Basler’s liquid lens vision solution provides autofocusing within a hundred milliseconds—one of the fastest autofocus systems on the market. It allows users to accurately focus on the target object despite working distances that continuously change beyond the normal depth of focus for machine vision lenses. Our system enables OEMs and system integrators to automate complex inspection tasks with a compact, cost-effective solution. This autofocus vision system can be integrated into completely automated systems for many different vision tasks, including: classifying, code reading, position recognition, measurements, error detection, and more.

**Solution highlights**

- Accomplish your autofocus task with an all-in-one vision system
- Streamline your automation efforts
- Speed up system development
- Get expert advice on the optimal solution for your application

**How does the system function?**

The curvature of the liquid lens is adjusted by applying an electrical current. This allows the focal length to be tuned to the desired value to bring the target into focus. Instead of controlling the liquid lens with a hardware controller and programming codes, Basler offers the option of controlling it with a customized camera. Dedicated firmware and algorithms are developed within the camera to meet your autofocus requirements, making this an all-in-one vision system offering fast refocusing, compact size, and easy integration.

**Streamline your automation efforts**

**Developing an autofocus solution on your own**

<table>
<thead>
<tr>
<th>Host Devices</th>
<th>API</th>
<th>AF Algorithm</th>
<th>Personnel Required</th>
<th>Programming Effort</th>
<th>Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>C#, python</td>
<td></td>
<td></td>
<td>Already built into the camera</td>
<td>Very high</td>
<td>Entry level</td>
</tr>
</tbody>
</table>

**Basler’s autofocus solution:**

- liquid lens controlled by a camera
## Solution Example

### Key Specifications of the Vision System

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Distance</td>
<td>150 mm - infinite</td>
</tr>
<tr>
<td>Angle of View (AOV)</td>
<td>8.2” (Hor.) / 6.1” (Ver.)</td>
</tr>
<tr>
<td>Focus Tuning Time</td>
<td>&lt; 25 ms</td>
</tr>
<tr>
<td>Autofocus Processing Time</td>
<td>75 ms(min.)</td>
</tr>
<tr>
<td>AF Frame Coverage</td>
<td>93%</td>
</tr>
</tbody>
</table>

### Customized Camera (model: acA2040-120ucAFC)

- **Sensor Format**: 1/1.8” (IMX252)
- **Resolution (H x V)**: 2048 px X 1536 px
- **Frame Rate**: 120 fps
- **Interface**: USB 3.0
- **Pixel Bit Depth**: 8, 10 or 12 bits
- **Digital Input**: 1
- **Digital Output**: 1
- **Power Supply**: via USB 3.0 interface
- **Power Requirement (typical)**: 3.4 W

### Fixed Focal Lens (model: C23-5028-5M-P)

- **Focal Length**: 50.0 mm
- **Lens Mount**: C-mount
- **Iris**: F2.8 - F16.0
- **Sensor Format**: 2/3”
- **Min. Working Distance**: 400 mm

### Liquid Lens (model: EL-16-40-TC)

- **Clear Aperture**: 16 mm
- **Response Time**: 5 ms
- **Settling Time**: 25 ms
- **Lifecycles**: > 1’000’000’000
- **Max Power Consumption**: 3.0 W (@500 mA)
- **Weight**: 40 g

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### More Possibilities by Customizing Basler Cameras

- **ace**
  - **Sensor Format**: up to 1.2”
  - **Frame Rate**: up to 751 fps
  - **Interface**: USB 3.0 or GigE

- **ace 2 R PRO**
  - **Sensor Format**: up to 1.2”
  - **Frame Rate**: up to 168 fps
  - **Interface**: USB 3.0 or GigE

- **boost R**
  - **Sensor Format**: up to 35 mm
  - **Frame Rate**: up to 400 fps
  - **Interface**: CoaXPress 2.0

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