

Necking

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 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.

