

Considering the Height Compensation

If a height compensation is required, it can be realised, for example, through the orthosis. A height compensation at the orthosis provides the advantage that patients may wear ready-made shoes. The following text describes which steps must be considered when modifying a height compensation, in addition to the steps of the usual modifying technique. One part of the modifying technique is, for example, [Making the Negative Cast with e-Cast](#), where you can find all information regarding the positioning of the plumb line - which is also used in this tutorial - under the subitem "Determining the Ideal Position".

And, if the final model is finished, you can see how to further proceed with the orthosis by using the online tutorial [Producing a Height Compensation](#).

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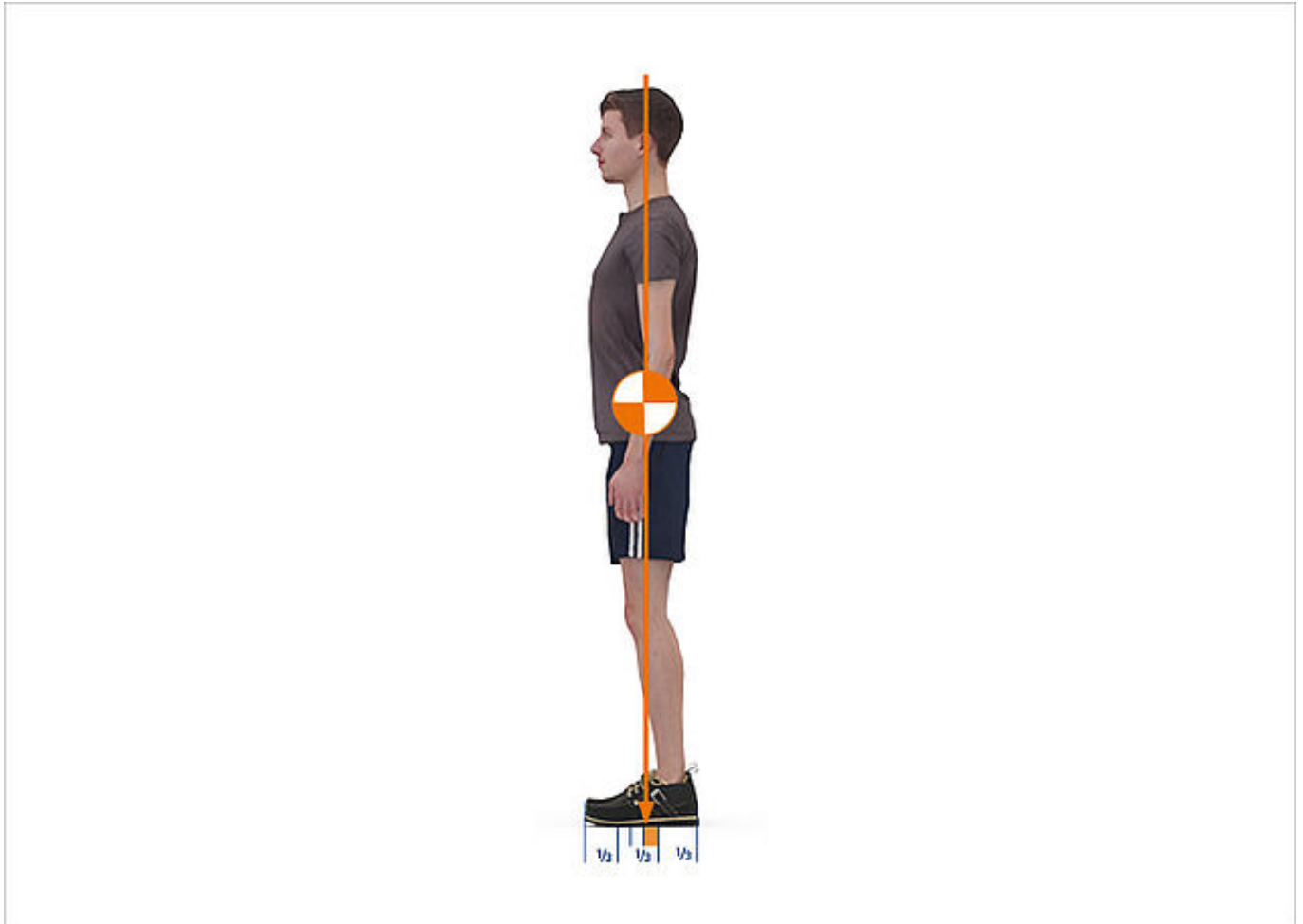
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For the following work steps, the plumb line is used as a reference.

Check the individual normal posture in the sagittal plane with the help of a laser plumb bob. The plumb bob should fall as follows:

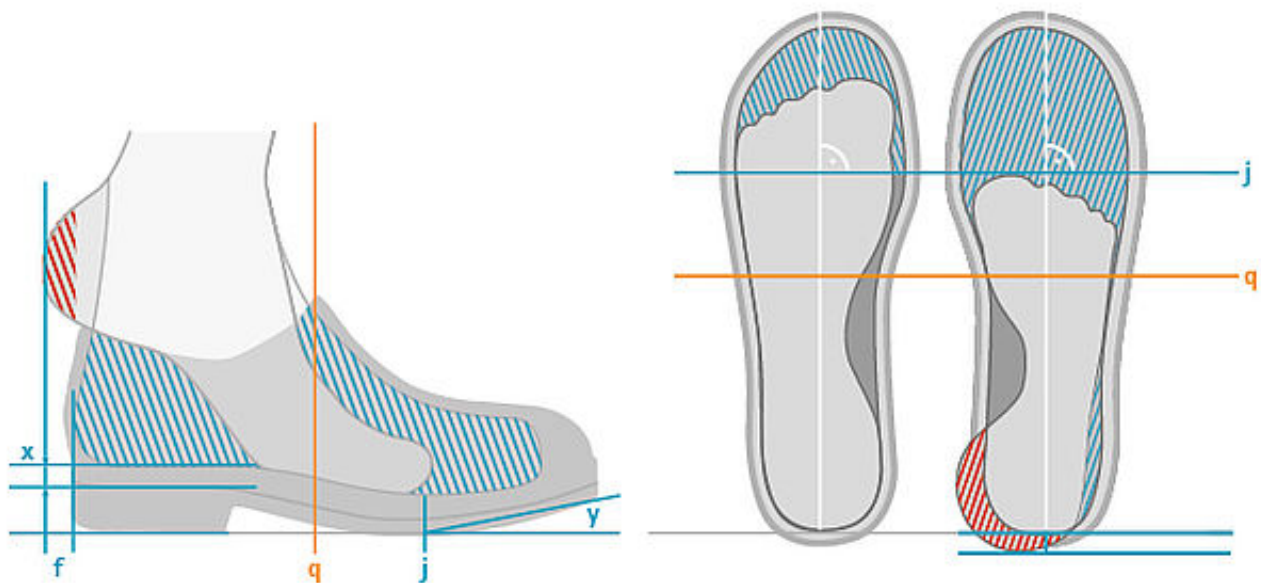
- from the body's centre of gravity,
- across the greater trochanter,
- centrally through the ap measurement at knee height,
- to the rear third of the front half of the supportive area.

With extension deficits, the knee joint does not serve as a reliable point of orientation. If this is the case, approximate the above-mentioned fixed points as closely as possible.

Write down if the plumb line falls through or before the knee's pivot point.

Note: take the length difference of the feet into account, if present.

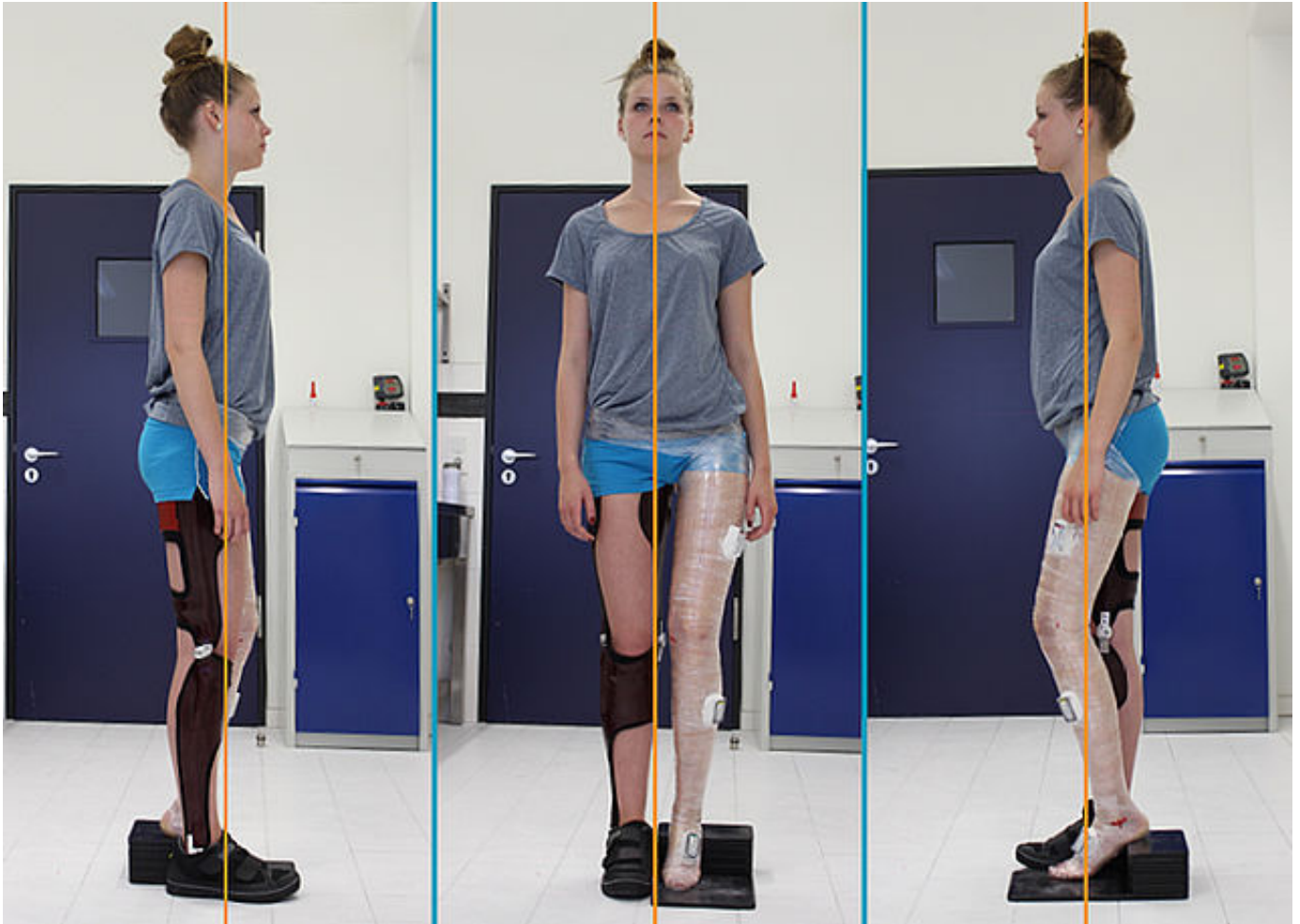
Note: if the patient is unable to stand (even with assistance), mark the plumb bob reference area (orange) on a stencil and write down the values.



When producing a height compensation, it is essential to create a leverage ratio that is similar to the contralateral side. To do so, the following steps are necessary:

- compensate the volume under the heel and in the forefoot area (blue hatching),
- set the heel back (pink hatching),
- define the mechanical rolling-off line (j),
- consider the heel-to-toe drop (x),
- consider the toe spring (y).

Note: mark the plumb and rolling-off line of the healthy/unaffected foot on the shoe's insole (or a copy) and use the insole as a guidance for all further steps.

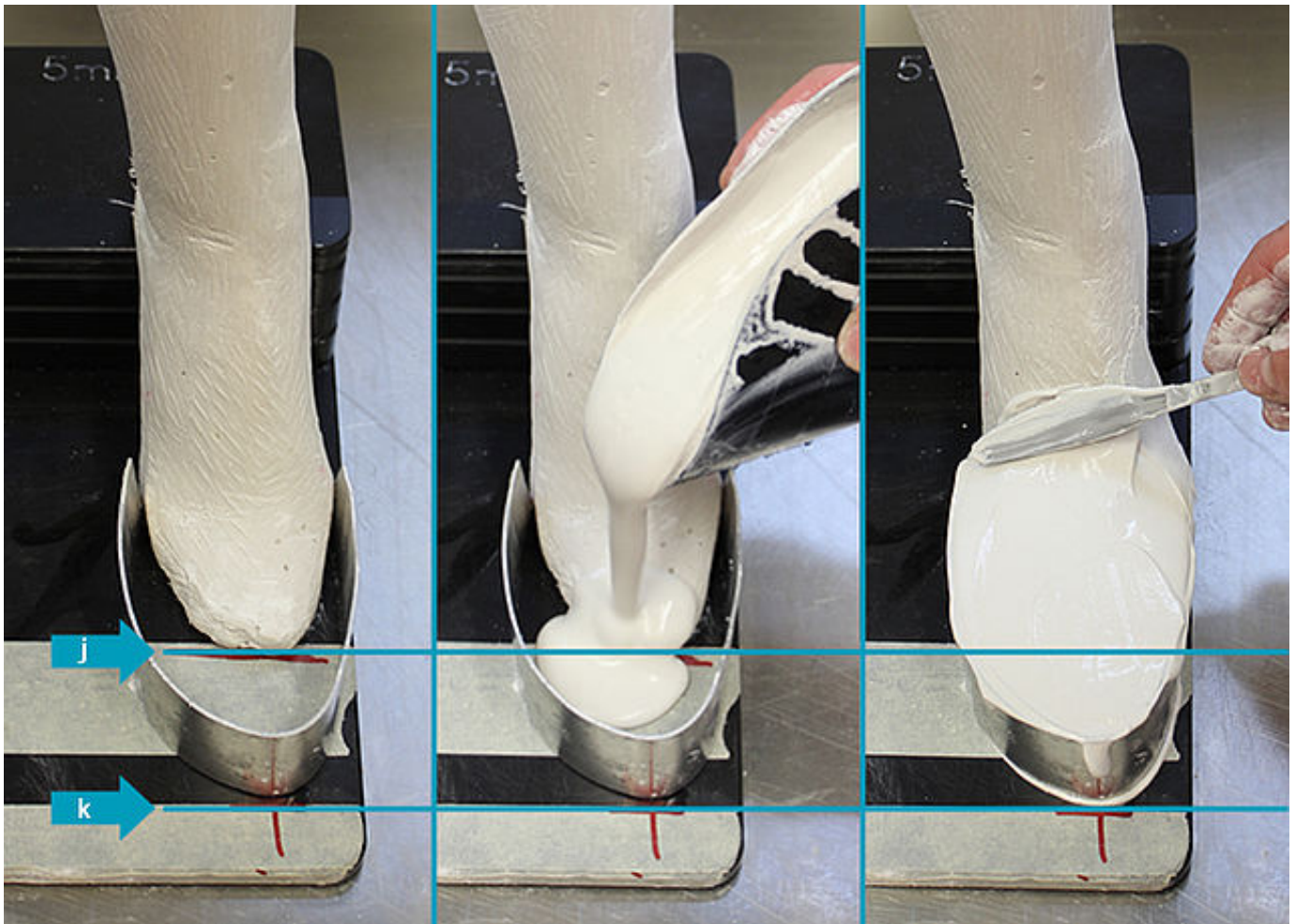


Setting the Ideal Position

You can set the height of the pitch and the height compensation on the h-Cast. On the contralateral sight, the patient may wear an orthosis or also stand on an h-Cast. If possible, the patient stands in the gait-related normal posture. Here, the stance-related normal posture is described:

- feet as close as possible,
- consider the external rotation,
- both legs carry the same load,
- drop the plumb line,
- put the h-Cast back until the plumb line drops correctly and a balanced load on both legs is possible.

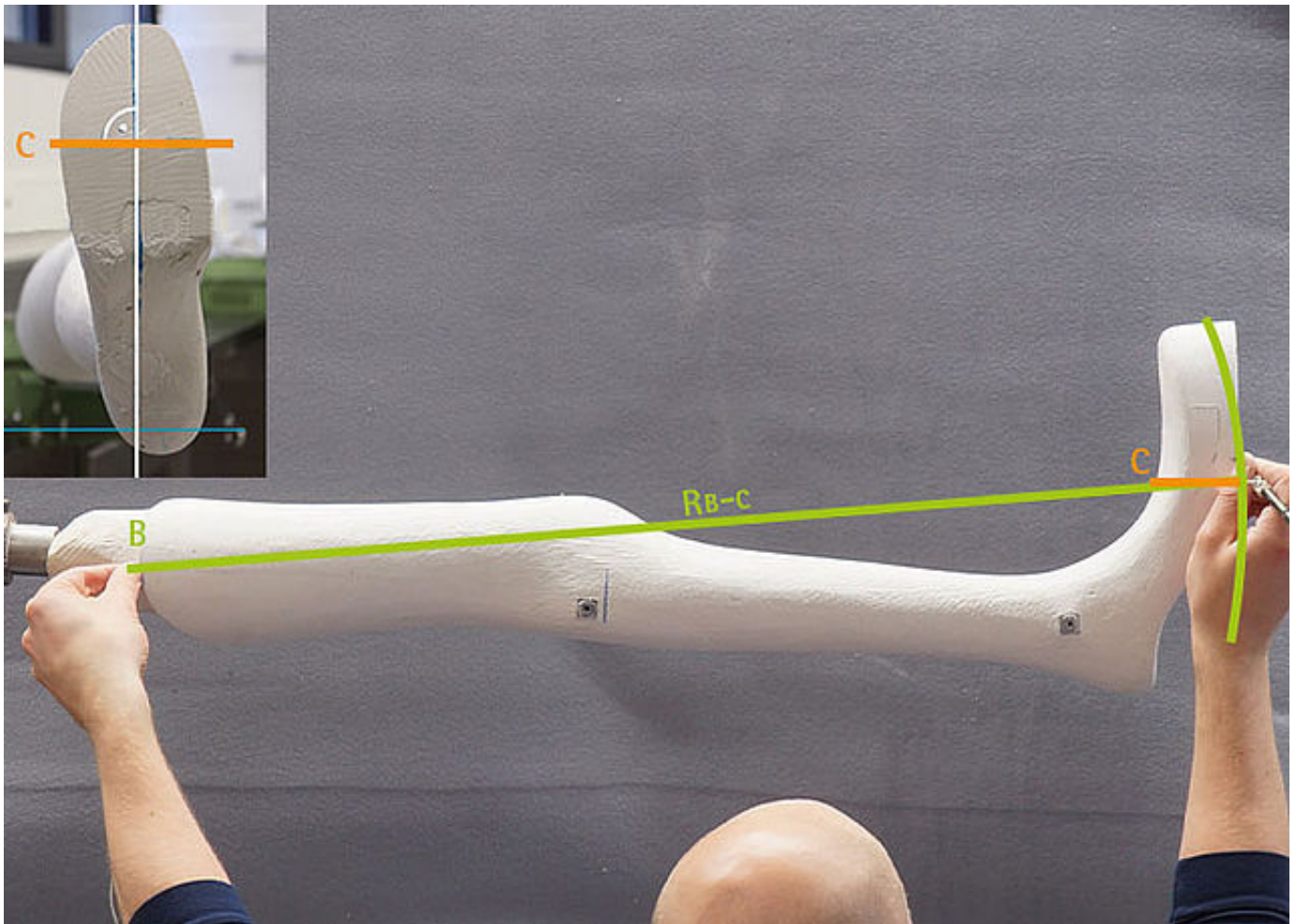
Also consider the online tutorial [Making the Negative Cast with e-Cast](#).



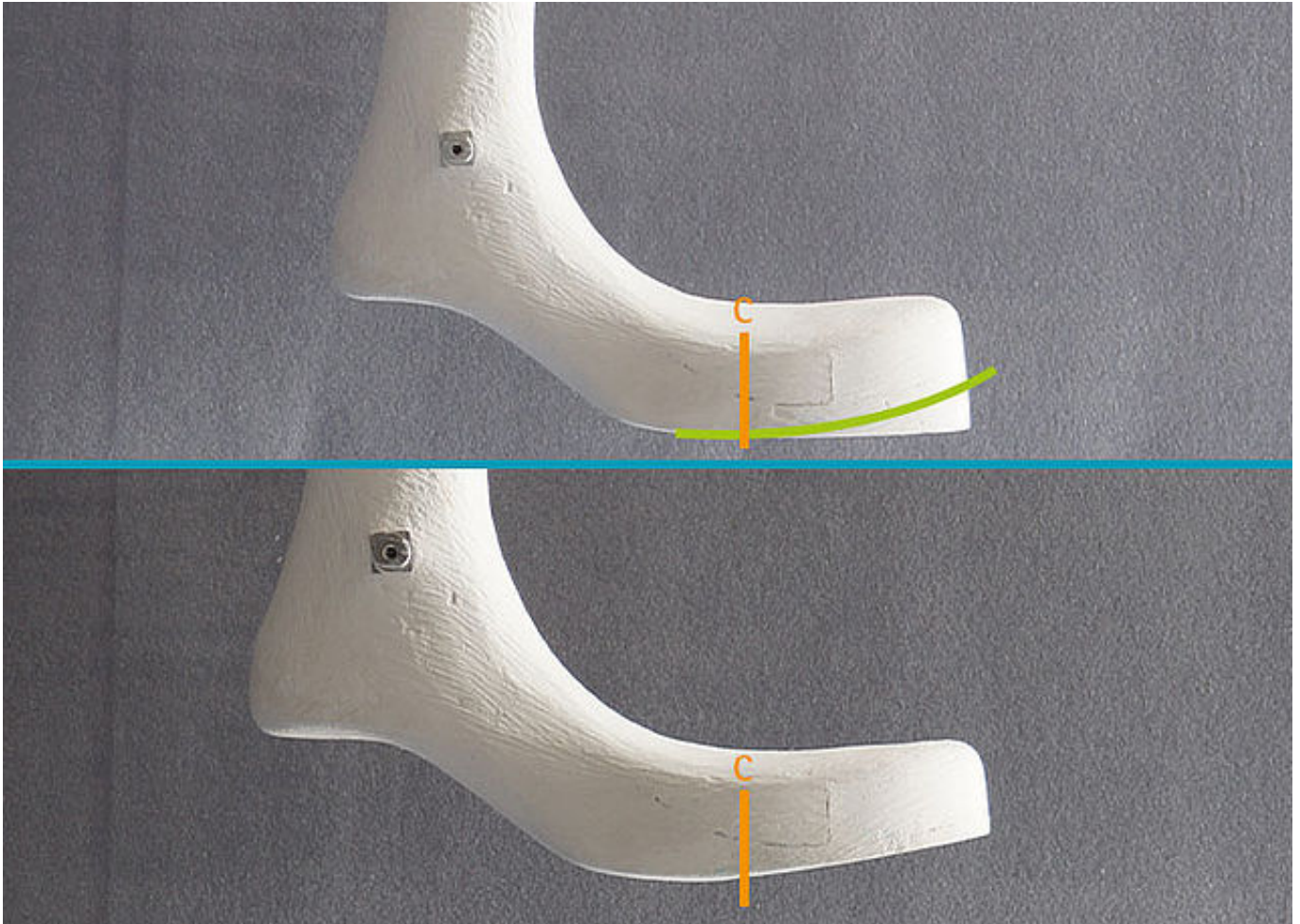
Modifying the Positive Cast

- position the aluminium clasp or similar
- Prolong the forefoot up to k. k stands for the inner shoe dimension and j marks the mechanical rolling-off line.
- fill the form with plaster
- create a smooth transition
- let the model harden

Also consider the online tutorial [Making the Positive Cast](#) and [Modifying the Positive Cast KAFO](#).

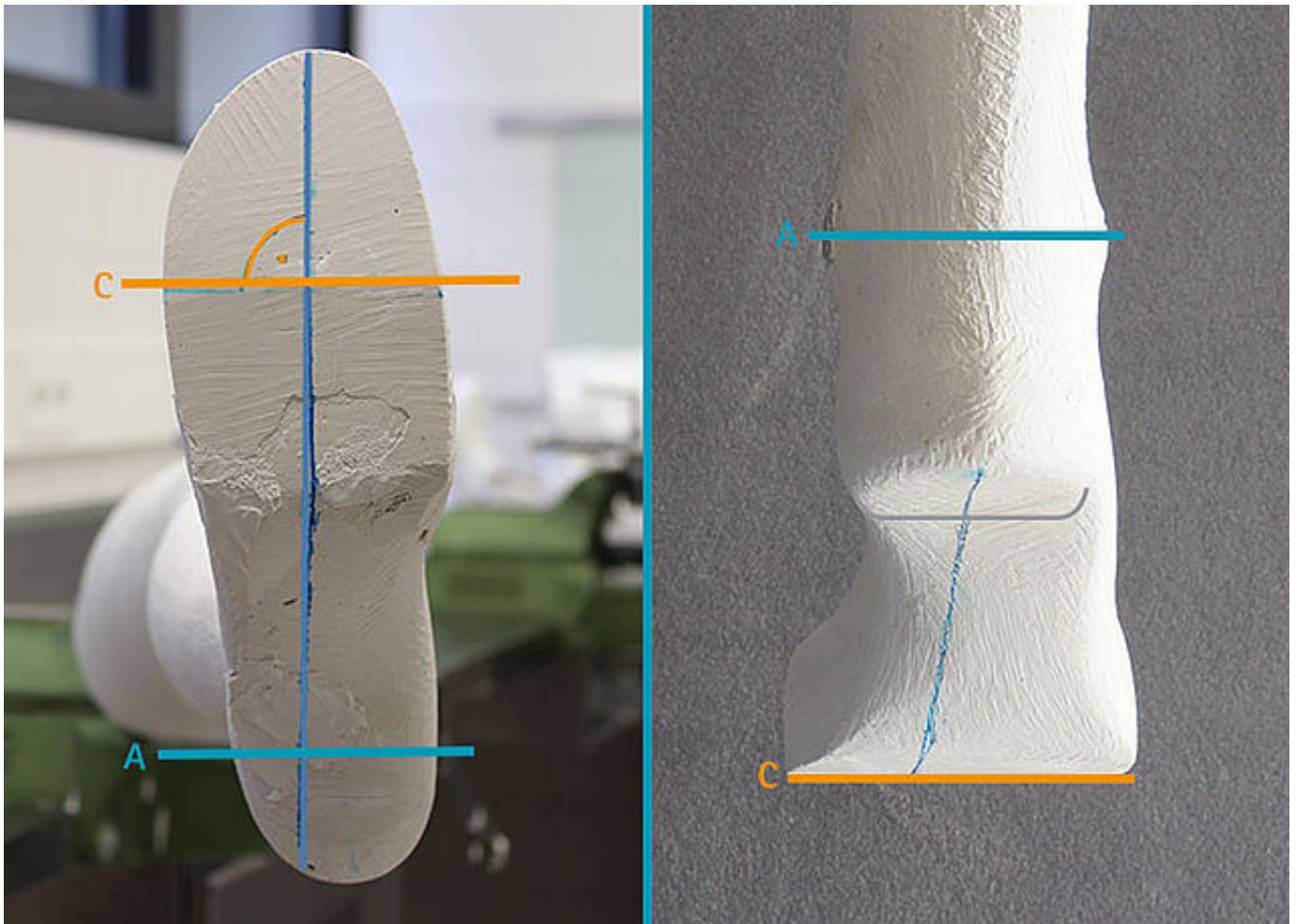


In order to define the toe spring, determine the trochanter (B) first. Tie a string to a pen. The string's length (R) should match the distance from the trochanter (B) to the rolling-off line (C) (R_{B-C}). Hold the string at the trochanter (B) and place the pen at the rolling-off line (C). Use the pen to draw the circle line on the positive cast.



Modify the forefoot area of the foot piece corresponding to the drawn marking.

Note: modify the bottom and the top of the foot piece parallel to one another. This way, the screw clamp can easily be attached in the later work steps.



Mind the parallelism when modifying the foot piece. Modify the heel, the rolling-off area and the forefoot area parallel to the axis/axes.

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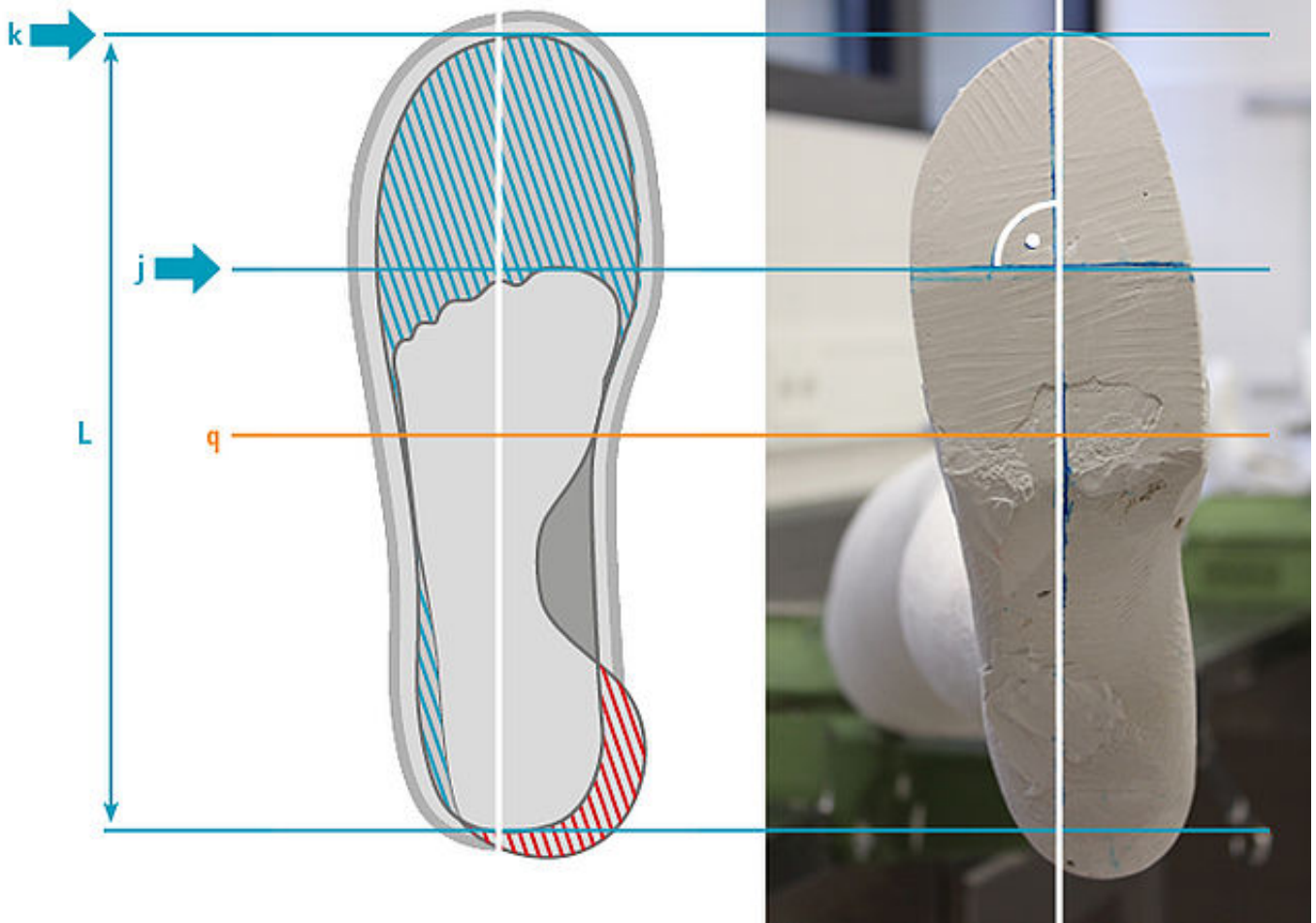
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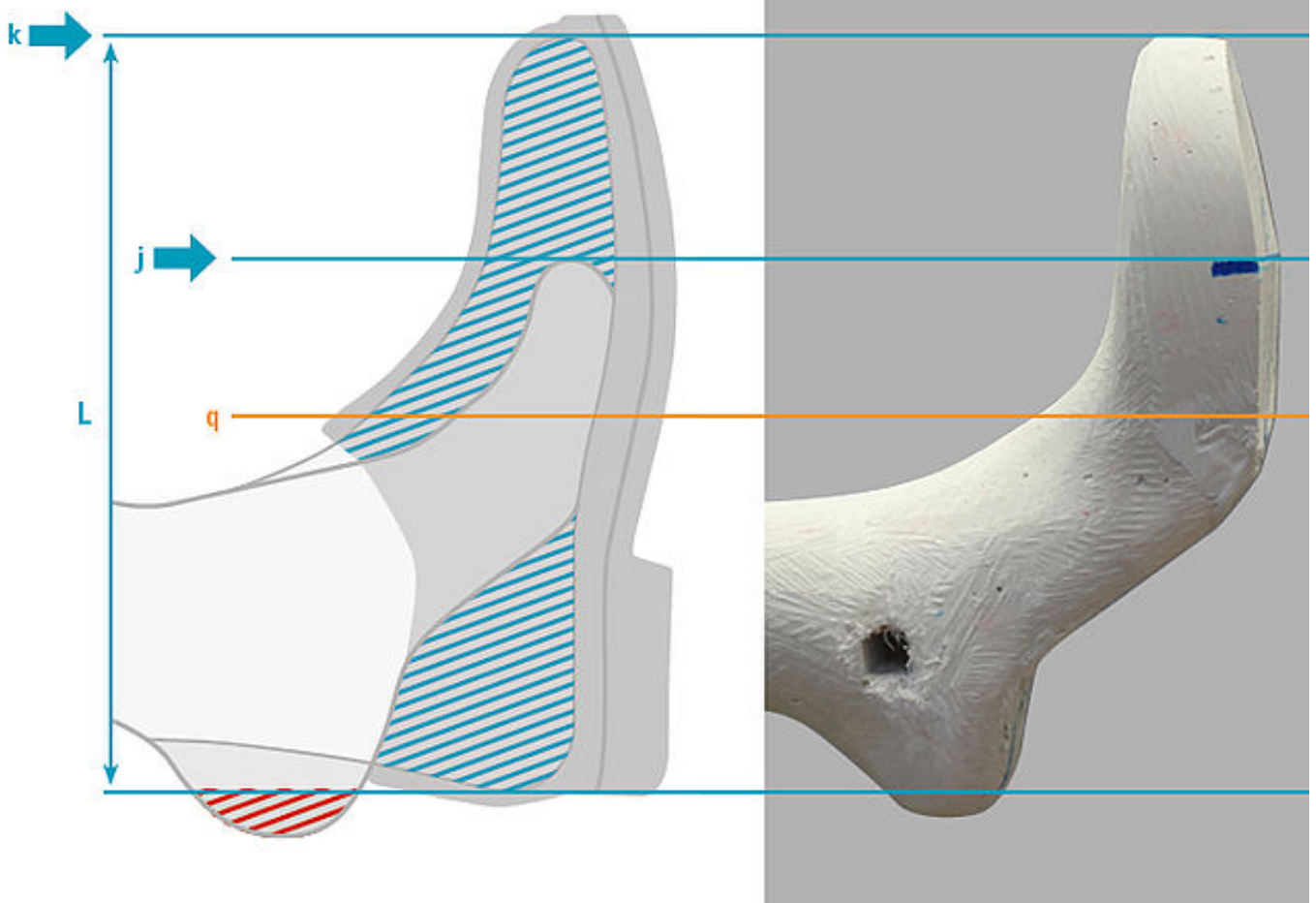
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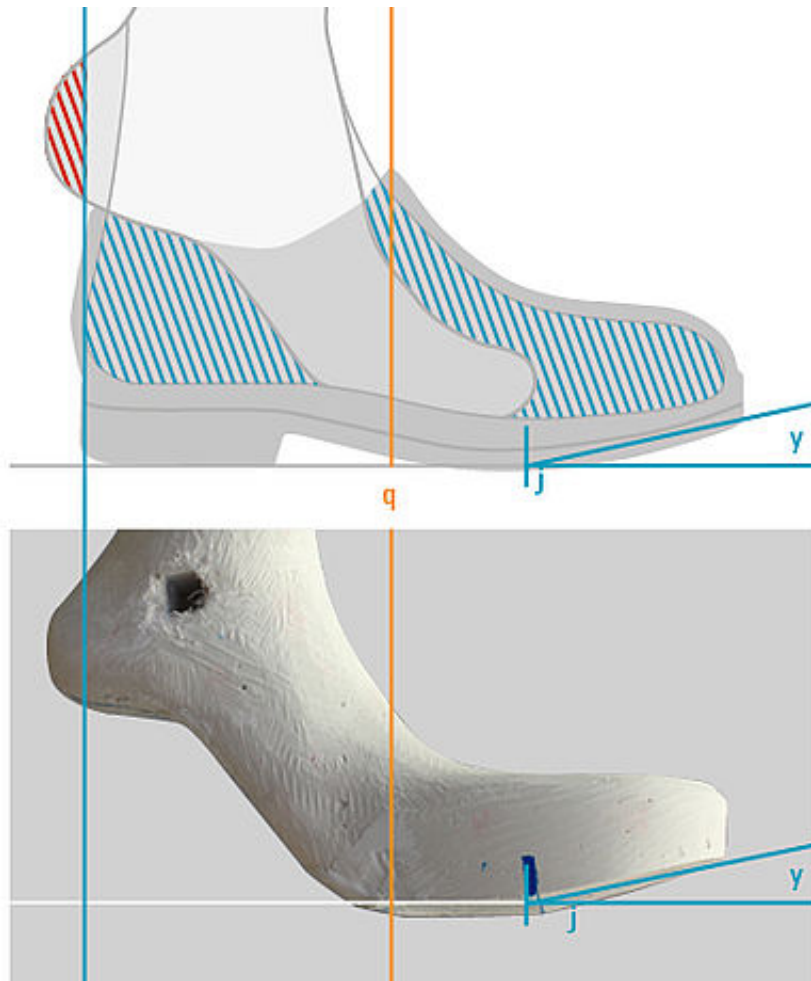
Modified positive cast from below:

- j is the mechanical rolling-off line
- k is the point where the aluminium clasp had been positioned
- l is the inner shoe length (the heel protrudes; pink hatching)



Modified positive cast from lateral:

- j is the mechanical rolling-off line
- k is the point where the aluminium clasp had been positioned
- l is the inner shoe length (the heel protrudes; pink hatching)



Modified positive cast from lateral while standing:

- the toe spring y must be modified
- it begins at the mechanical rolling-off line j

The toe spring is essential for:

- the foot piece's fitting in the shoe
- making a physiological terminal stance possible \square knee remains extended longer \square body's centre of gravity remains at one height \square energy is saved
- making a physiological swing phase possible \square functional shortening of the leg \square swinging freely without compensating (e.g. vaulting, circumduction) possible \square energy is saved

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