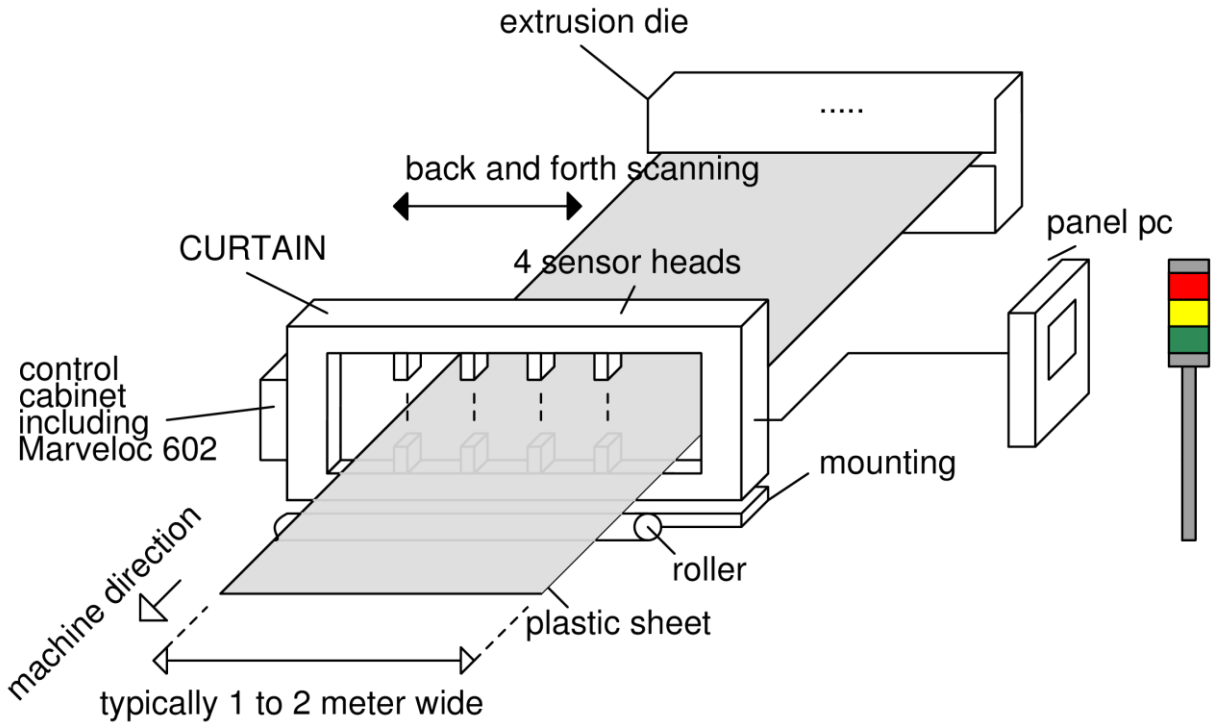
Cast sheet case

Hammer-IMS provides contactless solutions for thickness profile measurement of plastic sheets during the extrusion process. Conceptually, such a solution is shown below:



Figuur 1: Typical set-up of Hammer-IMS CURTAIN-Marveloc 602 installation in a plastic sheet extrusion line

Now, what will drive companies to choose an inline solution based on Hammer-IMS's CURTAIN-Marveloc 602 solutions? Assume you are extruding polycarbonate sheets and have a single production line installed having a width of 2 meters. Assume you produce at a production speed of 2 meters per minute and that your products are on the average 10 millimeters thick. This means that this production line converts about 60 cubic meter (about 72 metric tons) of polycarbonate per day. This means about 25000 metric tons per year. International tolerances on the thickness of these polycarbonate products are +- 5%. This means that plastic converting companies need to guarantee a maximum deviation of +-5% from the nominal value according to international standards. For a 10 millimeter thick polycarbonate sheet, this means that thicknesses should be within a ±500 micrometer tolerance. The cost of the base compounds is an important cost in the plastics converting industry. Therefore, companies tend to produce their products as close as possible to the -5% lower threshold, while still guaranteeing international standards. Hammer-IMS' technologies assist companies in the plastics converting industries to achieve this while enabling you to keep a 20 micrometer safe-margin into account for thick plastic sheets. This 20 micrometer safe-margin is a sufficiently-high safety-margin compared with the performance of Hammer-IMS's measurement equipment, which is in the micron range.

Assume that your engineers and process operators are currently doing their best to produce at a -3% value by means of manual thickness measurement by means of a caliper. Your team is currently not using any objectifying and automated measurement equipment. The -3% value means that you will take a 200 micrometer safe-margin on the -5%. This safe-margin is necessary to compensate for human errors and the inability to predict the thickness of the sheet in the middle of it. The figure below shows how this safe-margin needs to be sufficiently high to cover the uncertainties of the thickness measurement for a manual measurement.

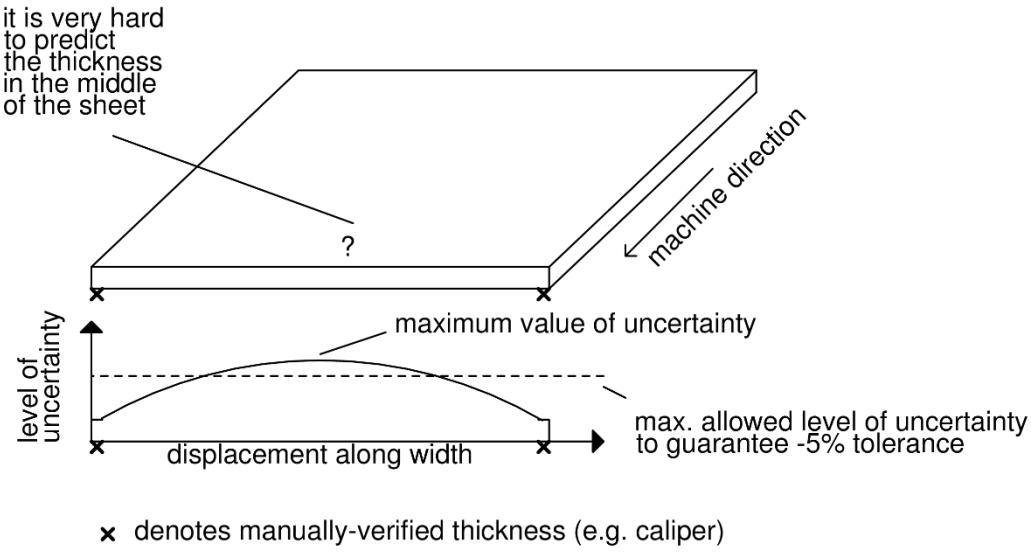


Figure 2: The uncertainty on the actual thickness is determined by both a human error while measuring the thickness of the sheet by a caliper and the fact that a measurement on the sheet's border is not representative for the thickness in the middle of the sheet. If the uncertainty is beyond a certain value, you cannot guarantee a -5% tolerance anymore and need to take a safety-margin into account.

When using an automated measurement equipment based on four sensor heads, positioned at a fixed point along the cross-machine direction, the previously shown figure would look like:

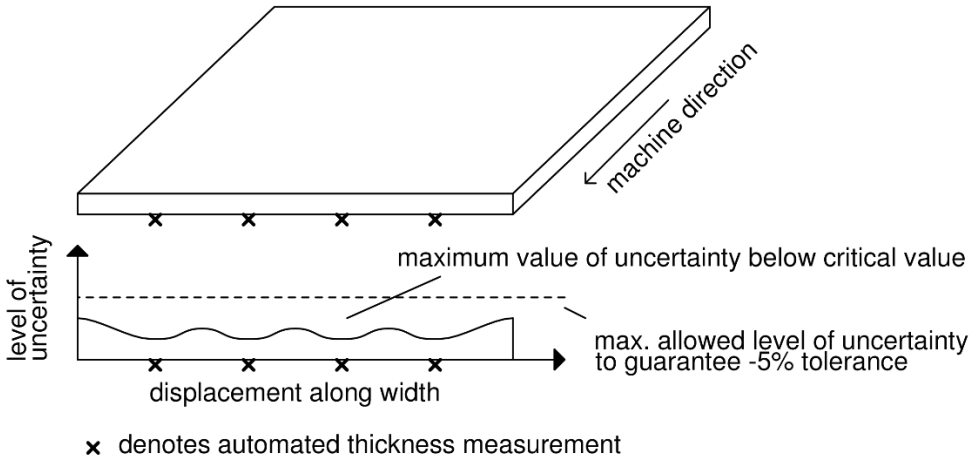


Figure 3: when a multi-head measurement system is present, uncertainties are under control, especially in the middle of the plastic sheet

The worst-case uncertainty can now be controlled better. You can imagine that the level of uncertainty will be even more flattened-out when the multi-head measurement system travels back and forth in the cross-machine direction. Therefore Hammer-IMS's solutions are the number-one choice when targeting close to the lower threshold value, rather than choosing classic solutions based on a single traveling sensor head.

If your company would choose for a solution provided by Hammer-IMS, it is expected to reduce the margin from 200 micrometer to 20 micrometer. This yields a reduction of 180 micrometer of material content on the average. For your 2-meter wide polycarbonate extrusion line this means a material saving of about 3 metric tons per day or (assuming a 24/7 non-stop production) or more than 1000 metric tons per year…. Automation for your production line is the way to go…