KAYSUN

INJECTION MOLDING & ENGINEERING SOLUTIONS

Injection-Molded Part

QUALITY CONTROL CHECKLIST

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Quality control is integral to injection molding. Without a quality benchmark, accuracy and precision become moving targets. Parts are subject to inconsistencies, defects, and failure. You could be facing a high-dollar spend with little — if anything — to show for it.

The molder you partner with must demonstrate plastic injection molding quality engineering at every project phase. Quality control checks are central to consistently achieving desired outcomes, especially when parts present tight tolerances and other design complexities.

This overview summarizes several ways experienced molders should engage with your project to ensure quality control, minimize rework, and ultimately realize time and materials cost savings.

Visual Quality Control Checks

An injection-molded plastic part provides quality control technicians and molding engineers with important information about the manufacturing process.

Visual inspections can either verify that production is going as planned, or reveal quality issues through the appearance of these common injection-molding defects:

BURN MARKS: Discolored plastic-part surface degradation caused by excessive heating, rapid injection speeds, or etching from overheated trapped air

FLASH: Liquid resin that escapes from a tool parting line and solidifies on the outside of a part

FLOW LINES: Discolored streaks, patterns, or lines that result from varying speeds or wall thicknesses a plastic encounters during tool flow

JETTING: Wavy lines or folds on a part surface that indicate the plastic's failure to stick to the tool due to flow resistance and/or incorrect gating

SHORT SHOTS: Voids in a molded part where plastic is physically missing, making the part unusable

SINK MARKS: Visual, measureable marks — usually in the form of depressions or craters — that appear on part surfaces

SURFACE DELAMINATION: Thin surface layers of contaminated material that physically peel away from the molded part

VACUUM VOIDS: Surface air pockets (bubbles) indicating inconsistent solidification times between the inner sections of the part and its surface

WARPING: An unplanned and unwanted bend, curve, or geometry in a molded part

WEAK WELD LINES: A line (or plane) that appears when plastic flowing from different parts of the tool insufficiently bond together

Post-production visual quality inspections are essential.

However, it's problematic if this is the only time your molder physically looks at the parts. Injection molders that are committed to quality have start-up and in-process inspection procedures in place.

Technicians at the in-house Kaysun Quality Lab use an advanced IQMS quality system to continuously monitor part quality and align it with customer requirements. If deviations occur corrections can be made to bring parts back into specification in real-time, rather than after the fact. Precise quality is maintained without incurring the spiraling costs of scrapping an entire faulty production run and starting over.

Structural Quality Control Checks

There are threats to injection-molded plastic part quality that you can see — and those you can't.

Structural inspections allow plastic injection molding quality engineering teams to work from the inside out to manage part integrity, which is especially important for complex or critical applications.

Identifying structural quality part defects requires comprehensive testing equipment and methodologies, including:

Moisture content testing

Water absorption negatively impacts the performance characteristics of many resins. To mitigate moisture-related risks to part quality, molders have a choice. They can use a weight loss method of inspection that may produce unreliable results, or apply the far more precise Karl Fisher Titration method — the preferred testing approach for quality control.

The Karl Fisher Titration method chemically reacts with water while ignoring other volatiles to accurately calculate the moisture content percentage and identify how it influences part quality.

Destructive and fatigue testing

Stress testing and cyclical testing to failure allows engineers to qualify specifications or make corrective materials adjustments prior to or during production. Pulling representative sample parts from a production run for intermittent testing of weld strength, impact strength, materials fatigue impact, and other characteristics further reinforce quality assurance.

CMM inspection

Using coordinate measuring machines (CMM) provides precision in injection molded part geometries. CMM testing adds a layer of part quality control as engineers use it to verify the accuracy of parts produced against design specifications.

CT inspection

Computer tomography (CT) is a nondestructive technique for visualizing the interiors of injection molded parts. This “inside out” analysis is used to verify measurements of part features and structures that — if incorrect — could compromise part quality or cause outright failure.

Structural quality defects come with far-reaching consequences. Protect your brand! Partner with Kaysun — a molder with the in-house testing capabilities and proven specialized inspection team needed to eliminate sub-surface quality issues.

How Tooling Qualification Impacts Part Quality

Ignoring tool design and performance quality could be a costly mistake. Tooling is generally the most expensive part of an injection molding project, and corrective retooling only adds to an already substantial investment.

But there are other costs to consider like substandard parts, production delays, slower time to market, and non-repeatable processes.

Working with a molder that qualifies tools by applying the exactness of scientific molding is imperative. Why? Scientific molding principles ensure the highest-quality process and outcomes are achieved by challenging every aspect of the tool during qualification, including:

- Mechanical functionality in the press
- Part production consistency during short-shot testing and gate seal studies
- Quality control sampling and part measurement adjustment/finalization
- Documentation of process parameters (melt temperature, fill time, mold temperature, coolant flow, cycle time, and pressure curve) for templated, repeatable production

The Measure of a Quality Injection Molding Partner

There are plenty of experienced injection molders, but not every one makes for an ideal partner. A molder that's passionate about incorporating quality into every project, every time:

- Holds industry-appropriate certifications (e.g., IATF, ISO, MedAccred), backed by proven expertise
- Is well-versed in key quality process principles, practices, and benefits (e.g., Advanced Product Quality Planning, Product Validation)
- Seamlessly incorporates engineering, design, testing, and equipment into top-quality solutions for even the most complex applications

Kaysun exemplifies the quality-driven injection molding partner you need to gain a competitive advantage. Schedule a free consultation with Kaysun engineering experts to explore the possibilities.

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