**Case Hardness Depth (CHD) Measurement**

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| **Surface Hardness** | | |
| A common application of hardness testing is the evaluation of the hardness depth of surface hardened materials. This is done by means of performing a series of hardness impressions from the edge of the [sample](http://www.struers.co.in/default.asp?top_id=5&main_id=156&sub_id=222&doc_id=918#footnote) towards the centre. The hardness progression is plotted in a graph and the distance from the surface to the so-called hardness *limit* (HL) is calculated.  ***Case Depth = Distance from “Surface” to “Hardness Limit”***  Applicable Standards: *EN ISO 2639 / EN 10328 / ISO 3754 / DIN 50190-3* |  | [Click to enlarge](http://www.struers.co.in/resources/elements/7/401448l.jpg) |
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| **Why Hardening?** | | |
| Hardening of steel is done to increase the *strength and wear properties*. One of the prerequisites for hardening is sufficient carbon and alloy content. If there is sufficient carbon content then the steel can be directly hardened. Otherwise, the surface of the part has to be carbon enriched using diffusion treatment hardening techniques. Hardened steel parts are typically used in moving or rotating applications where high wear resistance and/or strength is required, such as gear and engine parts, injection pumps and nozzles, etc. As hardening makes the steel brittle, *surface* hardening is therefore performed to retain the ductility in the material core. |  | [Click for overview](http://www.struers.co.in/resources/elements/7/401454l.jpg) |
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| **Different ways of Determining the Hardness Limit** | | |
|  |  | There are different ways of determining the hardness limit and thus calculating the CHD value. The procedure depends on the hardening process used. Generally, we distinguish between three ways of calculating the hardness limit:  ***1. Carburised or carbonitrided parts (EN ISO 2639)*** Hardness Limit = 550 HV *CHD (Eht) = Distance from surface to point where hardness is 550 HV*  ***2. Induction or flame hardened parts (EN 10328, ISO 3754)*** Hardness Limit = 80% x (Minimum) surface hardness. *CHD (Rht) = Distance from surface to point where hardness is 80% of (minimum) surface hardness.*  ***3. Nitrided parts (DIN 50190-3)*** Hardness Limit = Core Hardness + 50 HV. *CHD (Nht, NCD) = (Max.) Distance from the surface to the point where hardness is 50HV1 above core hardness* |
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| [Click to enlarge](http://www.struers.co.in/resources/elements/7/401466l.jpg) |  | **Example of CHD Progression**     *CHD Measurement Displaying CHD-value of 0.95 mm at Hardness Limit of 550 HV1* |