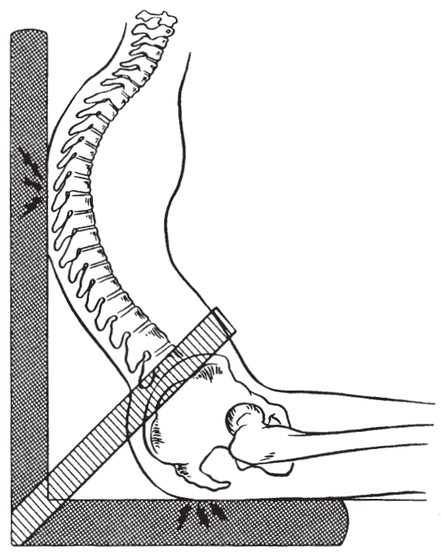


FIGURE 1

Increased extensor tone at the hips

A second area of concern in dealing with pelvic stabilization is much more active and violent. It is a situation typified by "pelvic thrusting" and usually caused by increased extensor tone at the hips. There is usually minimal structural or functional deformity, probably due to the fact that it is an intermitent phenomenon. The thrusting may be symetrical in the medial/lateral plane, or it may include a rotational component.

One key factor in the success of designing appropriate seated positioning systems for individuals with this type of involvement is to match the seat-to-back angle of the seating system to the limitations (if any) of actual acetabular hip flexion available. It seems almost universal practice in dealing with increased extensor tone, to use a seat to back angle anywhere from 85 degrees to an extreme of 60 degrees. This is often done without regard to actual hip flexion available or to potential effect on viscera and internal organs. This approach may be successful in maintaining an individual in a seating system, but will almost inevitably place the pelvis in posterior tilt, introduce a "C" type kyphotic curve, and have a deleterious affect on head control.

We feel that the more rational and appropriate approach to this problem is a combination of a more conservative seat-to-back angle (approximately 85 degrees), 5 to 10 degrees tilt of the entire seated positioning system, and an appropriate pelvic stabilization component to generate a posteriorly/inferiorly directed force applied inferior to the ASIS.

METALCRAFT INDUSTRIES, INC. • P.O. Box 75 • 399 North Burr Oak • Oregon, WI 53575
Telephone: (608) 835-3232 • FAX: (608) 835-9180 • Email: Customer-Service@Metalcraft-Industries.com

Pelvic stabilizers

There are a number of "pelvic stabilizers" in common use. We are not attempting to generate a comprehensive listing of all pelvic stabilization components. The three most common types of components are: the "seat" belt, peroneal (groin) straps, and the "pommel".

"Seat" belts. The seat belt can be an extremely effective tool if used correctly. If the seat belt is attached so that the line of pull is below the ASIS in a posterior/inferior direction and it is securely fastened it will ususally be successful in maintaining pelvic alignment. The major failing of the seat belt is that it`s appropriate use is entirely subjective. How tight is "securely fastened"? Even a loosely fastened seat belt will keep the individual in his wheelchair, but not necessarily appropriately positioned. If the seat belt is loosely fastened, and the person is allowed to "thrust" against it repeatedly, the shear force generated will evevntually cause discomfort and the potential for breakdown. Because of the inherent flexibility of a webbing belt, the seat belt conforms to the rounded contours of the pelvis and is usually ineffective in dealing with pelvic rotation.

Peroneal straps. Because they apply a posteriorly directed force lateral to midline, and usually well inferior to the ASIS, peroneal straps are effective in dealing with pelvic rotation. There is the same subjectivity involved in the proper securing of the peroneal straps as is involved in proper use of a "seat" belt. The additional problem of acceptance of "groin" straps, especially by older client/patients, is a concern.

"Pommels". The third, commonly used "pelvic stabilizer", is the "pommel". We firmly believe that the groin is not an appropriate weight bearing area. There is the obvious problem of the external genitalia. Applying force to the area of the symphisis pubis may be somewhat effective in limiting the amount that the patient/client can slide forward as a result of PPT and/or "thrusting. It does not, however, effectively reduce pelvic tilt, nor does it have an effect on pelvic rotation. We feel, however, that the use of a well designed "pommel" as an abduction wedge to reduce adduction contracture and to maintain hip alignment is appropriate.

SUBASIS BAR

To adequately address the need for reduction of posterior pelvic tilt, to maintain pelvic stability in the case of increased extensor tone, to prevent pelvic rotation, and to provide for consistent, objective repositioning by various primary care givers, we have developed the subasis bar.

Design. The subasis bar is a round, padded aluminum bar which attaches to the lateral hip pads of a seated positioning system. The diameter of the aluminum bar ranges from 1/4" to 3/4", depending on the size of the patient/client. The bar is covered with 1/2" of pelite; a dense polyurethane foam. It is inserted in a slot in one lateral hip pad and then secured into a spring loaded bracket on the opposite lateral hip pad. It is designed to be fastened and removed using one hand. This allows for maintaining appropriate pelvic alignment while inserting the subasis bar. Consistent,reproducable,objective repositioning is assured because the subasis bar mounting system allows for only one appropriate position.

Location. The subasis bar is carefully positioned to fit in the area of the femoral (Scarpus) triangle (see Figure 2). This is the anatomical area bordered by the sartorius, the inguinal ligament, and the adductor tendon. This area, especially during sitting when the adductor tendon is relaxed, provides a viable area to apply force. This is the same area that is utilized by the prosthetist for suspension of the quadralateral socket of a prosthesis for an above-knee amputee.

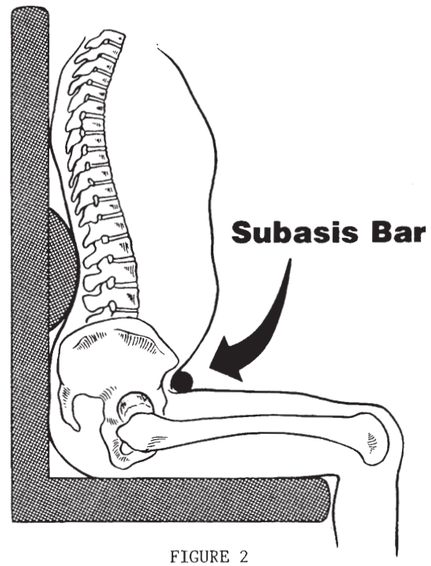


FIGURE 2

Clinical parameters. To be effective, the subasis bar must be used in conjunction with a well designed seated positioning system including a minimum of a firm padded seat and back, and lateral hip pads. The client/patient must be positioned so that the sacrum is perpendicular to the seating surface and parallel to the back surface. Hip flexion to 90 degrees is desirable; pelvic tilt reduced to neutral is optimal, though we have had some success with moderate, fixed deformities. In the seated position, with the hips flexed to 90

METALCRAFT INDUSTRIES, INC. • P.O. Box 75 • 399 North Burr Oak • Oregon, WI 53575
Telephone: (608) 835-3232 • FAX: (608) 835-9180 • Email: Customer-Service@Metalcraft-Industries.com

degrees, there must be at least 3/4" clearance between the inferior surface of the ASIS and the shaft of the femur.

Clinical experience

The subasis bar has been used in over 50 cases. In all cases, posterior pelvic tilt was reduced to neutral; as allowed by passive range of motion. Problems with maintaining appropriate position due to "pelvic thrusting" have been virtually eliminated. Positioning of the subasis bar inferior to the anterior superior iliac spine eliminates the potential for breakdown over bony prominences. Patient/client and primary care giver acceptance and compliance is assured through careful explanation of the rationale behind the design of the subasis bar.

Dept. of Rehabilitation Engineering
University Hospital and Clinics
University of Wisconsin-Madison
600 Highland Ave. E3/211
Madison, Wisconsin 53792

"Serving The Needs Of Seating Professionals Since 1984"

METALCRAFT INDUSTRIES, INC.

P.O. Box 75 • 399 North Burr Oak • Oregon, WI 53575

Telephone: (608) 835-3232 • FAX: (608) 835-9180 • Email: Customer-Service@Metalcraft-Industries.com