14. Welded joints

Welded joints cause considerable notch effect through differences of the metallurgic structure, residual stresses and different hardness, resulting in considerable risk of material fatigue under dynamic loads. This is applicable to all kinds of welded joints like arc welding, laser welding, friction welding or friction stirr welding.

The piston of a shovel excavator is shown as example. Piston and piston rod are connected by means of the friction welded joint. Despite the relief groove turned at the out the diameter, the joint was endangered through material fatigue. The fatigue strength became increased so significantly through deep rolling, that no more cracks

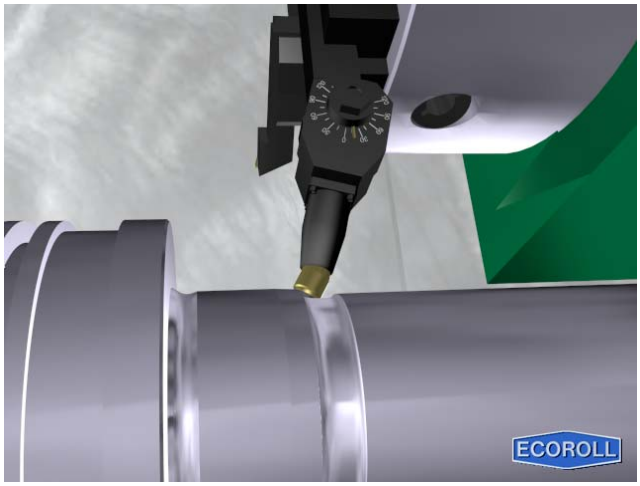

Fig. 14-1: deep rolling of a friction welded joints

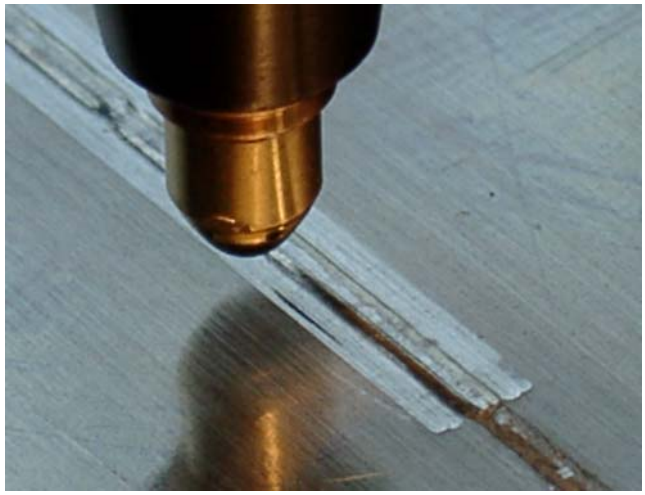
Fig. 14-2: deep rolling of to laser welt

where experienced under operation conditions (Fig. 14-1).

Also welding joints of flat structures, that are welded by WIG, MIG or lasers show the above described problem. By the unique properties of the hydrostatic ballpoint tool, it is able to deep role that welding seem without prior machining (Fig. 14-2). Through the automatic following system of the tool, the ball follows the contour under constant rolling force. The demanded, equally permanent quality is guaranteed.