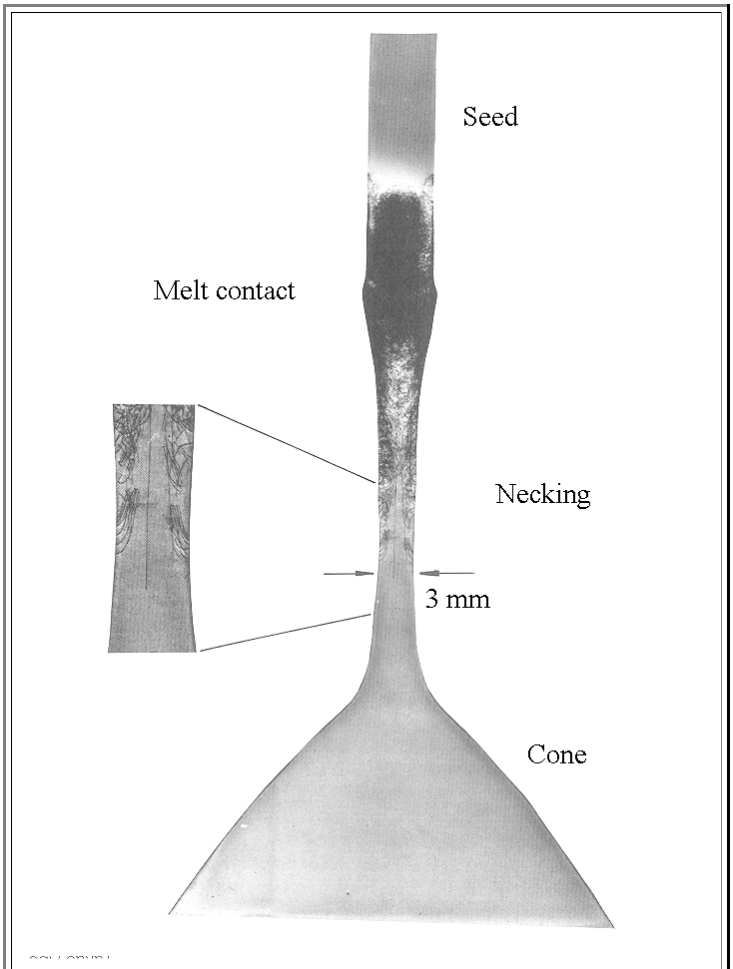
Necking

Illustration

- Here is an **X**-ray topograph of the first part of crystal growth
  - An **X**-ray topograph is similar to a transmission electron microscope image - it shows the interior of the sample and dislocations are visible as dark lines.
- You see a dislocation-free seed crystal, followed by region full of dislocations. This is unavoidable because dipping a solid seed in a melt that has by definition a higher temperature, always causes a "thermal shock" with stress and strain and therefore plastic deformation.
  - The the diameter of the now growing crystal is made as small as possible (it still must be able to carry the weight of the finished crystal - up to **250 kg** or so). This is the "**necking**" or Dash process.
  - The dislocations disappear after a few **cm**, the question is why? The picture almost shows it. For the usual **<100>** oriented crystal, the glide planes of the dislocations (the **{111}** planes) are all inclined to the growth direction, and the dislocations, still feeling some stress, will simply move out of the crystal.
  - This is where the art part comes in - or better came in. Keep enough stress to move the dislocations, but not that much that new ones will be generated.



Courtesy of Wacker / Siltronic; Burghausen, Germany