

Technical Assistance Request:

A key energy savings component in the solvent extraction system is the expansion valve used to relieve the pressure in the extraction chamber. Water and solvent are at 75psi pressure prior to the expansion valve. The combined fluid stream is heated to vaporize the fluid prior to expansion. A water turbine, (Pelton wheel or similar) acting as the expansion valve, must be coupled to a gas compressor turbine to recover energy from the fluid stream, transferring it to the gas stream, thereby reducing the electrical energy the compressor must expend to re-compress the gas back to 75psi.

The design contemplates a 3D printed turbine expander/compressor, designed and simulated using computational fluid dynamics, to derive the optimum ratio of expansion and compression for maximum energy recovery. Similar to an energy recovery turbine in traditional RO water systems, this one functions under varying pressure and between a gas stream and a liquid stream, so traditional "off-the shelf" designs are not suitable.

We have heard there are several labs with 3D metal printing that might be able to design and fabricate such an advanced energy recovery device which will be a key innovation in the solvent extraction system and that would have the computational resources to simulate the device prior to fabrication.