INDUSTRY // PLASTICS & PACKAGING

Packaging inspection systems for plastics and packaging lines

Camera checks for injection moulded, compression moulded and thermoformed parts, closures, preforms and printed packaging, as part of packaging line automation.

TECHNICAL REVIEW: Frank Guo (https://www.linkedin.com/in/frank-g-15b59b57) · REVIEWED 3 OCTOBER 2026

Request an assessment

// SHORT ANSWER

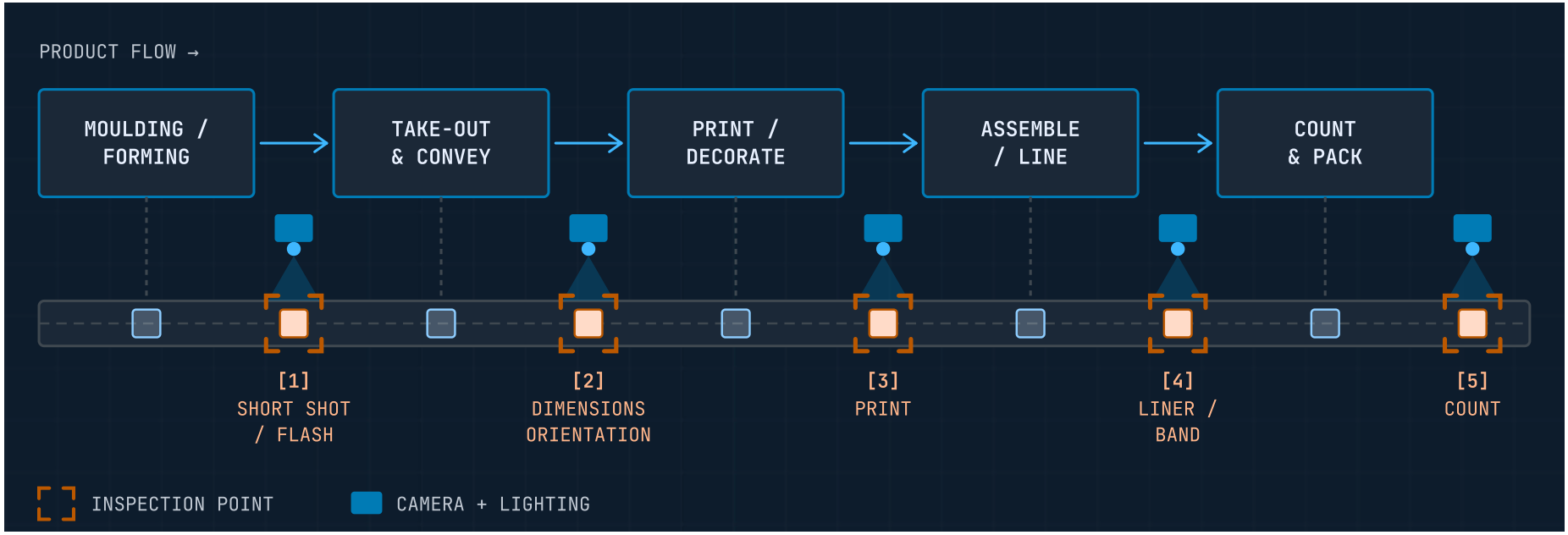
A packaging inspection system is a camera station that checks moulded, thermoformed and printed packaging for visible faults: short shots, flash, specks and other surface contamination, print defects, key dimensions, orientation, and missing liners or tamper bands on closures. Results depend on how parts are presented, on normal cavity-to-cavity variation, and on lighting that suits clear or translucent material. Internal voids, moulded-in stress and material properties are not visible, so each check is confirmed on your own parts first.

// WHERE IT FITS

Inspection points from mould to pack

A typical sequence for moulded or thermoformed packaging; many lines skip printing or assembly.

[Schematic] PROCESS FLOW · NOT TO SCALE



[1] Shape: short shots, flash, specks and forming faults at the machine exit.

[2] Dimensions: key features and orientation after take-out.

[3] Print: presence, completeness and registration after decoration.

[4] Liner & band: liner, wad, insert or tamper band present.

[5] Count: the right number of parts per bag or box.

// DEFECT RISKS

What goes wrong at each step

Visible faults by step, and the application that checks for them.

PRODUCTION STEP	TYPICAL VISIBLE FAULTS	INSPECTION
Injection moulding	Short shots, flash at parting lines and gates, black specks, burns, colour streaks	Surface defect detection
Thermoforming	Incomplete forming, webbing, torn or badly trimmed edges	Surface defect detection
Take-out and conveying	Key features out of size; parts on their side or upside down; double or stuck parts	Dimensional measurement Presence & counting
Printing and decoration	Missing, smeared or misregistered print; wrong artwork for the job	Label & print inspection
Closure assembly	Missing liner or wad, uncut or missing tamper band, missing insert	Presence & counting

// INSPECTIONS

Checks that apply to plastics and packaging

Surface and dimension checks often share one camera when the part is held still at a known position.

Surface defect detection

Short shots, flash, specks, burns and forming faults, with lighting chosen for the material.

`At: mould or former exit`

Surface defect detection →

Dimensional measurement

Diameters, heights and hole positions on selected features, without contact.

`At: take-out or conveyor`

Dimensional measurement →

Label & print inspection

Print presence, completeness and registration on cups, tubs, lids and closures.

`At: after printing`

Label & print inspection →

Presence & counting

Liners, tamper bands and inserts present; parts the right way up; counts per bag or box.

`At: assembly and packing`

Presence & counting →

`// APPLICATION MAP`

Plastics and packaging inspection scenarios by product

Typical parts from South African moulders, converters and packaging plants, what a camera checks on each, and the application page with the detail. The method in each row is a starting point, confirmed on your own parts. Functional tests such as tamper band pull-off, leak testing and wall thickness stay separate.

PRODUCT / LINE POSITION	WHAT IS INSPECTED	TYPICAL FAULT CAUGHT	INSPECTION METHOD	RELATED APPLICATION
Water and soft-drink caps with tamper bands at the moulding or slitting machine exit	Tamper band, bridges and the cap skirt	Uncut or broken bridges, a folded or short-shot band, flash	Camera looking into the cap with a ring light, plus a side view of the band	**Surface defect detection**

PRODUCT / LINE POSITION	WHAT IS INSPECTED	TYPICAL FAULT CAUGHT	INSPECTION METHOD	RELATED APPLICATION
Lined and wadded closures after the lining machine	Liner or wad present, centred and flat	Missing, double or off-centre liner	Camera looking into the closure with diffuse light	**Presence & counting**
PET preforms at take-out or before the blow moulder	Neck finish, body and gate	Short or damaged neck finish, black specks, gate stringing, white haze	Backlight through the body; a finish camera looking down	**Empty containers & preforms**
Flip-top dispensing caps after assembly	Lid closed and hinge intact; orifice insert present	Open or half-closed lid, missing insert	Camera looking down on the cap, low-angle light	**Presence & counting**
Thermoformed meat and fruit trays after trimming and stacking	Formed shape and trimmed edge	Webbing, incomplete forming, torn or ragged trim	Backlight under clear trays; low-angle light on opaque ones	**Surface defect detection**
Injection-moulded bread and beverage crates at the mould exit	Full outline, ribs, handle openings and the moulded logo	Short shot on a rib, flash in openings, burn marks	Wide-view camera or several cameras with diffuse front light	**Surface defect detection**

PRODUCT / LINE POSITION	WHAT IS INSPECTED	TYPICAL FAULT CAUGHT	INSPECTION METHOD	RELATED APPLICATION
Paint pails with in-mould labels after the moulding cell	Label position and wrinkles; handle fitted	Shifted or creased label, missing handle	Side cameras around the pail, diffuse light	**Label & print inspection**
Blow-moulded HDPE bottles and jerry cans after deflashing	Neck and handle area, bottle outline	Flash left at the neck or handle, an oval neck. Leak testing stays a separate station	Backlit profile; top camera on the neck	**Dimensional measurement**
Printed laminate toothpaste tubes after printing and capping	Print registration and colour; cap fitted	Misregistered or missing colour, missing cap	Tube rotated past a camera, or several views, diffuse light	**Label & print inspection**
Dry-offset printed margarine tubs after the cup printer	Complete print and text on the tub wall	Missing colour, smears, partial print	Camera with diffuse light as the tub turns, or several cameras	**Label & print inspection**
Blown film on the winder	Film across its full width	Gels, holes, streaks and contamination	Line-scan camera over a backlight, paced by an encoder	**Web & line-scan inspection**

PRODUCT / LINE POSITION	WHAT IS INSPECTED	TYPICAL FAULT CAUGHT	INSPECTION METHOD	RELATED APPLICATION
Self-adhesive label reels on the converter before rewinding	Printed labels on the moving web	Missing or smeared print, matrix not stripped, splices	Line-scan or strobed area camera across the web	**Web & line-scan inspection**
Woven polypropylene sacks after cutting and printing	Printed panel, cut edge and stitched bottom	Misprint, frayed cut, missing stitch line	Camera over the flat sack with diffuse light	**Surface defect detection**

// INTEGRATION

Conditions specific to moulding and packaging

These conditions decide how the station is taught and lit.

CAVITIES

Cavity-to-cavity variation

Parts from a multi-cavity tool differ slightly. Limits are taught from every cavity so normal variation passes.

CLEAR PARTS

Clear and translucent material

Front light passes through clear plastic; a backlight shows edges, short shots and flash that front light misses.

APPEARANCE

Texture, gloss and colour

Textured or glossy surfaces and colour shifts between batches can look like defects. Normal appearance is taught from several batches.

WE ASK

Good parts from each cavity

WE ASK

Material, colour and clarity

WE ASK

Samples from several batches



PRESENTATION

Orientation off the machine

Parts dropped from a mould land at random angles. A one-sided check needs consistent presentation or more views.



CHANGES

Mould and colour changes

A new tool, insert or colour means a new recipe or adjusted limits, selected with the job change.



ENVIRONMENT

Heat, static and dust

Warm parts may still be shrinking, and static pulls dust onto surfaces where it can look like contamination.

WE ASK

How parts leave the machine

WE ASK

Tools and colours on the machine

WE ASK

Where parts are measured today

// CONVERTERS

Print control for converters supplying food plants (FSSC 22000 2.5.2(d))

What food customers ask packaging converters to prove, and where inspection fits.

Converters that print film, labels, sleeves or cartons for food plants certified to FSSC 22000 are asked to prove print control. Version 6 of the scheme (Part 2, 2.5.2(d)) asks packaging manufacturers for approval of each print run against the agreed standard or master sample, a process to detect and identify printing errors during the run, and segregation of different print variants.

In-run print inspection on the press or rewinder is covered on the web and line-scan inspection page. For moulded and decorated packs, a label and print check after decoration does the same job at part level. Artwork approval stays with pre-press and the customer.

Manual checks at the press or the moulding machine depend on each inspector's judgement and attention, which vary across shifts, and skilled inspectors are hard to find and keep. A station applies the same limits to every part and keeps images for the quality team; it does not replace the setter who fixes the cause.

Source: FSSC 22000 Scheme Version 6, Part 2, 2.5.2(d) (https://www.fssc.com/wp-content/uploads/2023/03/FSSC-22000-Scheme-Version-6-.pdf) (read 2026-09-25).

// LIMITS

What a camera cannot tell you about a plastic part

We agree these boundaries before a project starts.

× Needs another method

- **Internal voids and stress.** Voids inside opaque parts, moulded-in stress and material properties are not visible.
- **Wall thickness of opaque parts.** A camera sees the outline and surface, not the thickness of an opaque wall.

✓ Works reliably when

- **Parts are presented consistently.** A nest, guide or robot place gives each part the same position.
- **Normal variation is sampled.** Good parts from every cavity, batch and colour.

- **Function and fit.** Whether a closure seals or a clip snaps is a functional test; vision checks the visible features.
- **Tight tolerances on large parts.** Resolution is shared across the field of view; these may need several cameras, telecentric optics or another gauge.
- **Lighting suits the material.** Backlight for clear parts, low-angle light for surface relief.

// SAMPLES & ACCEPTANCE

What to send for a sample test

We test your own parts before proposing a station; quantities and shipping are agreed first. The same samples later define acceptance.

Sample preparation guide

Good parts
Parts from every cavity, and from different batches and colours if they vary.

Defect parts
Short shots, flash, contamination, print and assembly faults, including borderline ones, each marked.

Drawings
Part drawings with the dimensions and tolerances that matter to you.

Acceptance
False rejects on good parts from all cavities and missed defects on marked samples; levels agreed per project.

// MANUAL INSPECTION

Why manual inspection struggles on these lines

Conditions on moulding and packaging lines that make checking by eye unreliable over a full shift.

- **Continuous output.** Machines eject parts every cycle, around the clock, so an operator checks samples and faults between samples go into the box.
- **Clear and translucent parts.** Short shots, flash and specks in clear material are hard to see under room lighting.

- **Glare and gloss.** Glossy surfaces and printed film reflect, and small print faults on a running web are hard to follow by eye.
- **Heat and static.** Warm parts are uncomfortable to handle and may still be changing shape; static pulls dust onto surfaces where it looks like contamination.
- **Many cavities and colours.** Knowing what is normal for every cavity, colour and tool is a lot to hold in mind on a busy shift.

These are reasons to automate the checks that are defined and visible, and to keep people for judgement and for fixing causes. The guide to manual or camera inspection compares the two.

// LINE SOLUTIONS

Line solutions for plastics and packaging

Complete stations for lines in this industry, each with the HIKROBOT hardware, installation and an indicative installed budget for a typical application in rand, excluding VAT. **All line solutions →**

LINE SOLUTION	FAULTS IT CATCHES	HIKROBOT CONFIGURATION	INDICATIVE BUDGET (EXCL. VAT)
Closure inspection	Short shots, flash, broken tamper band bridges, missing or off-centre liners	Two to four views, backlight and dome light, air-jet reject	R 370 000 – R 1 290 000

LINE SOLUTION	FAULTS IT CATCHES	HIKROBOT CONFIGURATION	INDICATIVE BUDGET (EXCL. VAT)
Folder gluer inspection	Glue missing on the flap (where visible), wrong print, unreadable barcode	Vision sensors or 4K line scan, UV light, machine kicker	R 170 000 – R 970 000

// FAQ

Plastics and packaging inspection questions

What does injection moulding quality inspection check?

On the line, injection moulding (molding) quality inspection checks what is visible on each part: short shots, flash, sink marks, black specks, burn marks and colour deviation, key dimensions and orientation, and missing liners or inserts. Internal voids, moulded-in stress and material properties need other tests.

Can short shots and flash be detected on moulded parts?

Often, when the part is presented consistently. A backlight shows the outline of a short shot; low-angle light shows flash on a parting line. Thin flash on clear material is harder, so we test your parts first.

Will cavity-to-cavity variation cause false rejects?

It can if limits are taught from one cavity only. We teach limits from good parts from every cavity and review borderline parts with your quality team, so normal variation passes.

Can parts be measured straight off the machine?

The visible outline and features can be measured, but warm parts may still be shrinking. How camera results compare with your later lab measurements is agreed during the sample test.

What happens when we change moulds or colours?

Each tool or colour gets its own recipe or limits, selected with the job change so parts are not checked against the wrong reference. A new part needs samples and a teaching step.

Can vision inspect tamper bands on plastic caps?

Yes, for visible faults: uncut or broken bridges, a missing, folded or short-shot band, and flash. The camera usually looks into the cap and at the band from the side. Whether the band breaks correctly when the cap is opened is a functional pull-off test, which a camera cannot replace.

What does preform inspection check?

Visible faults in PET preforms: a short or damaged neck finish, black specks, gate stringing and white haze, usually at the machine take-out or before the blow moulder. Wall-thickness distribution, material properties and moulded-in stress need other methods.

RELATED: Surface defect detection → Dimensional measurement → Label & print inspection → How we deliver a project → All industries →

// PLASTICS & PACKAGING

Request an assessment for your parts

Tell us the parts, materials and faults you need to catch. We will say which checks apply and what a sample test needs.

Request a Vision Assessment