

10. Study on Seismic Isolation System for Storage Rack Pallets

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The 2011 off the Pacific coast of Tohoku Earthquake and The 2016 Kumamoto Earthquake caused damage to palletized loads due to fall off from the storage racks of some automated multi-level storage and retrieval systems. And furthermore, some of the loads that fell off obstructed the movement of the automatic handling systems so as to impair the material handling function. In order to avoiding loads collapse and loss from business interruption, there is a growing need for effective measures to prevent loads from falling off from the storage racks. This study, therefore, developed a pallet seismic isolation system that can be applied to both planned and existing storage racks and can be installed to seismically isolate individual loads. The study showed that the newly developed seismic isolation system reduces the maximum response acceleration of loaded pallets by half and that after earthquake shaking ends, the pallet returns to its original position. The newly developed seismic isolation system were implemented in a storage rack system installed in the warehouse building at the Technical Research Institute of Okumura Corporation.

Key words: automated multi-level storage and retrieval system, rack, seismic isolation system, inclined slide bearing, earthquake response analysis, shaking table experiment