

Cutting with water: From fish to fracking

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We've all seen how water can cut through mountains with its erosive power and crack rock when pumped underground at high pressure. We're perhaps less familiar with water jets used as a precision cutting tool, employed regularly in the food and textile industries. Abrasive water jets, with small particles of garnet in the stream, can cut hard materials such as glass and metal. They are competitive with other precision machine tools such as laser, plasma, and wire EDM cutters but don't generate a heat-affected zone in the material.

There are some challenges with abrasive water jets, however. Depending on the traverse speed of the cutter, striations can form on the cut face, a blank region can be left in the sample, and the kerf (i.e., the gap left by the cut) can develop an undesired internal angle (bevel).

Our goal for the camp is to understand the basic operation of the abrasive water jet and the mechanisms underlying the problems described above. Time permitting, we'll propose some parameter choices or procedural changes to address the problems.