PENELOPE-BASED USER-FRIENDLY FAST INTERFACE FOR CALCULATING DOSE DISTRIBUTION IN IRRADIATED PRODUCTS

Randolph SCHWARZ
Pacific Northwest National Laboratory, Richland, Washington, USA

Mark MURPHY
Pacific Northwest National Laboratory, Richland, Washington, USA

Suresh PILLAI
Texas A&M University, College Station, Texas, USA

Manufacturers of polymer-based products requiring sterilization, including medical devices and components used in biopharmaceutical production, use computer simulation and/or dosimetry measurements to determine the dose distribution within these products during irradiation. Such detailed dose distribution is required for the product sterilization validation process for approval by federal regulators (e.g., U.S. Food & Drug Administration and European Medicines Agency). The radiation field can be provided by cobalt-60 gamma-rays, X-rays or electron-beam. There are several commercially available software packages that can provide detailed dose distribution within such products, whether in the design phase or of actual product, but a tremendous amount of labor is needed for training and for the actual use of this software. In the attempt to improve on these existing dose distribution software tools, Team Nablo, an international collaborative team led by Pacific Northwest National Laboratory and funded by the U.S. National Nuclear Security Administration, is studying a particular novel approach. This approach would create a Penelope-based graphical user interface to calculate the dose distribution within individual and boxed products and utilize a voxel method. It is hoped that this software tool would allow 1) The flexibility to cover medium-to-high product complexities, 2) Sufficient accuracy and precision of the dose distribution, 3) Use by individuals who are novices at radiation modeling, 4) As compared to existing similar software, much less labor for training and for obtaining dose results, and 5) Availability to any user and at no cost. This presentation will describe the software package that Team Nablo is currently developing, and to what degree it is expected to meet these 5 goals.