INDUSTRY // BUILDING MATERIALS

Tile inspection, brick and board inspection with machine vision

Tile quality inspection and camera checks for boards, bricks, blocks, roofing sheets and pipes.

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Request an assessment

// SHORT ANSWER

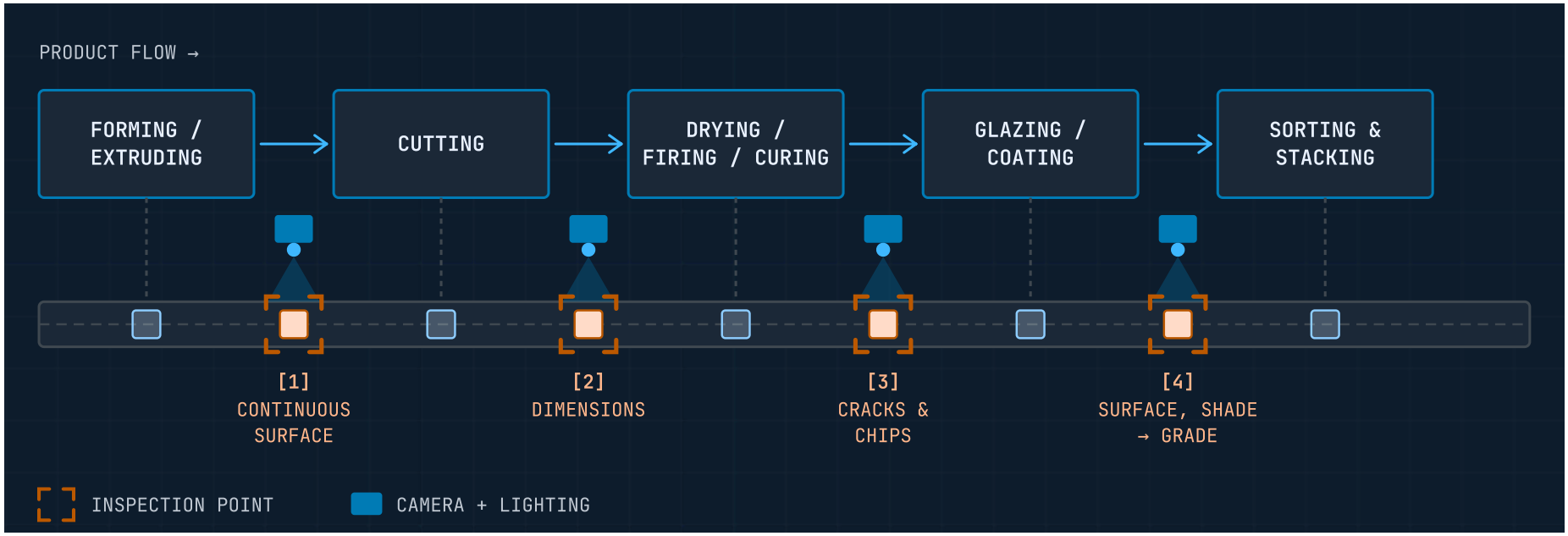
Tile inspection with machine vision finds visible surface defects such as cracks, chips, blisters and glaze faults, measures length, width and squareness, and can sort units into grades or shade classes; the same checks apply to boards, bricks and blocks. Continuous or large products such as board, sheet and pipe are usually imaged with line-scan cameras. Dust, heat and vibration decide how the station is built. Strength, density and internal cracks are not visible to a camera.

// WHERE IT FITS

Inspection points from forming to stacking

A generic sequence; each product skips or adds steps.

[Schematic] PROCESS FLOW · NOT TO SCALE



[1] Continuous surface: board, sheet or pipe imaged by line-scan before cutting.

[2] Dimensions: length, width and squareness of cut units.

[3] Cracks & chips: after drying, firing or curing.

[4] Surface & shade: finish and colour, combined into a grade for sorting.

// 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
Forming, pressing, extruding	Blisters, paper tears and streaks on board; marks on sheet and pipe	Web & line-scan inspection Surface defect detection
Cutting	Wrong length or width, out-of-square corners, chipped edges	Dimensional measurement
Drying, firing, curing	Cracks, chipped corners and colour change between kiln or dryer zones	Surface defect detection
Glazing, printing, coating	Pinholes, glaze drips, missing or smeared print, coating scratches	Surface defect detection
Sorting and stacking	Grades or shades mixed in one box or pallet	Grading (below)

// INSPECTIONS

Checks that apply to building materials

Surface and dimension checks can often share one station.

Surface defect detection

Cracks, chips, blisters, pinholes and glaze faults.

At: after firing, curing or finishing

Dimensional measurement

Length, width, squareness and edge straightness of cut units.

At: after cutting

Web & line-scan inspection

Continuous board, sheet or pipe imaged line by line as it moves.

At: after forming, before cutting

Surface defect detection → Dimensional measurement → Web & line-scan inspection →

// GRADING

Sorting units into classes

Several checks combine into one decision per unit.

01

Define the classes on samples

Each grade or shade class is set by physical reference units agreed with your quality team.

02

Hold the image stable

Shade needs constant lighting and colour settings, checked regularly against a reference.

03

Combine and signal

Surface, dimension and shade results form one grade, sent to the sorter or stacker.

// APPLICATION MAP

Building materials inspection scenarios by product

Typical products from South African building materials 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 product. Strength, water absorption, density and internal cracks remain laboratory tests.

PRODUCT / LINE POSITION	WHAT IS INSPECTED	TYPICAL FAULT CAUGHT	INSPECTION METHOD	RELATED APPLICATION

PRODUCT / LINE POSITION	WHAT IS INSPECTED	TYPICAL FAULT CAUGHT	INSPECTION METHOD	RELATED APPLICATION
Ceramic floor tiles after the kiln, before the sorting line	Glazed face, edges, size and shade	Cracks, chipped corners, pinholes, glaze drops, a shade outside the batch	Diffuse and low-angle light; colour camera for shade	**Surface defect detection**
Inkjet-printed wall tiles after the digital printer or kiln	Printed decor across the face	Streaks from blocked print-head nozzles, missing decor, smudges	Colour line-scan or area camera with even light	**Surface defect detection**
Gypsum board (plasterboard) on the board line after the dryer	Paper face and bound edges	Paper tears, blisters, stains and damaged edges	Line-scan across the width with a line light and encoder	**Web & line-scan inspection**
Fibre-cement sheets and ceiling boards after curing and trimming	Face, edges, length, width and squareness	Cracked or broken corners, edge delamination visible at the cut, out-of-square sheets	Overhead cameras or line-scan with the sheet presented flat	**Dimensional measurement**
Concrete blocks and pavers on the production board after the block machine	Top face and edges of each unit on the board	Broken corners, cracks, missing or incomplete units	Overhead camera triggered once per board, low-angle light	**Surface defect detection**

PRODUCT / LINE POSITION	WHAT IS INSPECTED	TYPICAL FAULT CAUGHT	INSPECTION METHOD	RELATED APPLICATION
Clay face bricks after the kiln or at the setting machine	Face colour, texture and arrises	Chipped arrises, cracks, colour outside the agreed range	Colour camera with low-angle light	**Surface defect detection**
Concrete roof tiles after curing and colour coating	Nibs, interlocks and coating cover	Broken nib, cracked interlock, bare patches in the coating	Camera over the tile with diffuse and low-angle light	**Surface defect detection**
IBR and corrugated roof sheeting after the roll former	Coated surface along the moving sheet	Coating scratches, dents, roll marks and colour change. Profile height needs a laser profile sensor	Line-scan camera paced by an encoder	**Web & line-scan inspection**
PVC pipes after the extruder, at the marking printer and saw	Printed marking along the pipe, outer surface, cut end	Missing or unreadable marking, streaks, a ragged cut	Cameras around the pipe; OCR/OCV on the marking	**OCR/OCV & code inspection**
Melamine-faced boards after the short-cycle press	Decor surface	Scratches, press marks, dry spots, the wrong decor	Colour line-scan with even light across the board	**Web & line-scan inspection**

PRODUCT / LINE POSITION	WHAT IS INSPECTED	TYPICAL FAULT CAUGHT	INSPECTION METHOD	RELATED APPLICATION
Insulation rolls after roll wrapping	Wrap intact and the right label for the product	Torn wrap, missing or wrong label	Camera beside the conveyor with diffuse light	**Label & print inspection**
Cement bags at the rotary packer discharge	Printed cement class and date code on the valve bag	The wrong class printed after a silo change, missing code, burst bag	Camera over the bag face; OCR/OCV on the code	**OCR/OCV & code inspection**
Strapped cubes of bricks or blocks at the stacker and strapping station	Cube label present and matching the product; layers complete	Missing or wrong cube label, a gap in a layer	Camera or code reader at the strapping station	**Carton & pallet verification**

// ENVIRONMENT

Conditions specific to building materials plants

Dust, heat and vibration are designed for from the start.

DUST

HEAT

VIBRATION

Clay, cement and gypsum dust

Dust coats optics and can look like a defect on product. Sealed housings, air purge and cleaning keep the image usable.

WE ASK

Dust sources near the line

Kilns and dryers

Radiant heat affects electronics. The check sits after cooling, or the housing is cooled.

WE ASK

Product temperature at the check

Presses, saws and conveyors

Vibration blurs images and shifts measurements. Cameras mount on rigid, isolated frames.

WE ASK

Where the station could be mounted

SIZE

Large and continuous product

Board and sheet are imaged by line-scan cameras paced by an encoder; wide product may need several.

WE ASK

Product width and how speed is measured

TEXTURE

Rough faces and patterns

Textured and printed surfaces vary naturally. Samples show where texture ends and a defect starts; brick and block lines add tight dimensional consistency.

WE ASK

Designs and finishes that run

// LIMITS

What a camera cannot tell you about building materials

We agree these boundaries before a project starts.

Needs another method

- **Internal cracks and laminations.** Need methods such as acoustic or ultrasonic testing.
- **Strength and absorption.** Strength, water absorption and density are laboratory tests.
- **Hidden faces.** The underside needs another view; the inside of a pipe may not be visible.
- **Height.** Flatness, warp and thickness need 3D or profile measurement.

Works reliably when

- **Product is presented consistently.** Flat, spaced, with an encoder on continuous lines.
- **Optics are protected.** Housings, air purge and cleaning are part of the design.
- **Classes are defined on samples.** Physical reference units for every grade and shade.

// SAMPLES & ACCEPTANCE

What to send for a sample test

We test your own products before proposing a station. The same samples later define acceptance.

Sample preparation guide

Good product

Units from normal production, for each size, colour and finish.

Defect samples

Cracks, chips, blisters and out-of-size units, each marked.

Grade references
Units that mark the boundary between grades or shades.

Acceptance
False rejects, missed defects and grading agreement with your inspectors; levels agreed per project.

// MANUAL INSPECTION

Why manual inspection struggles on these lines

Conditions on building materials lines that make checking by eye unreliable over a full shift.

- **Dust.** Clay, cement and gypsum dust coats product and hangs in the air, hiding fine cracks and chips.
- **Heat.** Product leaving kilns and dryers is too hot to inspect up close, so checks move to after cooling or are skipped.
- **Size and weight.** Large tiles, boards and blocks are heavy to turn, so undersides and edges are often not looked at.
- **Glare, texture and shade.** Glazed and textured faces reflect light differently, and grading shade by eye varies between inspectors and with the light.
- **Shift fatigue.** Noise, vibration and long runs of near-identical units make the occasional defect easy to miss.

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 building materials

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)
Cement bag inspection	Missing or illegible packing code, wrong pre-printed bag, bag count per order	Vision sensor or 2 cameras in purged housings, reject flap	R 140 000 – R 840 000
Pipe print inspection	Missing, smeared or wrong marking text; metre count out of sequence	Vision sensor or 3 cameras around the product, encoder, alarm	R 110 000 – R 650 000

// FAQ

Building materials inspection questions

Can machine vision find cracks and chips on tiles or bricks?

In tile and brick inspection, usually yes, when lighting makes the crack or chip stand out; low-angle light shows relief. Fine cracks on rough or patterned faces are harder, so we test your products first.

Can a camera grade tiles by shade?

It can sort units into shade groups when lighting and camera colour are stable and classes are defined on physical reference tiles. Random patterns are harder.

How are boards or roofing sheets inspected while they move?

With line-scan cameras that build the image line by line as the product passes, paced by an encoder. Defect positions can be passed on so the right piece is rejected after cutting.

Can vision check length, width, squareness and flatness?

Length, width and squareness can be measured from a top view when the product is presented consistently. Flatness, warp and thickness need height information, usually from a 3D or laser-profile method.

Will dust and heat stop a camera working?

Not if they are designed for. Sealed housings, filtered air and regular cleaning keep dust off the optics. Near kilns, the station sits where the product has cooled, or the housing is cooled.

Can vision replace strength or water absorption testing?

No. A camera sees surface and shape. Strength, water absorption, density and internal cracks need laboratory or other test methods.

Can concrete blocks and pavers be checked on the production board?

Yes, for visible faults. An overhead camera triggered by the block machine images each board and flags broken corners, cracks and missing or incomplete units. Compressive strength, density and faults below the top face need sampling and laboratory tests.

RELATED: Surface defect detection → Dimensional measurement → Web & line-scan inspection → Machine vision lighting guide → How we deliver a project → Support & changes →

LINE SOLUTIONS USING THIS: Rebar bundles →

COMMON IN THESE INDUSTRIES: Metal components →

TYPICALLY BUILT WITH: Area scan cameras with a vision controller →

// BUILDING MATERIALS

Request an assessment for your line

Tell us the products, finishes, grades and conditions around the line. We will say which checks apply and what a sample test needs.

Request a Vision Assessment