

AbstractID: 6498 Title: CNC Milling Based Immobilization Mould Fabrication

Purpose: To increase the effectiveness, reduce cost and improve the efficiency of production of immobilization moulds

Method and Materials: A process was developed to produce immobilization moulds from CT simulation data sets using Computer Numerical Controlled (CNC) milling techniques. The process demonstrated that custom moulds could be manufactured post simulation. The mould making process began with the patient undergoing a conventional planning CT scan in the treatment position but without a custom mould. External contour data was extracted from each slice with subsequent processing splitting each contour into an anterior and posterior segment. The anterior segment data and the posterior segment data were converted into surface renderings and used by a CNC to carve models of the patient from styrofoam, producing a "positive" representation of the anterior surface and a "negative" of the posterior surface. UVEX plastic was then vacuum-formed to the "positive" model.

Results: An immobilization device was manufactured for a patient undergoing cranial radiotherapy. The UVEX "positive" and styrofoam "negative" combined to form a "clam-like" device offering the combined attributes of conventional aquaplast and vac lock bags. The resulting immobilization placed the patient in exactly the same position they had assumed during simulation, ensuring a faithful planning process (i.e. the device accomplished the same requirements as an accessory produced prior to and used during simulation). However, the new approach transformed a serial process into a parallel process, with mould manufacturing and planning occurring simultaneously. The new production process did not involve physical contact with the patient. The cost to produce the mould was significantly less than that of aquaplast based techniques.

Conclusion: A technique was developed to produce immobilization devices consisting of a UVEX mould and styrofoam cradle to create a "clam-like" accessory. Production was accomplished without patient contact. The process offered both cost and production time savings.