

# High-Speed Prediction Engine™



## Real-Time Sustained Hyperspectral Prediction

Hyperspectral push-broom cameras are ideally suited for industrial on-line process measurements. Large quantities of spectra are produced by successive parallel measurements of continuously moving samples, such as food and agricultural products on a conveyor belt or pharmaceutical tablets streaming by a camera. The Specim Ltd SWIR camera, for example, is capable of producing 256 spectral data points for each of the 320 spatial points captured by the camera at any given time. The camera is capable of sensing up to 100 frames per second, thus producing 32,000 complete spectra every second.

In a continuous production process, it is not practical to archive such large quantities of raw data. Thus, the incoming data stream needs to be calculated at the real-time speed of the camera. This computational task is easily achieved using the MRC-920-030 High-Speed Prediction Engine™ module, which connects directly to the camera. The module's prediction algorithm compresses the raw spectral data to produce the prediction result for each spatial data point.

## Hyperspectral Measurement System

In order to scan the entire surface of a sample, the subject must move in front of the camera at a constant rate. The camera simultaneously measures all the spectra of the entire viewing line at a rate of 10 to 100 frames per second. A variety of mathematical transforms may be computed on spectra in real-time, and unique prediction methods may be applied for specific applications. The prediction engine produces spectral data compressed into smaller, more informative data specific to your application.

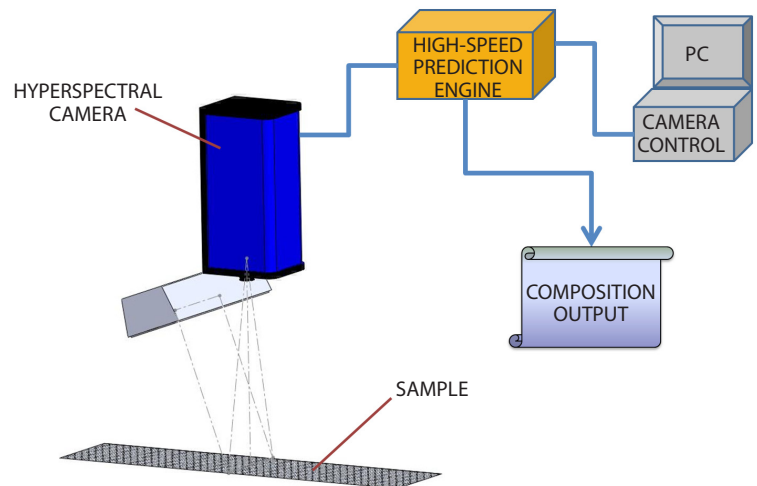
## Adjustable Conditioning Options

- White and dark referencing
- Frame averaging
- Spectral averaging or smoothing
- No-, first- or second derivative
- SNV correction

## Prediction Models

- Thickness calculation
- Color coordinate calculation
- Composition calculation
- Material type differentiation, e.g., plastic types

The camera is directly connected to the prediction engine, which is placed between the camera and the optional camera controller computer. A USB port on the prediction engine is used for the output of prediction data to a process computer.



## Specifications and Ordering Information

MRC-920-030 High-Speed Prediction Engine  
 Specific applications and camera types may require different versions of the Prediction Engine. Please contact Middleton Research for further details.