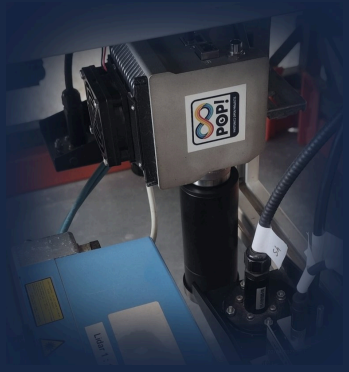
INDUSTRIAL QUALITY CONTROL

PRO-PIX

PHOTONICS OPEN PROJECTS



FROM MEASUREMENT TO DECISION

CAPABILITY
A zone delineated, then measured

MEASUREMENT
A spectrum, an identified zone and its RGB image

USE
Spot checks, incoming materials, process monitoring

DECISION
Rule on a deviation from reference, with the part to hand

BEFORE / AFTER

Visual judgement	→	**Recorded, time-stamped measurement**
Destructive testing	→	**Sample preserved**
Average over the whole sample	→	**Measurement localised on the zone checked**
Deferred laboratory result	→	**Data obtained at the moment of the check**

WHICH DEVIATION ARE YOU TRYING TO DETECT?

Describe it in one sentence. We will tell you whether spectral measurement can reach it, and in which configuration.

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Putting a figure on what two operators describe differently, where the deviation has a spectral signature.

"The sensor delineates the zone to be checked, measures its spectral signature and keeps its image. The check produces a recorded measurement, provided the deviation sought has a discriminable spectral signature."

1 CURRENT LIMITATIONS

- **Today, appearance checks rest on the operator.** Two people, two stations, two shifts: the threshold is not the same.
  The decision varies, and is hard to defend against a customer complaint.
- **Deviations in composition, moisture or surface treatment do not always show.** A colour camera sees them no better than the eye does.
  They are caught at the customer's site, not at the inspection station.
- **Reference methods are often destructive and deferred.** The sample goes to the laboratory and does not come back.
  The batch is produced before the result arrives.

2 ADDRESSED MEASUREMENT

1. **OBSERVATION**
   The part or the product, through a built-in 1080 px RGB camera that keeps its image.
2. **SEGMENTATION AND MEASUREMENT**
   A segmentation model delineates the zones to be checked; the spectrometer measures each of them.
3. **RESULT**
   A spectrum, a zone and its image, compared on board against your reference: the deviation is returned at the point of observation.

3 PRIORITY APPLICATIONS

DETECTING A DEVIATION BETWEEN BATCHES

SITUATION Inspection station, on products from successive batches.
MEASURED Spectral measurement on homogeneous zones set by protocol.
RESULT A quantified deviation from a reference you built yourself.

Pin down a drift before it turns into a non-conformity.

SPOT CHECKING, WITHOUT DESTRUCTION

SITUATION Part or sample presented to the sensor at a fixed station.
MEASURED Measurement without contact or preparation, at 1.5 m and beyond.
RESULT A recorded measurement, paired with the image of the zone checked.

Replace a judgement with data, and keep the sample.

CHARACTERISING INCOMING MATERIALS

SITUATION Goods-in, before release to production.
MEASURED Identity and homogeneity checks against a reference.
RESULT One signature per supplier batch.

Catch a deviation where it costs least to correct.

PROCESS MONITORING

SITUATION At the key stages of a process: drying, coating, blending, finishing.
MEASURED Repeated measurements at the same spot, to a constant protocol.
RESULT A measured trend, with the matching image at every point.

Link a machine setting to its real effect on the product.

WHAT CHANGES

01 ON-BOARD ANALYSIS
The deviation from your reference is returned at the point of observation.

02 LOCALISED MEASUREMENT
The spectrum covers the zone checked, not the whole sample.

03 DOCUMENTED RECORD
Spectrum, zone and image are stored in a single record.

04 RECONFIGURABLE SENSOR
One camera covers several checks and several product references.

TECHNOLOGY LICENSED FROM ARVALIS / PHOTONICS BRETAGNE

SPEC. PRO-PIX

INDUSTRIAL QUALITY CONTROL

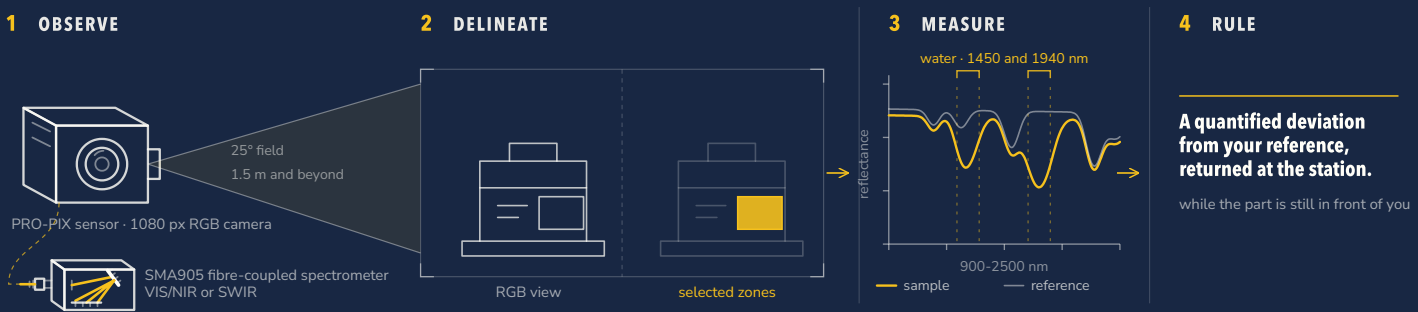
- **Your on-board algorithms remain your property**
- **Method proven on ONE-PIX, transferred to PRO-PIX**
- **OEM white-label integration**
- **Designed and made in France, in Lannion**

SPECIFICATIONS

SPECIFICATION	PRO-PIX VIS/NIR	PRO-PIX SWIR
Typical spectral range*	400-1000 nm *The range is chosen to suit the spectral question.*	900-2500 nm
Spectral resolution*	0.5 nm typical (0.06 to 20 nm depending on configuration) *The finer the resolution, the better the discrimination and the longer the integration time.*	
Built-in RGB camera	1080 px, segmentation and colour reference	
Measurement and analysis rate**	4 to 10 Hz at best *Segmentation, measurement and analysis included: this is the rate at which usable data leaves the sensor.*	
Typical working distance / FOV	1.5 m to infinity / 25°	
Triggering / Connectivity	Hardware and software triggers / GigE	
Control software	Graphical interface / Python SDK / ROS	
Dimensions / Weight***	125 × 90 × 90 mm / < 700 g	
Ingress protection / Temperature	IP65, complete system / 0-40 °C	

* depending on the spectrometer selected. ** depending on the number of clusters and the segmentation and integration times. *** excluding the remote optical head

OPERATING PRINCIPLE: ADDRESSED MEASUREMENT



1 RGB observation · 2 zone segmentation · 3 addressed spectral measurement · 4 on-board analysis inside the sensor, 4 to 10 Hz

STATE OF THE ART

PRO-PIX has no published industrial quality-control case study yet. Spectral imaging has, however, established:

- Hyperspectral imaging is used to inspect surfaces and coatings (oil, wax, lacquer, protective treatments) for layer thickness, uniformity and composition.
  Industrial surface and coating inspection applications of hyperspectral imaging
- The applied weight of an adhesion promoter and residual moisture have been monitored in line by NIR camera in textile finishing.
  Daikos & Scherzer, Progress in Organic Coatings, 2020 and 2022
- Against a single-point measurement, imaging locates heterogeneity where spectroscopy returns only an average for the whole sample.
  Review of non-destructive testing methods using hyperspectral imaging, 2026
- Non-destructive testing of metal powders by NIR imaging has been demonstrated for characterisation and contamination detection.
  Non-destructive quality control in powder metallurgy using hyperspectral imaging, 2022

WHO FOR?

- **Quality managers**: replace a judgement on appearance with a measured deviation.
- **Process and methods engineers**: follow a drift at the station, without stopping production.
- **Product R&D and innovation**: characterise a coating during development.

CONDITIONS AND LIMITS OF USE

- **4 to 10 Hz at best:** the fit is spot checking, fixed stations, process monitoring and moderate throughput, not high-rate single-item inspection.
- **Not every defect is within reach:** only those whose deviation has a spectral signature that is discriminable at the chosen resolution.
- Working distance from 1.5 m: the sensor observes a scene.
- The discrimination available is that of a spectrometer at the chosen resolution: it is established on your own products.
- IP65 across the complete system, 0-40 °C temperature range.

TELL US THE DEVIATION, WE WILL SAY WHETHER IT CAN BE MEASURED.

We assess the feasibility of your check before proposing any equipment. Indicative lead time: three months. Rental is available for an evaluation in real conditions.

WHAT TO SEND US

- → The deviation or defect to detect
- → The material and geometry of the product
- → The working distance and rate available at the station

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