

DODILog project - conditions for carrying out tests in a real environment with PSS Polytec

Date created: 09/09/2024

Revised: 28 April 2026

Author(s) : K. Crépon / M. Faure / S. Maudemain

Working paper

> DESCRIPTION OF THE TECHNOLOGY TESTED

The instrument tested is a Polytec PSS infrared sensor consisting of a sensor head (contact or distance) and a terminal box connected to a computer. The scanning system can be moved several metres away from the box (6 m). It is connected to the box by an optical fiber.

The PSS Polytec is dustproof (IP64) but is not ATEX certified, so it must be installed outside an ATEX zone.

The box and computer must be connected to the electricity supply.

Analysis is performed in a grain flow, at a distance (20 +/-5 cm) or on a close contact.

The test zones identified are

- On a conveyor belt,
- On a grain descent column during sampling.

Calibrations have been carried out on common wheat and barley.



Figure 1 : PSS Polytec distance sensor head (source: Polytec) Figure 2 : PSS Polytec contact sensor head (source: Polytec)

> CONDITIONS REQUIRED FOR A TEST ON CONVEYOR BELT (STEP 1)

Test methodology: continuous spectra are taken on a flow of common wheat and samples are taken from the same flow to analyse the infestation using a reference method. A comparison between the results of the reference analysis and the models will be used to validate the models.

Requirements:

- Receiving or shipping common wheat
- Possibility of installing the distance head sensor above the conveyor belt (an arch can be installed by ARVALIS or POLYTEC teams)
- Electrical connection nearby
- Distance between reading sensor and terminal box less than 6 m
- Outside the ATEX zone
- Possibility of taking samples without any risk to the operator (ideally, samples should be taken using an automatic sampler, failing which, samples should be taken from the flow using a hand bucket).



Figure 3 : Example of the installation of a distance sensor head on a test site (ARVALIS pilot site)



Figure 4: Examples of possible installation sites for distance head sensors in silos (on the left, on the frame of the conveyor belt with the addition of a support, on the right, on the existing support of another device).

> CONDITIONS REQUIRED FOR A TEST ON SAMPLES (STEP 2)

Test methodology: Spectrum measurement of the sample taken from the lorry's tipper at reception, measurement of the infestation at reception by sieving, conservation of a sub-sample for incubation and determination of the hidden infestation.

Requirements:

- Receive common wheat.
- Routine sampling at reception with probe sampling.
- Possibility of installing the contact sensor head on a grain drop c or to modify the sample intake flow to incorporate a spectrum-acquisition belt.

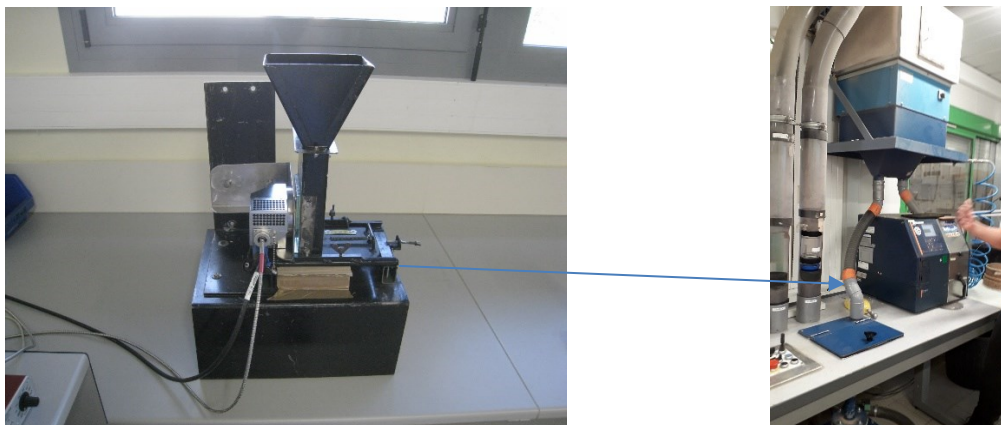


Figure 5: Contact sensor head installed on a sample hopper (left), can also be installed in an inspection unit (right).

> **INVOLVEMENT OF TEST SITE TEAMS**

A preliminary audit of the site will be carried out by ARVALIS and POLYTEC to determine, **in agreement with the test site teams**, the feasibility of the test and, if necessary, the positioning of the sensor heads.

ARVALIS will produce the installation supports for the devices adapted to the test site in its workshop.

The equipment will be installed and connected by ARVALIS personnel, under the supervision of test site personnel.

Samples will be taken on conveyor belts by ARVALIS staff.

Infestation analyses will be carried out by ARVALIS.

The involvement of the site staff should not exceed 3 FTE (days).