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# Thesis proposal – indicate wood chip fraction using machine vision

## 1 Background

Cind AB develops advanced measurement equipment using stereovision technology. The company has its site in Jönköping and two products on the market. TimSpect is used to measure the volume of logs stacked on a timber truck. CargoSpect is used to measure the dimensions of palletized goods while being transported on a fork-lift. This thesis is related mainly to the product TimSpect.

<https://www.cind.se/timber-industry?wix-vod-video-id=7ab202ac5fd94414aa96a1824823e4d8&wix-vod-comp-id=comp-jwcev4jm#>

<https://www.cind.se/logistics?wix-vod-video-id=5e9e6b63a28e41d9bb5b962b8b0d08c9&wix-vod-comp-id=comp-jwcfbejn#>

Our systems uses passive stereovision where two or more industrial machine vision cameras are calibrated via our proprietary software. An 3D point cloud reconstruction of the object to be measured is created using pattern recognition and matching between the cameras. The software is running on a linux based computer and the image processing is done entirely on the CPU.

This link shows a more technical video that illustrates the stereovision software:

[https://www.youtube.com/watch?time\\_continue=11&v=7pPERzs9RU4](https://www.youtube.com/watch?time_continue=11&v=7pPERzs9RU4)

The currently installed TimSpect systems measure only round wood on trucks, but there is an interest from our customers to use the system to also measure the volume of bulk materials, such as wood chips, loaded in a container. We have made some initial field trials that shows promising results for this application of our technology. The video below shows such an example:

[https://video.wixstatic.com/video/f2cafe\\_bf84cf2ec694457984a1e85d1cc7bb11/720p/mp4/file.mp4](https://video.wixstatic.com/video/f2cafe_bf84cf2ec694457984a1e85d1cc7bb11/720p/mp4/file.mp4)

## 2 Problem statement

It is not only the volume that is important when measuring wood chips for the paper- and pulpindustry. Equally important is the fraction size, i.e. the size of the actual chips. This is normally measure as a ratio of different classes of the total volume.

We want to investigate the possibilities to indicate the chip size distribution, i.e. the fraction of the total volume of different classes of chip sizes of a load by using our 3D point cloud, 2D images and maybe other relevant parameters that can be gathered by the system. This is a very challenging task, since the 3D point cloud doesn't have enough resolution to measure individual chips, it only measures the overall shape of the surface. Most likely a combination of analysis of both the 3D model and the 2D pictures must be used, and it could be an area suitable for various machine learning technologies.

Cind has available reference data in the form av video recordings of chip trucks where both volume and fraction distribution has been verified manually.

## 3 Scope

This thesis is suitable for Master Thesis Students.