

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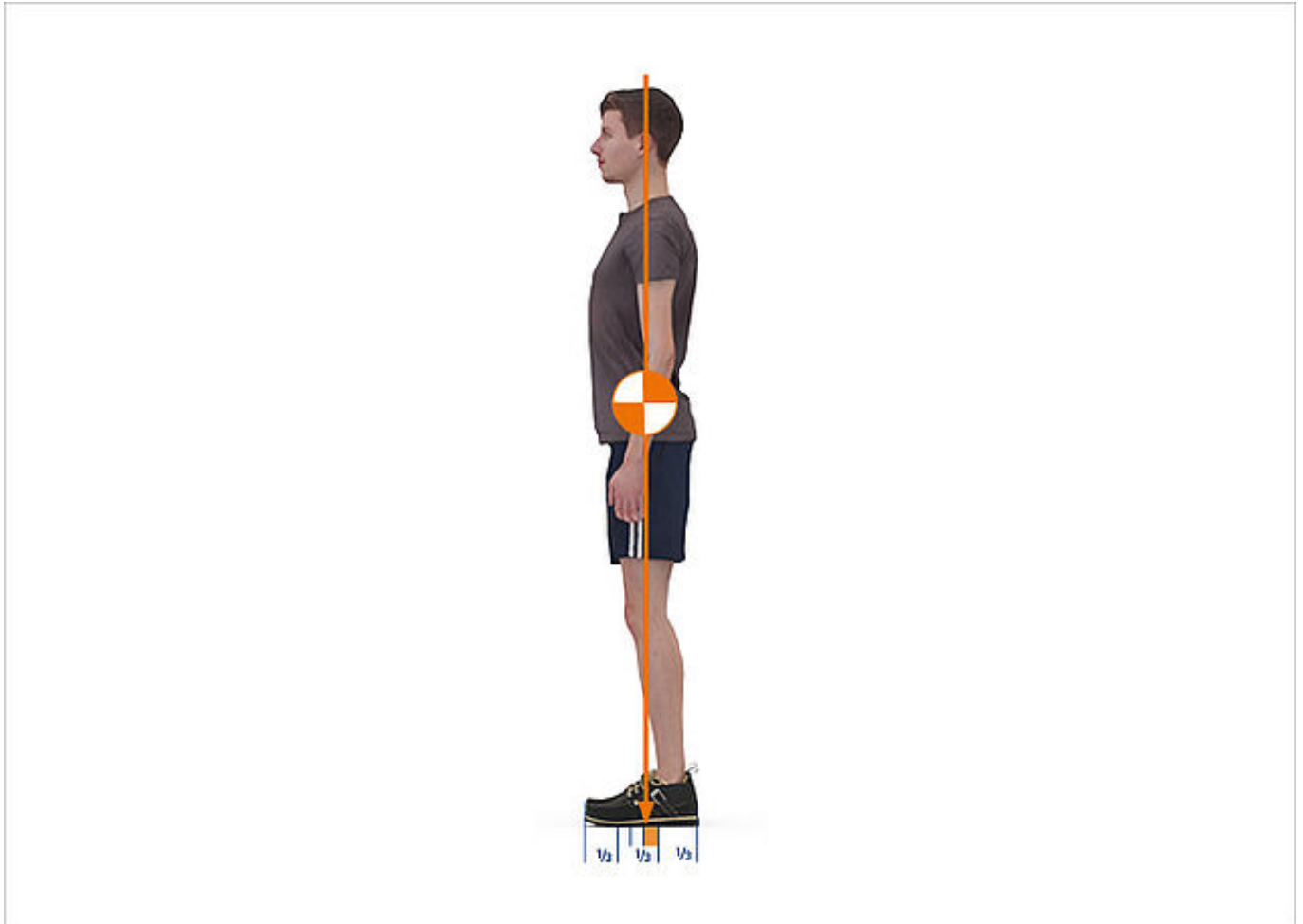
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For the following work steps, the plumb line is used as a reference.

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

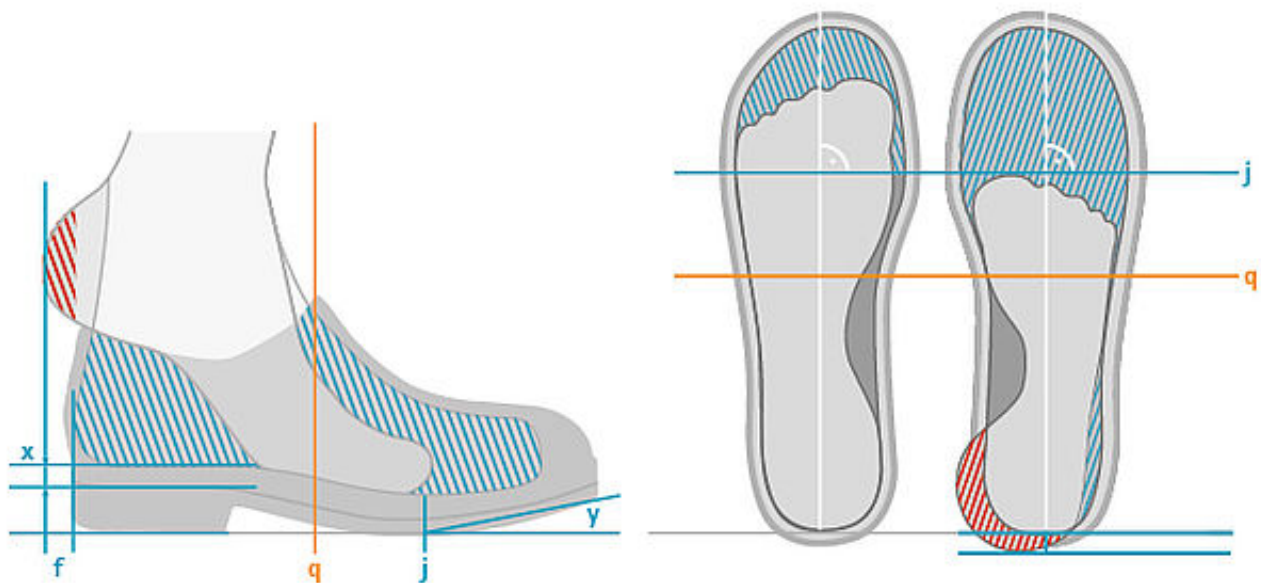
- from the body's centre of gravity,
- across the greater trochanter,
- centrally through the ap measurement at knee height,
- to the rear third of the front half of the supportive area.

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.*

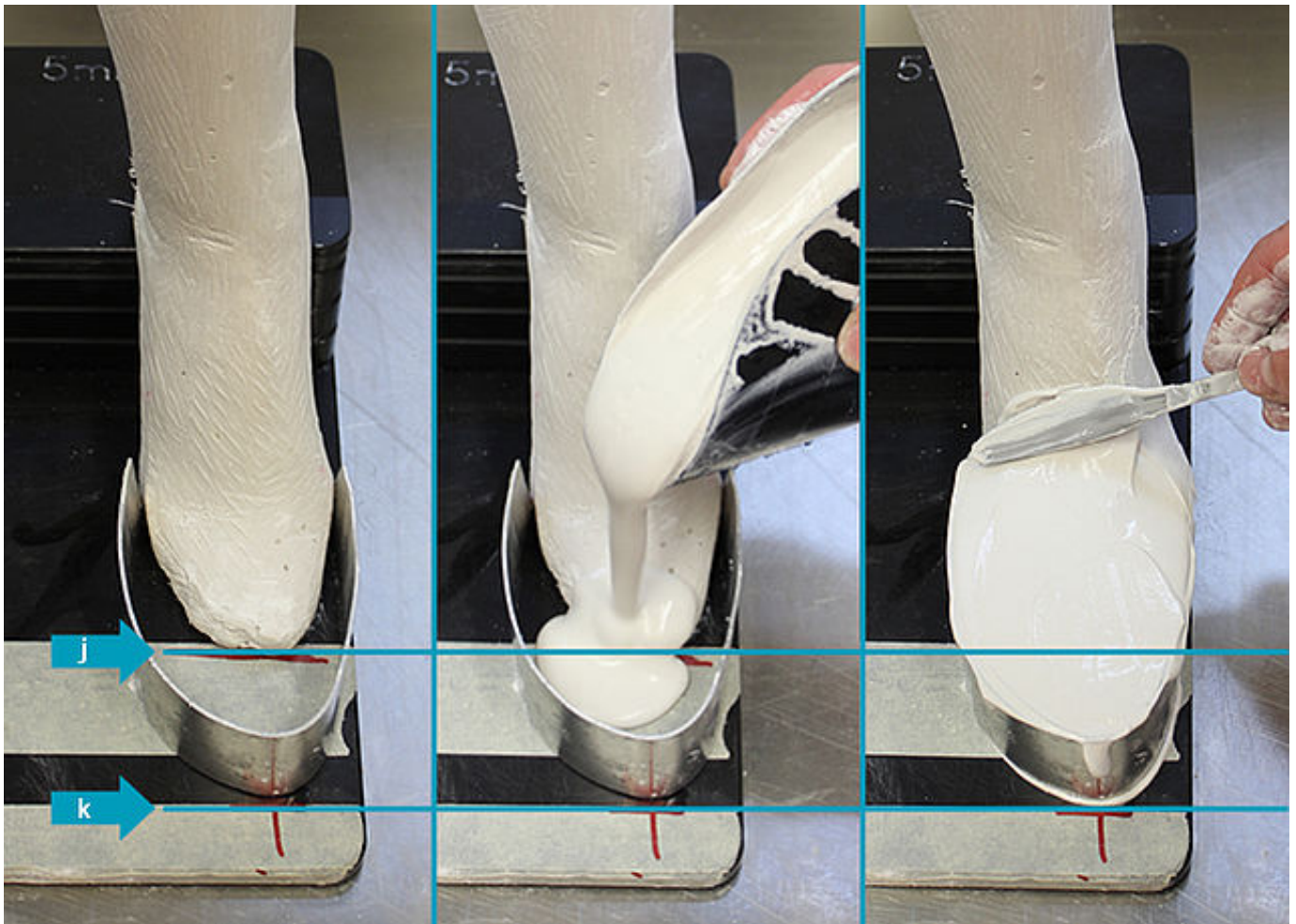
*Note: if the patient is unable to stand (even with assistance), mark the plumb bob reference area (orange) on a stencil and write down the values.*



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.*

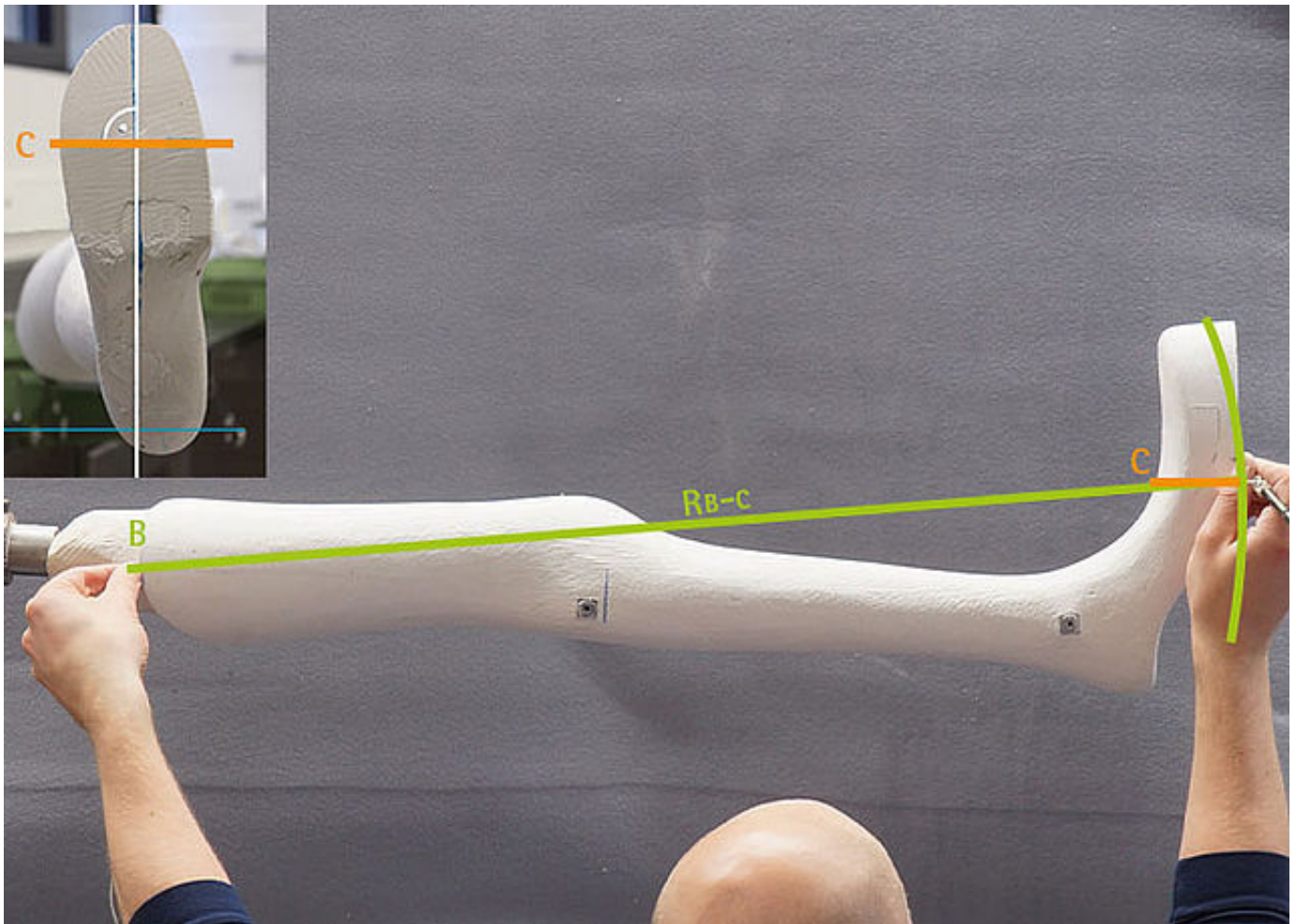


### Modifying the Positive Cast

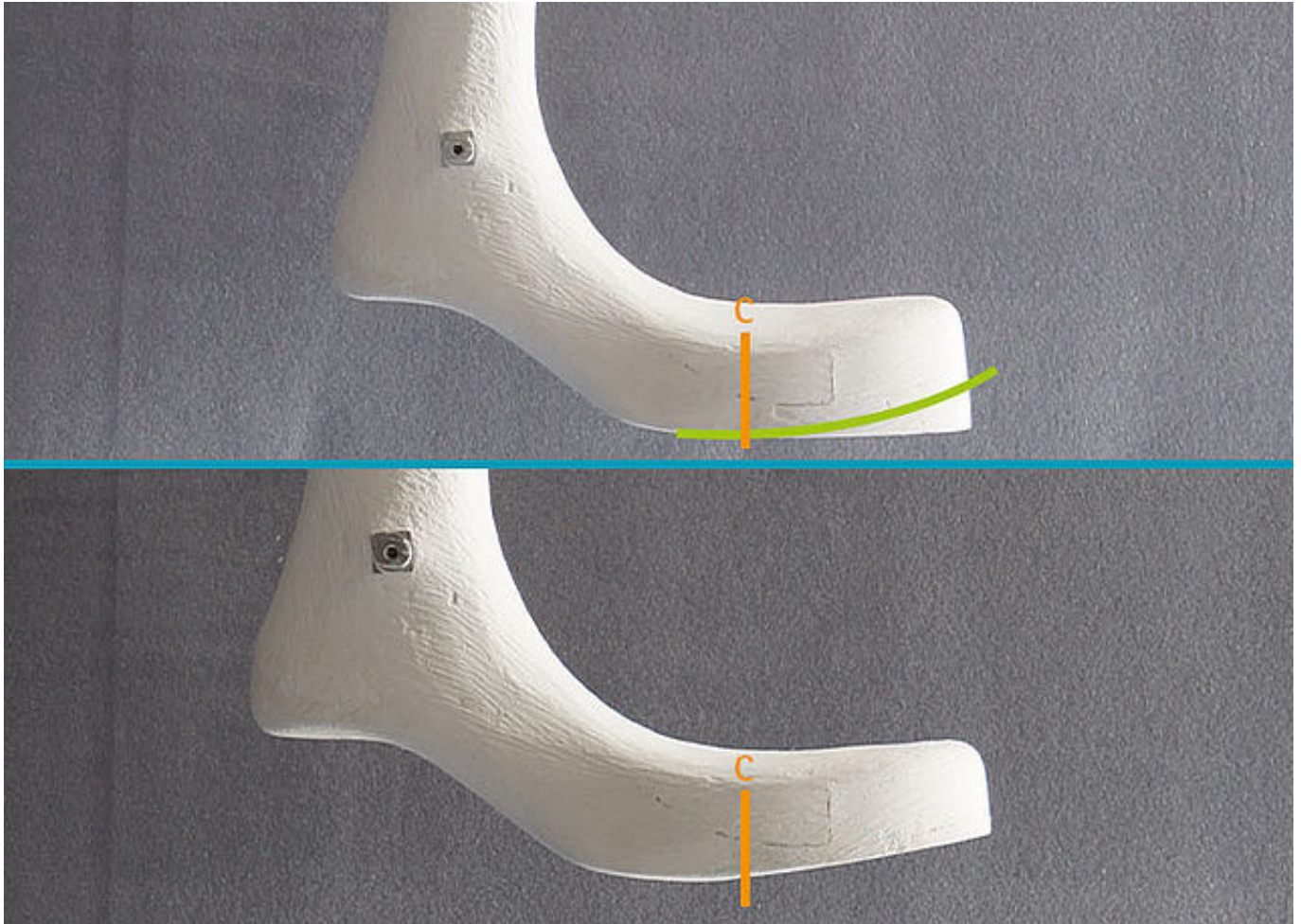
- position the aluminium clasp or similar
- Prolong the forefoot up to k. k stands for the inner shoe dimension and j marks the mechanical rolling-off line.
- fill the form with plaster
- create a smooth transition
- let the model harden

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.*

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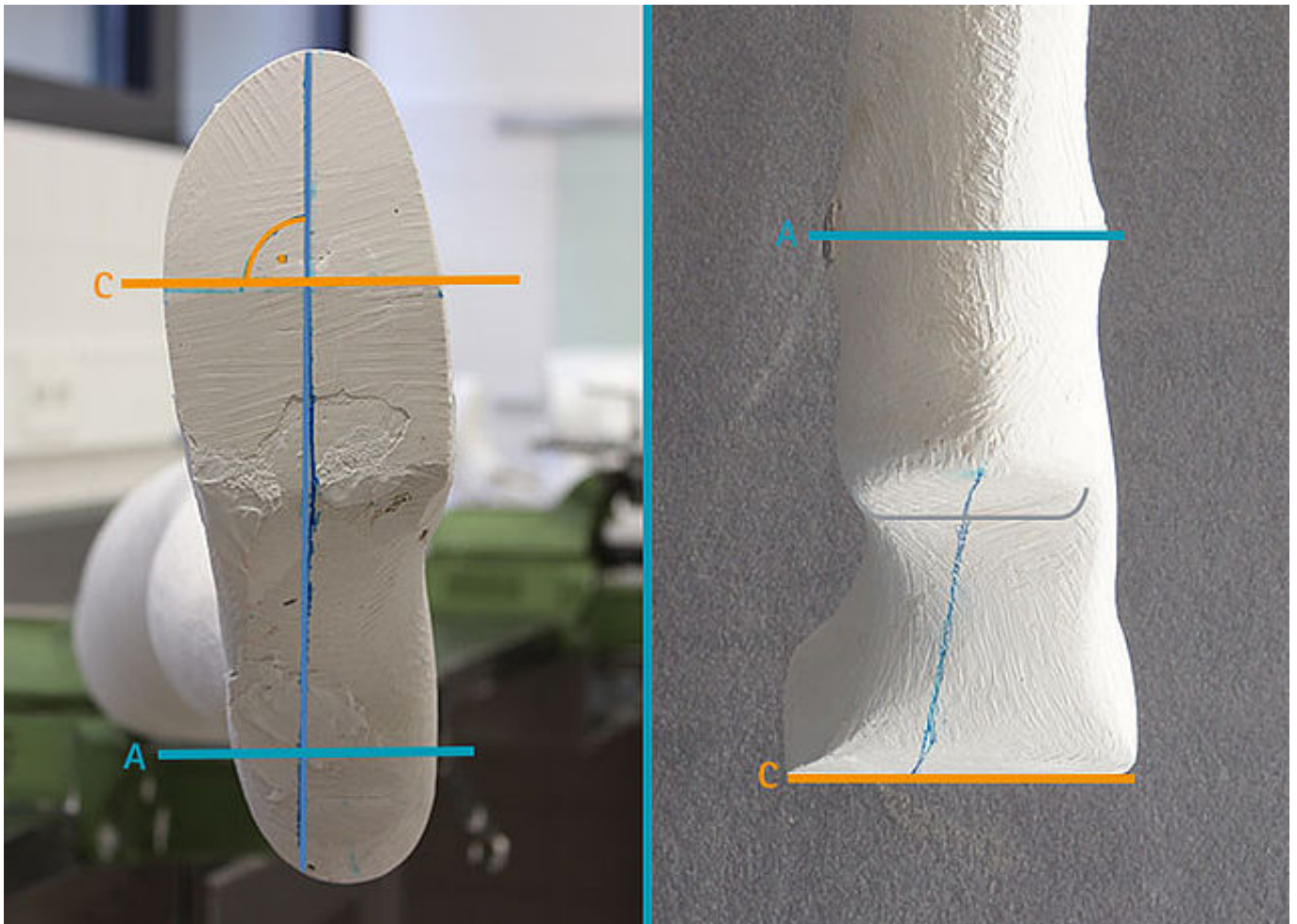
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Mind the parallelism when modifying the foot piece. Modify the heel, the rolling-off area and the forefoot area parallel to the axis/axes.

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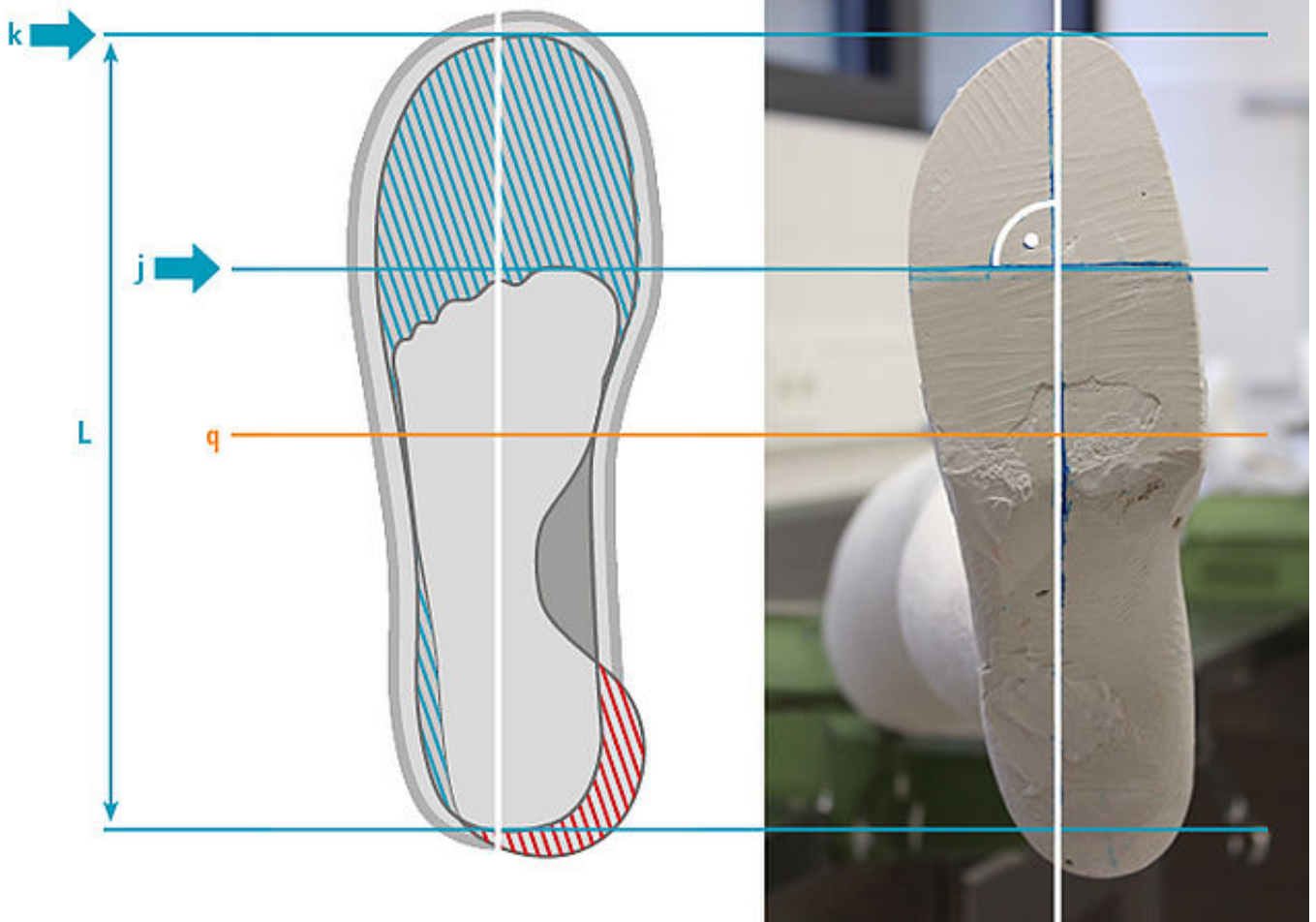
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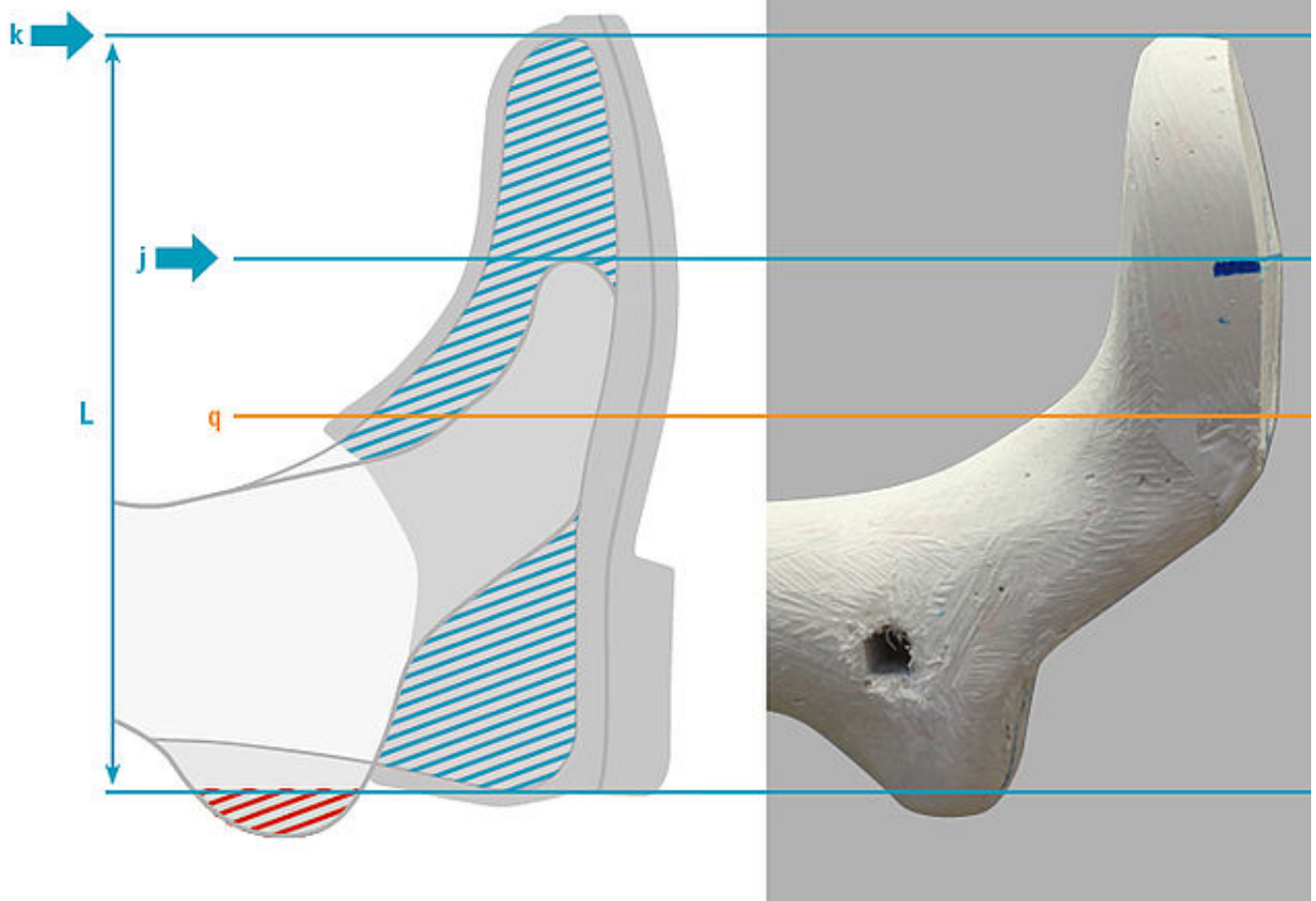






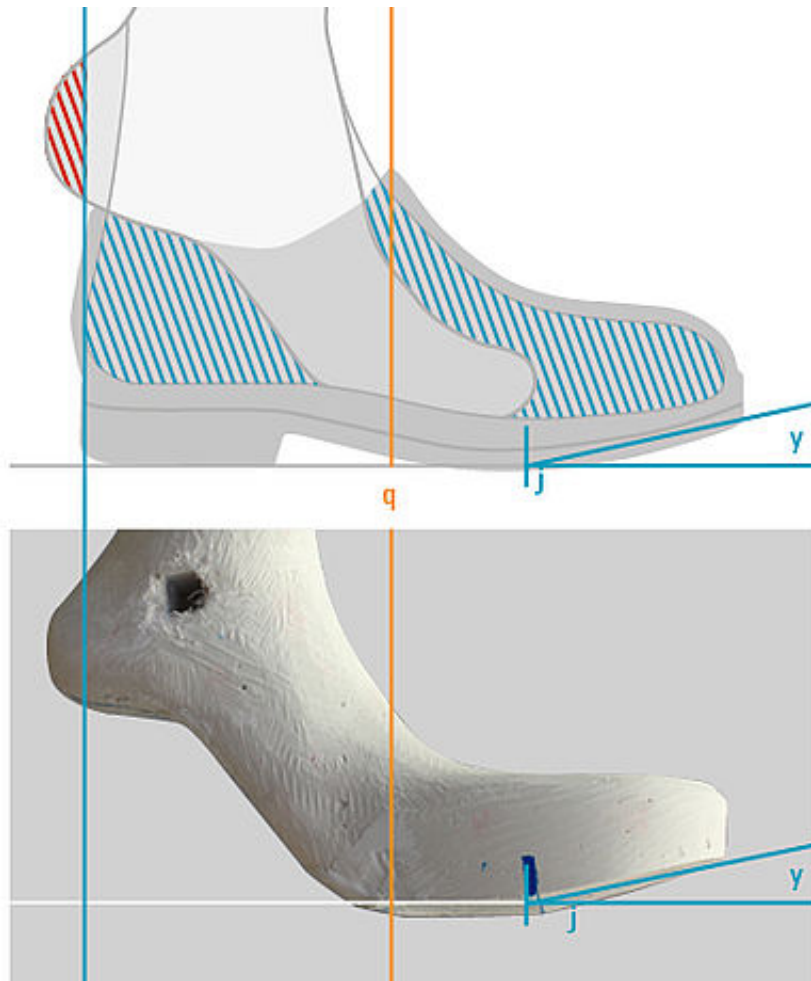
Modified positive cast from below:

- 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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