



Dr. Robert F. Welton  
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7/11/05

Dear Vladimir,

I am a physicist responsible for major components of the Spallation Neutron Source (SNS) accelerator system. The SNS is located in Oak Ridge, Tennessee, will be the most powerful pulsed neutron source in the world when it becomes operational in the next few years. The project is managed the University of Tennessee-Battelle for the US Department of Energy. There are enormous pressures on the staff to bring the accelerator to an operational state on schedule and within budget. Since many components in the accelerator pushed the limits of existing technology we are forced to develop and innovate many of these systems on-the-fly.

One resource which has been clearly indispensable in this process is the Tera Analysis program Quickfield. We have used this software to solve many problems: one of the most important is described in detail in the attached Journal paper and is related to the field of ion/plasma sources. In this case, we needed to replace the fragile porcelain coated, high-power RF antenna which creates a plasma (from which the ion beam is extracted) with a thick aluminum oxide plasma chamber. In order to accomplish this transformation, we needed to carefully understand the thermal stress which develops in the ceramic as a result of heating by the hot and dense ion source plasma. We employed the thermal and mechanical modules of Quickfield to solve for this thermal stress under differing design and operational conditions. In a short period of time, we were able to invent an optimum plasma chamber and cooling scheme as well as establish limits of the applied power. Without the use of the software we would have employed a hit-or-miss approach which would have been very costly in terms of time and money. The most remarkable feature of the software was that there was essentially no learning curve: it was productive in the first day of use! My hat is off to the developers of such a versatile, user friendly program.

Sincerely,

A handwritten signature in black ink that reads "Robert Welton". The signature is written in a cursive, flowing style.