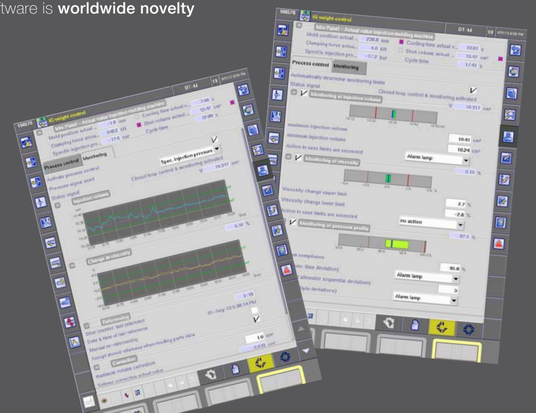
Intelligent online process control.

Even when environmental conditions change, **the quality of your moulded parts will be consistently high**. Shot for shot.

ENGEL **iQ weight control.**

- **The intelligent software** monitors and controls the injection process **of electric injection units** (for ENGEL e-motion, e-mac, e-victory and e-duo)
- **Improves process and weight repeatability** by online correction of injection speed profile and switch over point
- Ensures **consistent quality of moulded parts**: Avoids overpacking and short shots
- Significantly fewer rejects, far more good parts – meaning **higher productivity**
- Facilitates the **measurement and monitoring of viscosity changes** and thus identification of batch and moisture variations
- **Clearly arranged and easy to use interface:**
  - Software integrated into the **ENGEL CC 200 control unit** of the injection moulding machine
  - Simple to operate thanks to **largely automated functionality**
  - **Saves recurrent manual readjustment** of set values
- **No additional sensors** required
- Software is **worldwide novelty**



weight **control**

ENGEL iQ weight control
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ENGEL be the first.

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Switch over to **consistently high quality**.

ENGEL **iQ weight control**

Everything under control with **iQ weight control**

Moulding parts of consistently high quality, shot for shot even over long production periods. That's the aim of all injection moulders. Experience shows that an accurate injection moulding machine is not always enough to achieve this.

Variations of environmental conditions and raw materials also have a strong influence. In extreme cases, setting parameters have to be readjusted manually from time to time.

The innovative solution: ENGEL iQ weight control

ENGEL's new **iQ weight control software not only recognises these variations** automatically, it also makes the necessary adjustments. In real time, in the same shot. Before a reject part is moulded!

The result is a clear improvement in process and shot weight repeatability. In other words, more good parts, **fewer rejects and higher productivity**!

High precision injection moulding machine

\+ iQ weight control — Deviation of environmental conditions under control

= **Maximum repeatability**

How does **iQ weight control** work?

Conventional systems

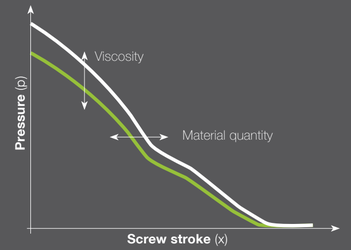
Exact repeatability of screw positions and injection speeds is the basis for high process stability. For this reason, the emphasis in the past has been on increasing the precision of the injection movement. Although this potential has now been exhausted, **an exact injection stroke is not always enough to guarantee consistent filling.**

One step ahead: iQ weight control

ENGEL has therefore taken a critical extra step to optimise process stability. Instead of the injection stroke of the screw, the **actual melt quantity is now defined as the control variable**. During the injection process, the intelligent iQ weight control software analyses the pressure profile versus the screw position in real time and compares the measured data online with a reference cycle.

When deviations are found, the system distinguishes between changes in viscosity and material quantities as possible causes. This makes it possible to immediately adjust the injection speed profile and switchover-point – **within the same cycle, before a reject is produced.**

- **Compares** the injection pressure curve with the reference curve
- **Identifies** and distinguishes between quantity and viscosity deviations
- **Adjusts** injection profile and switchover point in the same cycle
- **Improves** process and shot weight repeatability



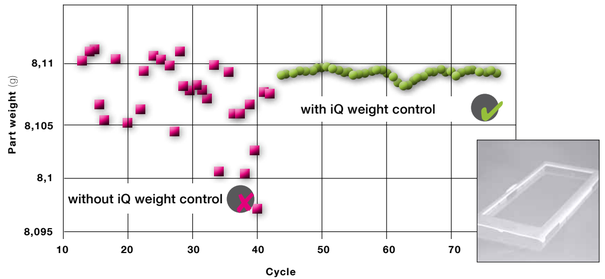
■ Current pressure curve
■ Reference curve

Variations in the fill quantity show themselves as a shift of the pressure curve in the direction of x; Viscosity changes scale the pressure profile in the direction of p. In reality a combination of the two effects occurs. **Using sophisticated mathematical transformations, iQ weight control 'decodes' the pressure curve** and calculates the deviations of melt quantity and viscosity.

What are the advantages of **iQ weight control**?

1 Significantly **improved weight repeatability**

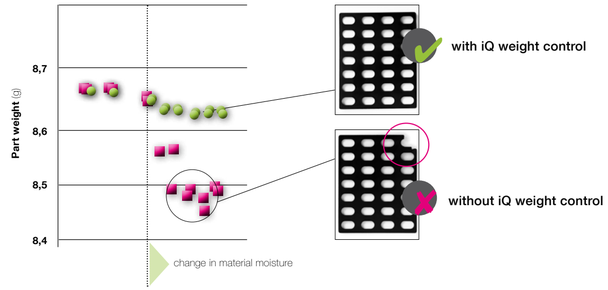
- Moulded part weight variance **reduced by up to 85%**
- Considerable potential for moulded parts with **high flow path to wall thickness ratios**



Thin-walled LCD display frame (POM): 85% reduction in weight variance

2 **Consistent mould filling,** even under variable process conditions

- **Automatic adaptation** of injection process to current conditions
- **No need for** repeated manual **readjustment**
- For example, in case of **variations of material moisture**, batch changes or varying ambient temperature



PA key panel: variations of material moisture are automatically compensated