

Orthopaedic Leathers

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In researching this article I received quite different answers. A shoe manufacturer stated there were no orthopaedic leathers, whereas a tanner exclaimed 'Rubbish, I have been supplying orthopaedic leathers for years and sell them world-wide'. Both are right to an extent. You can have a bovine or a sheep leather and there is no argument if they have been made from the correct animal skin. You can make key-fobs from off-cuts of shoe leather, but that hardly converts the shoe leather into key-fob leather. Upholstery leather is also used to line boardrooms or splits to provide a covering for tabletops.

Orthopaedic leathers can be used for general footwear purposes and be regarded as merely good quality leather, so the footwear manufacturer is correct in that sense. To him, there is nothing peculiar that would distinguish it from other leathers that he purchased to make boots or shoes. Indeed, he could buy them from the tanner who sells the same leather to the orthopaedic specialist. The tanner is also correct in that he supplies leathers which are ideally suited for the specific purposes of orthopaedic footwear.

So why are orthopaedic leathers any different? One of the problems is that the market is limited and specialised and that there are no general specifications or descriptions. The term orthopaedic refers to bones and their malformation and support. Orthopaedic footwear is therefore made for people with deformed feet. It is also used to support fallen arches and weak ankles, where the legs are supported by calipers. Here, the footwear is modified to incorporate these metal parts and may be supplied as a complete unit.

Even if you have odd shaped feet, which cannot be fitted by standard footwear sizes, you may have to use orthopaedic footwear. So our definition of orthopaedic leather is simply the kind of leather used for orthopaedic purposes, and it is immaterial whether it can also be used for ordinary shoes or as a prosthetic leather. Not all tanners of orthopaedic leathers will supply the complete range of leathers required by the specialist manufacturer, so the likely sources will now be considered.

Soling leathers

A traditional, sole leather tanner can supply vegetable tanned sole leather, which has the desired stability and support required for an orthopaedic shoe. Having said this, however, it is true to say that some tannages are more suitable than others. While all vegetable tanned leathers have good wet mould-ability and good set, oak bark is by far the best and is therefore most suited to the hand operations so often required for orthopaedic footwear. Due to low volume availability and high cost, it is only used where the properties are beneficial and the cost can be passed on in the final product.

The demand for oak bark tanned leather is in fact so great, that



Figure 1: Image courtesy of Jane Saunders & Manning, London, UK.

more leather is described as 'oak bark tanned' than the total available amount of oak bark and valonia (gall nuts of the oak tree giving similar properties) available. A frequently used alternative is sweetened chestnut, which gives a similar result, although it cannot be referred to as oak bark. The mellowness results from a slow tanning process, carried out in a series of pits. Unfortunately, this also adds to the cost. Hides intended for soling leather are segmented into butts, shoulders and bellies and tanned separately. Their final uses are generally as follows:

- Butts – actual soles.
- Shoulders - welts, insoles & supports.
- Bellies - toe-puffs, counters, etc.

Orthopaedic footwear is usually trial fitted and often requires alteration. Despite the advances made in modern synthetic materials, oak bark leather toe-puffs and counters are the only ones that will stand up to stripping and relasting.

Upper leathers

Orthopaedic footwear is ideally made to order for an individual person and for a specific problem. The one-off nature of the product determines the properties required of the leather. It has to be versatile, long lasting and non-allergenic. In particular, it must be more stretchy than normal to accommodate a protruding joint and still achieve good set, i.e., the achieved stretch must be maintained in wear and neither extend further or fall in. It is this property in particular that

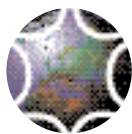


Figure 2: A set of leg calipers used as an added support for weak legs and ankles.

Courtesy of Jane Saunders & Manning, London, UK.

characterises orthopaedic leather. For maximum comfort, it must also be soft and have good water vapour permeability (WVP).

This is achieved by using either full vegetable tannage, or chrome with a heavy vegetable re-tannage, to provide the set required after lasting. To provide the extra stretch for this end purpose, the leather has to be less stretched in processing, and the resultant poorer area yield accounts for the higher price of this type of upper material.

Finishing can be conventional but the need for good WVP must be borne in mind. Greater permeability provides greater comfort in wear, and for problem feet, anything which reduces problems is beneficial. If a pigment, as opposed to an aniline finish, is involved, the type of finish used is important. Casein finishes have the best WVP but require a full grain leather and have only moderate wet rub fastness. Resin finishes give reduced - but adequate - WVP but with improved fastness. They also permit corrected leather to be used. Urethane finishes give good fastness, while WVP depends on the thickness of the finish applied.

Lining leathers

These are crucial to good performance in the final shoe and the suppliers of orthopaedic lining leathers pride themselves on the quality and performance of the leathers they produce. The basic requirement is for a high quality, stretchy leather, which will conform easily to the high lasting strains demanded by difficult last shapes. It will generally be totally non-dyed and have either little or no finish to maximise comfort and avoid staining of hose. Although the lining can be made of sheep leather for ultra softness for very delicate foot conditions, more normally the favoured raw materials are calf (see *World Leather* No 2 April 2003 p73), bovine split or goat, and all vegetable tanned in much the same way as for upper leather.

Prosthetic leathers

These are used in connection with artificial limbs. In most cases they provide the connecting link between the body and the artificial arm or leg. The leathers provide both support and comfort. A good example is the leather component of a set of leg calipers as shown in *Figure 2*, which clamps it to the patient's leg



Figure 3: Moulded leather jacket for support and posture correction of a spinal condition. Courtesy of Jane Saunders & Manning, London, UK.

while the lower end locates in an auto ring lock system built into the shoe. The corset is moulded from oak bark leather, which provides accurate support for the attachment. It is lined with chamois, which is extremely soft to prevent chafing and also absorbs and transmits perspiration. Time and experience has shown this to be an ideal combination.

However, chrome leathers can also contribute excellent properties in terms of comfort and long service. Originally chrome tanned Cordovan (horse) leathers, a uniform degree of stretch and movement in all directions was essential, being provided by the sporadic angle of weave.

Now superseded by cow leathers manufactured to harmonise spread and stretch in all directions, chrome leathers can provide an exceptional level of fit and cushioning around joints that are often both sensitive and awkward-angled. Today the comfort levels and perspiration resistance can be very high as a result of specialised retannages. These linings are non-finished pure dyed aniline leathers of the highest quality, and with the linings displayed as the caliper bucket-tops, in wear the appearance can be very impressive.

The moulded leather spinal corset (*Figure 3*) is again made from a combination of oak bark leather for structural strength and support, with a chamois lining for wearer comfort. The buckle and strap fastening uses traditional harness leather for strength and low distortion properties. All three materials are very traditional in both origin and manufacture. It is clear that, despite the tremendous advances made in mould-able synthetic materials, traditional leathers still offer the tremendous flexibility of application that orthopaedic shoe and appliance manufacturers require. ●