Reducing Change-Related Costs in Assembly of Lithium-Ion Batteries for Electric Cars by Mechanical Decoupling

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Abstract : A key component of the drive train of electric vehicles is the lithium-ion battery system. Among various other components, such as the battery management system or the thermal management system, the battery system mostly consists of several cells which are integrated mechanically as well as electrically. Due to different vehicle concepts with regards to space, energy and power specifications, there is a variety of different battery systems. The corresponding assembly lines are specially designed for each battery concept. Minor changes to certain characteristics of the battery have a disproportionally high effect on the set-up effort in the form of high change-related costs. This paper will focus on battery systems which are made out of battery cells with a prismatic format. The product architecture and the assembly process will be analyzed in detail based on battery concepts of existing electric cars and key variety-causing drivers will be identified. On this basis, several measures will be presented and discussed on how to change the product architecture and the assembly process in order to reduce change-related costs.

Keywords : assembly, automotive industry, battery system, battery concept **Conference Title :** ICME 2017 : International Conference on Manufacturing Engineering **Conference Location :** Melbourne, Australia **Conference Dates :** February 02-03, 2017

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