Automatic Unloading of Coffee Sacks out of Sea Containers – Special Pile Situations and Challenges for Gripping

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The automated unloading of coffee sacks out of a sea container is a complicated task, especially due to the non-predictable environment and piling situation of the container content. Gripping systems for this task have to be able to grasp sacks reliably out of every position in the container. This includes the challenges of clamped sacks, sacks fallen down from piles, or sacks, which are stacked in a chaotic manner.

The purpose of this paper is to review pile situations and suitable gripping strategies for unloading coffee sacks from sea containers. A special needle chain gripper will be presented and evaluated with focus on special pile situations. The paper will present design and functionality of the gripper as well as its evaluation by test cases. As a result, the benefits and drawbacks of this gripper system will be derived and possible application fields will be discussed.