

Call for entries to startup competition

Automated Inspection Challenge

Automated Final Inspection in Cylinder Head Manufacturing

Develop and demonstrate an automated inspection system that performs a 360° final inspection of cylinder heads in accordance with inspection specifications and can be integrated into a Volkswagen production line. Demonstrate its detection performance using real component samples.

Applications due by June 25, 2026.

3-5 teams will compete for the chance to have their solutions implemented at Volkswagen.

Context & Problem Statement

At the Volkswagen engine plant in Chemnitz, hundreds of thousands of cylinder heads undergo a manual 360-degree final inspection each year. Experienced employees inspect surfaces, drill holes, threads, contours, and contamination in accordance with detailed inspection guidelines. While this inspection ensures quality targets are met, it ties up qualified personnel who are needed elsewhere in the plant. Demographic shifts and a shortage of skilled workers are intensifying this pressure. boOst & Volkswagen Group Innovation are therefore seeking an automated solution that can reliably take over this inspection task.

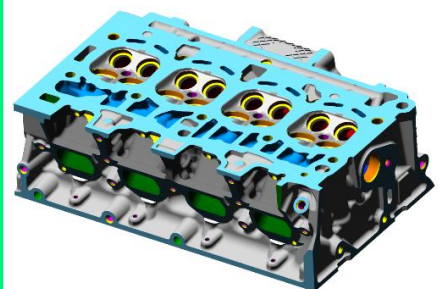
The Technical Challenge

The cylinder head is a complex, intricate cast part with numerous hard-to-reach surfaces, small threads, drill holes, and zone-specific tolerances. The metal surface reflects light in varying ways, and at the same time, dozens of different features must be evaluated simultaneously. Conventional camera systems reach their limits in this scenario and, in practice, generate too many false positives.

Furthermore, human inspectors can judge based on context, react adaptively to borderline cases, and reliably distinguish between relevant defects and harmless deviations. This combination of experience, judgment, and flexibility has historically been the hurdle for automation approaches and sets the bar for any new solution.

AI and deep learning, modern imaging techniques, and automated robotic handling now make it possible to fully capture complex components and precisely detect defect patterns. This makes economically viable automation realistic for the first time.

Illustration of the inspection task: Cylinder head R4 EU7



- Component dimensions: approx. 375 x 247 x 115 mm
- 157 drill holes to be inspected, depth up to 186 mm, diameter 7 mm
- 24 surfaces to be inspected

This is where the challenge begins.

We are looking for startups that develop solutions for automated quality inspection and are willing to demonstrate their detection performance using defined component samples. Applications will be accepted until **June 25, 2026**.

Solution Requirements

SCOPE

The solution must automatically cover the full scope of inspection as specified in the inspection procedure: defects, holes, threads, contours, and contamination. This applies to all six sides of the component.

INTEGRATION

All suitable inspection technologies (optical and non-optical) as well as hybrid systems are permitted. The solution can be flexibly integrated into the production line or the final inspection station but must take spatial constraints into account.

VALIDATION

Volkswagen provides component samples that are to be used to detect specific failure patterns based on standardized metrics. The goal is to create a real-world test setup. Digital test environments using synthetic data may additionally be used.

The quality of a solution is measured by how effectively it balances the competing priorities of detection performance, processing speed, and cost-effectiveness.

processing speed

Within the specified cycle time: Test \leq **30 seconds**

cost-effectiveness

False positive rate \leq **1%**
System costs justified by performance

detection performance

\geq **50%** of the inspection process is **automated** (initial phase; target: 100%)
No increase in customer **complaints**
Minimum detectable error size: **0.6 mm**

Format Industry Challenge

The challenge “Automated Final Inspection in Cylinder Head Manufacturing” is a structured innovation competition in which 3–5 European startups work in parallel on the same challenge and pit their solutions against one another.

The most successful team will have the opportunity to implement its solution in one of Volkswagen’s production facilities, provided it receives a favorable evaluation. Scaling the solution to additional production lines is possible.

boOst organizes and moderates the challenge, provides methodological support to the teams, and coordinates all points of contact between the startups and Volkswagen Group Innovation. Volkswagen Group Innovation provides structured feedback at set milestones, evaluates the results, and decides on the next steps for each team.

Timeline

June 25, 2026

Application deadline

July 02, 2026

Team selection & onboarding

July 06, 2026

Kickoff with all teams in Chemnitz

July 2026

Phase I: Problem analysis & solution concepts

Progress Report I

July - August 2026

Phase II: Solution development and prototype

Progress Report II

August - September 2026

Phases III & IV: Testing, development, and pilot planning with reviews

Late September 2026

Demo Day & jury evaluation

Application Process

A team may consist of a single organization or a consortium. This call for proposals is open to startups and companies from across Europe. Teams apply via registration form. We may contact you if we have any further questions or would like to conduct an interview.

Apply via registration form

The following must be submitted:

- Pitch Deck (PDF, max. 15 slides)
- Technical Approach & Suitability (PDF, max. 5 pages) including
 - understanding of the problem
 - proposed technology/components (software/hardware) and their relevance to the challenge
 - development and testing strategy
 - team introduction, including skills relevant to the challenge
- Optional: Demo video/introduction video (max. 3 min), images/screenshots, datasheets for relevant components, additional documents

For further questions, please contact:



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