Assessing the Importance of Motion Dynamics for Ergonomic Analysis of Manual Materials Handling Tasks using the AnyBody Modeling System.

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Most current applications of digital human figure models for ergonomic assessments of manual tasks focus on the analysis of a static posture. Tools available for static analysis include joint-specific strength, calculation of joint moments, balance maintenance capability, and low-back compression or shear force estimates. Yet, for many tasks, the inertial loads due to acceleration of body segments or external objects may contribute significantly to internal body forces and tissue stresses. Due to the complexity of incorporating the dynamics of motion into analysis, most commercial software packages used for ergonomic assessment do not have the capacity to include dynamic effects. Thus, commercial human modeling packages rarely provide an opportunity for the user to determine if a static analysis is sufficient. The goal of this paper is to quantify the differences between a static and dynamic analysis of a materials handling task using the AnyBody modeling system to include the effects of motion. The feasibility and tractability of performing dynamical ergonomic analysis with the AnyBody model is assessed for the analysis of an asymmetric lifting task. Comparisons between low back moments, compression and shear forces for dynamic and static analyses are presented.

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