1.3.27. PHASED ARRAY ULTRASONIC TESTING OF HEAVY-WALL SEAMLESS TUBES BY MEANS OF A TESTING PORTAL

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Heavy-wall seamless tubes with a diameter range from 178 – 419 mm, a wall thickness range from 20 – 100 mm and a tube length from 4 – 15 m are to be inspected by means of an ultrasonic testing portal. During the inspection, the tube is scanned with helical testing traces. While the tube is rotating, the probes are linearly guided along its longitudinal axis and are coupled onto the tube surface in the 12 o'clock position. Special about the testing system is the way to couple the ultrasound into the tube. Water jet coupling (also called squirter technique) is used, which means that the water path between probe and tube surface is in the order of several centimetres.

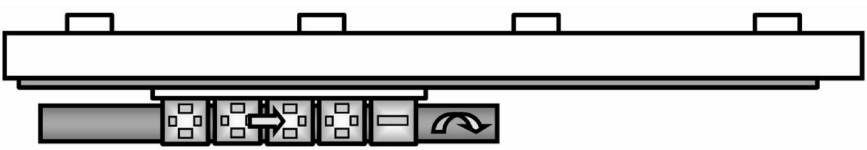

Fig. 1. Testing principle of a testing portal with 5 probe holders and helical testing traces

Five probes holders are employed, where four probe holders contain the probes for longitudinal and transverse defects and one probe holder is for straight-beam testing to measure the wall thickness and to detect inclusions. All probes are phased array probes. For the detection of longitudinal and transverse defects, phased array probes are used which can produce overlapping sound beams. Thus, a high probability of detection is achieved and the amplitude deviation in dynamic mode is reduced.

The probe carriers are gimbal mounted and are flexibly guided along the tube surface. The guiding elements (rollers made from hardened steel) do not have to be changed for varying tube diameter due to the jet coupling technique. This results in short changeover times and a long-lasting mechanical set-up.

A modern phased array testing electronics with almost 200 parallel testing channels is employed.