

# LASER HARDENING OF TOOLOX®

Toolox® is an excellent steel for the production of high performance dies and machine components. Toolox® is based on an ultra-clean steel metallurgical concept that gives it extraordinary properties. A combination of high strength, crack resistance and optimized workshop properties make it an ideal choice in situations with the highest demands. The guaranteed toughness as well as the plate per plate quality control minimizes the risk for early failures.

For some applications, the surface properties need to be further improved. In such cases, laser hardening has been shown to be a very efficient method, giving a high surface hardness with a relatively large with a relatively large depth. The combination of laser hardening and Toolox® 44 is especially interesting due to the uniquely high yield strength of Toolox® 44. Below the laser hardened layer there will be a very resistant material. Laser hardened surfaces have the further advantage of being very smooth. This reduces friction and the risk for material sticking to the surface.

Another benefit with laser hardening is that it is a very precise and extremely energy efficient method. You only harden the surface that needs hardening and it goes very fast. It only consumes a small amount of electricity, resulting in a very sustainable hardening method.

To increase the knowledge of the laser hardening behavior of Toolox® 44, testing and application development has been made in cooperation with the Swedish Laser hardening specialist LaserTool in Blekinge AB ([www.lasertool.se](http://www.lasertool.se)). LaserTool in Blekinge AB has since 2003 been pioneering the usage of laser hardening. Since then they have been proven a cutting-edge supplier for many different types of applications, including cold forming dies and advanced machine parts.

LaserTool is using a laser source combined with a robot, zoom optics and a pyrometer for exact temperature control. The surface hardness of Toolox® 44 can be boosted up to 56-60 HRC depending on hardening depth. For Toolox® 33 a surface hardness of 48-52 HRC can be obtained. Hardening depths of 0.2 to 2 mm is possible depending on the application.





Figure 1

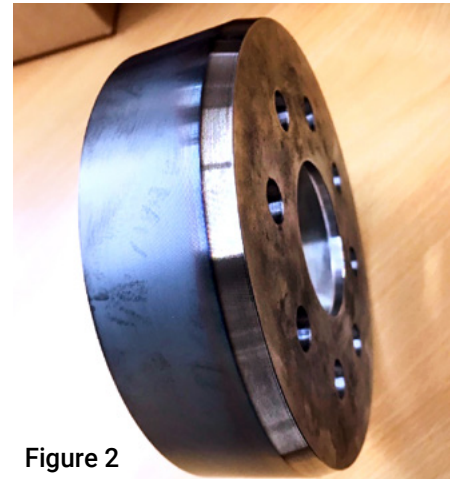


Figure 2

**Figure 1.** Laser hardening of Toolox® 44 has been used for several types of components. An excellent application is cold forming dies. The die used for stamping thick steel sheet, shown in Figure 1, was previously made in tool steel heat treated to 60 HRc. Cracking after 2000-3000 stampings made that solution unsuitable. Changing to laser hardened Toolox® 44 improved the lifetime to more than 100 000 stampings. The smooth surface also decreases the need for maintenance.

**Figure 2.** Another successful application is a bushing used in a shot blasting machine, seen in Figure 2. Around the bushing, a shovel wheel is placed. The wear from the wheel and the environment inside the machine represents severe conditions making laser hardening a perfect method to improve lifetime.



Figure 3

**Figure 3.** For machine components working under the most demanding conditions, laser hardening improves lifetime. SSAB is using laser hardened Toolox® 44 for cutting Hardox® and Strenx® steel plates, as seen in these shearing blades.

#### Availability

Plates and square blocks from 6–320 mm. Bars between 21 and 405 mm with lengths up to 5000 mm. Toolox® is available from the local SSAB stock. Cut pieces of Toolox® can be obtained through the well-established global network of Approved Toolox® Distributors. Both SSAB and the distributors can provide you with good application support as well as technical guidelines.

#### Contact and more information

Contact your local sales representative to learn more, visit [www.toolox.com](http://www.toolox.com) or consult Tech Support at: [help@ssab.com](mailto:help@ssab.com).