Evaluation of Forces on the Welding Probe of the Automated Retractable Pin-Tool (RPT)

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The NASA invention entitled "The Hydraulic Controlled Auto-Adjustable Pin Tool for Friction Stir Welding" (U.S. Patent 5,893,507), better known as the Retractable Pin-Tool (RPT), has been instrumented with a load-detecting device allowing the forces placed on the welding probe to be measured. As the welding probe is plunged into the material, the forces placed on the probe can now be characterized. Of particular interest are those forces experienced as the welding probe comes within close proximity to the back-up anvil. For a given material, it is believed that unique forces are generated relative to the distance between the welding probe and the anvil. The forces have been measured and characterized for several materials, and correlations have been made between these forces and the pin's position relative to the backside of the weld material.