5.3 Turbine blades

The blade surfaces deep rolled are partially or fully including the leading and rear edge in the setups shown in Figures 5-5 and 5-6. According to load conditions, deep rolling can be performed with linear, meander-shaped parallel traces in longitudinal or cross direction or in any suitable line pattern(Fig. 5-5.) This solution is preferred for thin blades, as it avoids bending of thin trailing edges. The blades are processed with a hydrostatic double tool. The rolling force is of both balls counteract so that bending of the edges is avoided

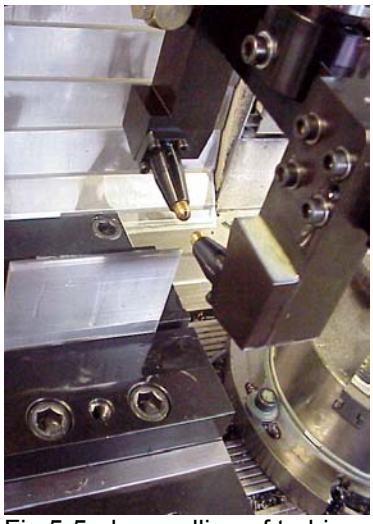

Fig.5-5: deep rolling of turbine blades in longitudinal direction

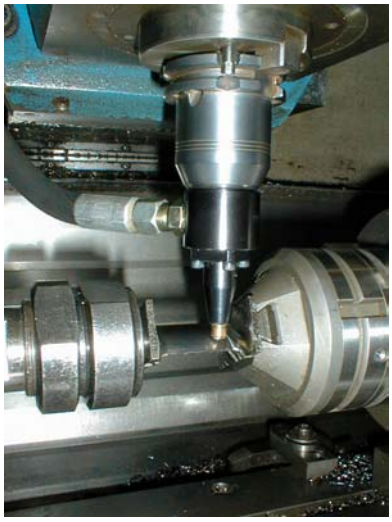

Fig. 5-6 :Circulated deep rolling of a turbine blade

Deep rolling can also take place on the blade milling machine in one setting after cutting (Fig. 5-6). Line patterns as above or helix-shaped tracks may be applied in this case.

5.4 Dovetail slots

The dovetail slots serve as connection between turbine blades and turbine disks. All dynamic loads acting at the the blades are lead into the turbine disks at this places. These loads lead to high local stresses under operation conditions moreover, that of the slots are notches in the disks, that the operating voltages concentrate at critical places. At these places, there is the danger of the material fatigue. Through deep rolling, an improvement of 50 strength was achieved in the past in numerous cases. Figures 5-7 and 5-8 show sequential deep rolling of the dovetail slots with two hydro

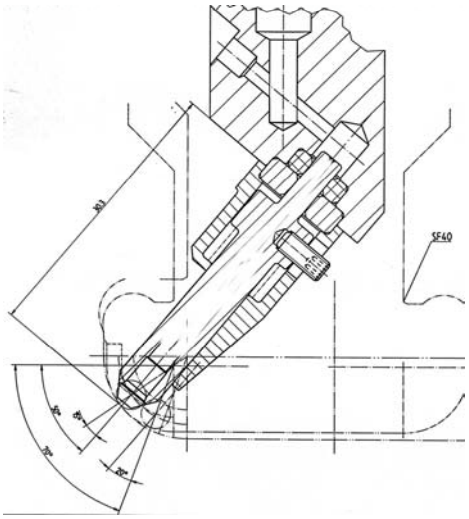

Fig. 5-7: deep rolling of a dovetail slot (working zone 1)

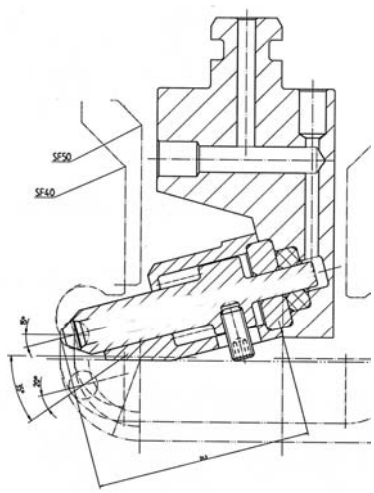

Fig. 5-8: deep rolling of a dovetail slot (working zone 2)

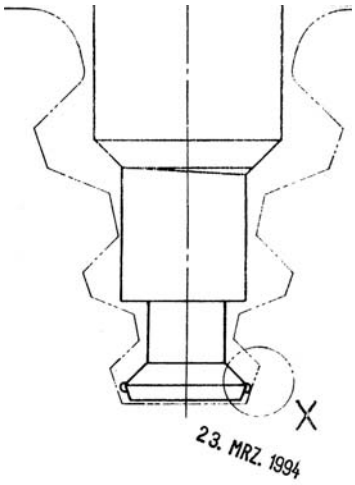

Fig. 5-9: double sided hydrostatic tool