

## The function structure as a tool for analysing an existing concept of a centrifugal fertilizer spreader

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**Abstract:** Nowadays, it is known that a part of the manufacturers in the agricultural machinery sector do not use reasoning techniques supporting their product design processes. It can be perceived that design uncertainty is large, and this issue needs solution. In order to meet this purpose, this article focuses on applying the function structure technique, looking forward to gain deeper knowledge on the current mode of operation of a trailed centrifugal fertilizer spreader. Doing it would improve the coherence between the physical configuration of the machine and its intended functions, in order to provide better understanding of the product architecture. First, this system was deployed in a hierarchy of subsystems according to the existing assemblies. The operation event chain was then deployed through static and dynamic inspections in the operation field. This event chain provided further knowledge in stating the overall functions for systems with fixed and variable fertilizer application rate. The function structure was then deployed in two phases for the fixed application rate case, an intermediate level with partial functions and an improved level with elementary functions, which was accomplished from the thorough study of the physical processes in the machine organs. The insights gained in this process include: the possibility of assessing critical functions for the machine to perform the overall task; the accessibility for establishing modes of operation and function exclusions in order to avoid bad interactions among entity flows; the ability of intervening in the product production management in modifying the assembly structure onto an organization by function; and, the possibility to derive new concepts which can better meet design specifications for the variable rate application version. The findings allow to state that the manufacturing organization will be able to verify the coherence of its product architectures by using this set of methods.

**Keywords:** mechanical systems, engineering design, function structure, conceptual analysis, product architecture.

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