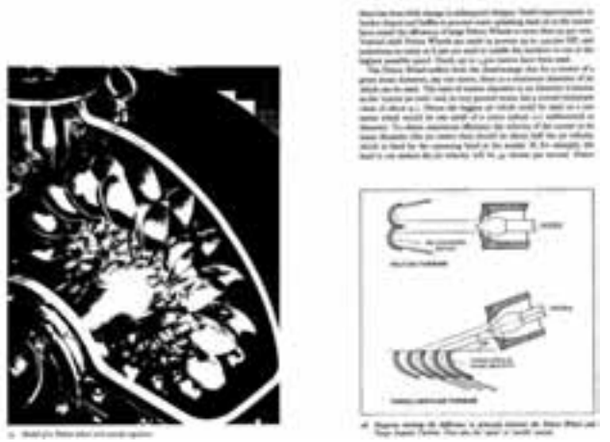
Turgo Nozzle Placement

Nozzle placement for a turgo runner is at an angle approximately 20 degrees above the runner's plane of rotation. In contrast a pelton runner and nozzle are co-planar. The 20 degree angle is a nominal or typical value. A lesser angle is preferable for higher efficiency. A value may be calculated based on the nozzle and runner diameters and number of spoons such that the jet is evenly split over 3 spoons.

Photo Courtesy of Stuart Fraser
http://www.fraser1.demon.co.uk/index_main.htm

This is a nice photo of a rather busy nozzle design. Here the jet angle is too steep such that the jet isn't spread over three spoons. It also hits the runner a bit before the tangent point. The photo nicely illustrates the flow path.



This illustration from an old book (Wilson) shows the difference between Pelton and turgo flow paths.

In practice the nozzle should be placed as closely as possible to the runner, while leaving a safe clearance to prevent contact.

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In order for the jet to divide across three spoons, the jet angle theta, relative to the runner rotation plane is computed as;

theta = arcsin(nozzle bore / (3* spoon spacing))

The spoon spacing is pi*(pitch diameter)/(number of spoons).