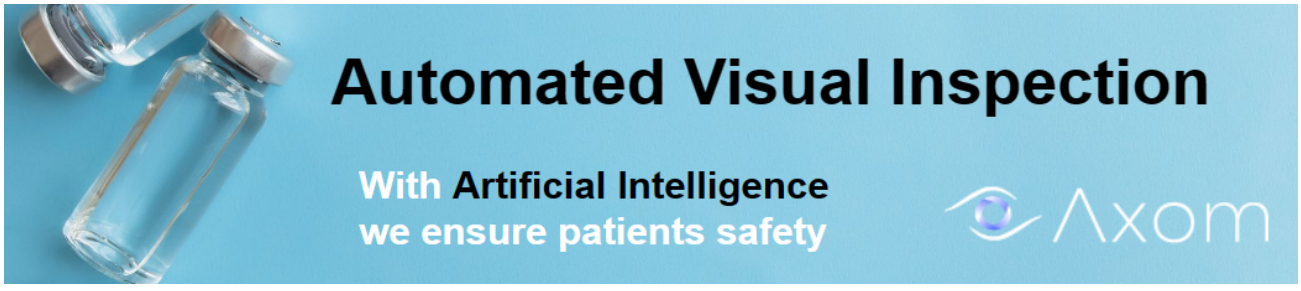
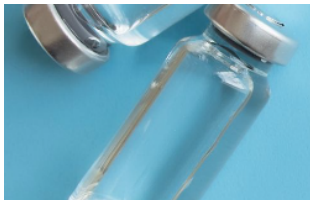



| Challenge | Common solutions | Axom<br>Unique solution |
|---|---|---|
| **Qualification of machine learning algorithms** | 2 other known GMP qualified ML algorithms for images analysis | GMP qualified with 3 customers. Ongoing qualification at one. |
| **Use of machine learning** | For bubble detection<br>For recipes optimisation | As unique image analysis algorithms |
| **Data generation** | Done by customer | Done by Axom - 10k to 500k images per detection |
| **Software used for image analysis** | Custom made using proprietary libraries like: open CV, Halcon, Cognex | Open Source algorithms supported by Facebook, University of Washington |
| **Particle detection approach** | Putting particles in rotation and using movement to detect it | Direct check on the image with signature detection like human |
| **Recipes** | 1 product = 1 recipe | 1 defect = 1 recipe |
| **Visual inspection performance** | Defect detection according to regulation<br>1-10% false rejects<br>Down to 50µm<br>Issues with bubbles | Defect detection according to regulation<br>0.1% false rejects in clean room<br>Down to 50µm<br>No bubble issue |
| **Visual inspection speed** | Up to 10 products per second | Ongoing design for 10 products per second (current 0.1) |

| | | |
|---|---|---|
| **Evolutivity** | 1-2 full time engineers needed for recipes management<br><br>Hardware design has to be updated for each customer | 1-2 subcontracted updates for the price of 0.5 engineer<br><br>Unique, compact hardware design |
| **Delivery speed** | 24-36 months including qualification | 3-6 months including qualification |
| **Cost** | 0.5-3m€ | 0.25-1m€ (2-3 times cheaper) |
| **Inline integration** | Very tough | Included for high speed design |
| **Space needed** | At least 6 sqm for high speed inspection | 1 to 2 sqm for high speed inspection |
| **Down time** | 5-20% due to number of complex components | Aiming for 1-2% by simplifying the machinery |
| **Product change** | One shift for existing products, 3 months for new products | 1 minute for existing products, 1 week for new products. |



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