

Table 24.6 Overview of in-line fineness measurement methods. Reproduced with permission of Bühler, Uzwil, Switzerland.



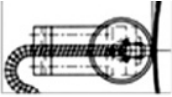
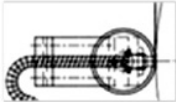
Direct		Indirect	
Type	Distance measurement	NIR Spectrometer	Throughput measurement
Position	Center of the 5 th roll	Center of the 5 th roll	After the discharge apron
Picture			
Principle	<p>The sensor runs with its wheels at the top of the chocolate layer and measures the distance between the wheels and the 5th roll surface.</p> <div></div> <p>Right: Film is displayed</p>	<p>The sensor measures the absorption of a certain wave length in the NIR Spectrum. The calculated value will, after a product related calibration, correlate with the film fineness.</p>	<p>Weights the chocolate masse (flakes) after refining per time. Out of the weight the fineness can be calculated as:</p> $\mu = \frac{Q}{d \cdot \pi \cdot l \cdot n \cdot \gamma \cdot F}$ <p>Q= Throughput d= Diameter 5th roll l= Usable length 5th roll n= rpm of 5th roll μ=End fineness in micrometer γ= Specific gravity masse F= Roll coverage 0...100% Measure the whole roll length.</p> <ul style="list-style-type: none">• Depends on roll coverage F• Only an average measurement• Depends on mass density γ
Advantages	<ul style="list-style-type: none">• Only one point measurement• Wear and tear of the wheels• Needs to be recalibrated very often• Stable film for accurate measurement	<p>Touch less</p> <ul style="list-style-type: none">• Only one point measurement• Calibration for all recipes necessary once• Full film at the measure point necessary for accurate measurements	



Figure 24.19 Different black-and-white patterns (whole roll length) for different incorrect control adjustments. Black is covered, white uncovered roll. Reproduced with permission of Bühler, Uzwil, Switzerland.

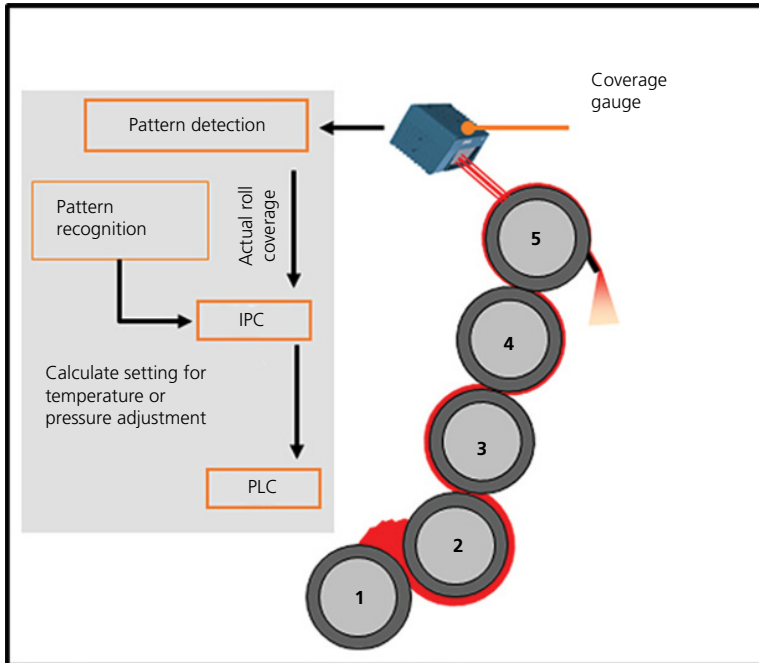


Figure 24.20 Refiner with automatic roll coverage control (FineFilm®). Reproduced with permission of Bühler, Uzwil, Switzerland.

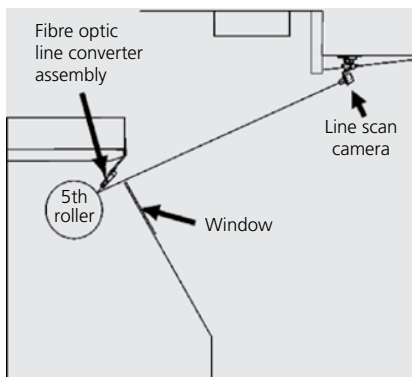


Figure 24.21 Experimental pilot rig. Reproduced with permission of Kraft Foods R&D Inc. Munich, Germany.