

## FSI Machine Vision Application Specification (Inspection)

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This is an editable Word document where spaces automatically expand to accommodate longer answers. Where applicable, use "X" to select from provided answers.

This is used in different ways at different stages in the process of developing the application specification. In the beginning it is often "thinking paper" used to "raise the questions", and to gather or draft tentative answers. Then it is often used as a tool for a collaborative effort between FSI and the client for spec optimization work, e.g to reduce cost and increase reliability and supportability while still fulfilling the need. Then it becomes the draft-for-review and then final, optimized specification of the mission and conditions of the application, sufficiently solid to fulfill that requirement for certification under FSI APST™ (Assured Path to Success™) program.

**Only the two marked (★) questions are mandatory** in order for a preliminary review of the application; this is enabled by temporarily using the "temporary default assumptions" (listed at the end) for all other yet-unspecified items.

Regarding photographs and other materials, early in the process photographs and other materials may help build background knowledge for the specific discussions and communications and answers. Later in the process, a written answer is essential in each area, and other materials are used/looked at only when referenced and as referenced by a specific answer.

For simplicity, most wording in this is specialized towards an automatic inspection application with parts moving through the inspection area, roughly single file on a conveyor. Feel free to note departures from this in the answers. For brevity we did not include definitions of terminology, but please contact us with any questions.

<b>Company Name, City &amp; State</b> of project	
<b>Project Name</b>	
<b>Other contact info: Name, address, phone #, email etc.)</b>	
<b>Dates &amp; Authors of this data sheet</b>	
<p><b>★ Items to be Inspected:</b> (Please try to provide tagged samples of both good and bad products.)          ___ Supplied samples, and any other products that are the same in all relevant aspects</p>	
<b>Line Speed</b> (feet per minute etc.)	
<b>Inspection Rate</b> (parts per minute, seconds per part etc.)	
<b>Time available for Inspection:</b> (from beginning of image capture until result information is required)	
<b>Part Spacing (center to center)</b>	

<b>Describe Background around the part in probable views</b> (this section is often skipped until after FSI determines the viewing angles)		
<b>Environment</b>	For the Camera(s) / Smarter Camera(s)	__ Clean and Dry
	For the CVP ("Brain box") (if separate)	__ Clean and Dry
<b>Indexed or Continuous Motion</b> "Indexed" = stops for the inspection "Continuous" does not stop for the inspection		__ Indexed    __ Continuous

**Part Presentation.** The degree (in each axis) to which the part position is consistent at the time of trigger / inspection. Modify units of measurement as desired.

<b>Upstream / Downstream Position</b>	__ Random    __ Consistent +/- _____"
<b>Orientation in horizontal plane ("yaw")</b>	__ Random    __ Consistent +/- _____°
<b>Fixed Vertical Position?</b>	__ Random    __ Consistent +/- _____"
<b>Fixed Side-to-Side Position?</b>	__ Random    __ Consistent +/- _____"
Orientation in the other two planes ("pitch" and "roll" is presumed to be consistent unless specified otherwise here:	

<b>Description of Part Travel &amp; Orientation in the inspection area:</b> (if this is very complex, FSI has an appendix available to assist with this section)	
<b>Physical Arrangement / Space Available for Inspection Equipment</b>	__ No constraints
<b>Inputs, Outputs &amp; Displays</b> Many will automatically be supplied either as standard, or to meet the minimum interpretation of the application. But please specify any that are specifically required.	<input type="checkbox"/> Standard digital/discrete inputs <input type="checkbox"/> Standard digital/discrete outputs <input type="checkbox"/> Standard full PC/Windows architecture Ethernet port <input type="checkbox"/> Standard serial port <input type="checkbox"/> Standard Parallel port <input type="checkbox"/> Connections for standard monitor, keyboard and mouse <input type="checkbox"/> Include monitor, keyboard & mouse <input type="checkbox"/> Other custom-defined ports, inputs or outputs

**★ Inspection Mission:**  
Please give a description of the general nature of each defect or attribute. For defect inspection applications, please define criteria for rejection. If the evaluation is not "pass/fail", please indicate, "provide data out only" in the rejection criteria space

<b>INSPECTION #1</b>	Inspect with respect to this attribute →	
	Reject if.... →	

<b>INSPECTION #2</b>	Inspect with respect to this attribute →	
	Reject if.... →	
<b>INSPECTION #3</b>	Inspect with respect to this attribute →	
	Reject if.... →	
<b>INSPECTION #4</b>	Inspect with respect to this attribute →	
	Reject if.... →	
<b>INSPECTION #5</b>	Inspect with respect to this attribute →	
	Reject if.... →	
<b>INSPECTION #6</b>	Inspect with respect to this attribute →	
	Reject if.... →	
<b>INSPECTION #7</b>	Inspect with respect to this attribute →	
	Reject if.... →	
<b>INSPECTION #8</b>	Inspect with respect to this attribute →	
	Reject if.... →	
Repeat the above as required for additional inspections.		

**Notes on Required Accuracy of the Measurement / Evaluation Process**

This issue is separate from part tolerances or numerically defined pass/fail criteria for the product, and does not affect the requirement to reliably reject all non-conforming parts. It does affect the ability to minimize the rejection of borderline-good parts. For gauging/measurement missions, this is usually specified, and for other missions it is usually not specified (and the default capability is accepted). If requirements vary inspection-by-inspection, please list them under the individual inspections.

<b>Required machine vision system measurement accuracy of numerical linear measurements (If applicable)</b>	
<input type="checkbox"/> Measurement accuracy as good as specified part tolerance(s) <input type="checkbox"/> Measurement accuracy twice as good as specified tolerance(s) <input type="checkbox"/> Measurement accuracy 4 times as good as specified tolerance(s) <input type="checkbox"/> Measurement accuracy 6 times as good as specified tolerance(s) <input type="checkbox"/> Measurement accuracy of +/- _____ pick units, delete others: inches / % / mm.	
<b>Please list any accuracy requirements for “non-gauging” missions:</b>	

<b>Implementation to be handled by:</b>	<input type="checkbox"/> Machine Vision Solution Provider who is or will be FSI Factory Trained <input type="checkbox"/> Person at customer who is or will be FSI Factory Trained
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	___ Undecided at this time, but one of the above 2 choices
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**Temporary Default Assumptions:**

In many cases our customers and field partners wish for us to proceed with a review prior to providing complete information. For this reason, we have developed *temporary default assumptions* for areas where information has not yet been provided. These assumptions are as follows: The parts (and their components) are stopped for 1 second for inspection in a position and orientation that is consistent in all respects. When non-specific requirements are stated, the least difficult clarification is presumed. The mission is to identify all bad parts and to minimize false rejects of borderline-good parts. There are no restrictions regarding location of machine vision equipment and lighting. The required measurement accuracy for gauging applications is twice as good as any product tolerances specified on this sheet. The default accuracy of the implementation/equipment combination on non-gauging applications that meets other requirements is accepted. The background (fixtures/conveyors) brightness/color is contrasting/optimal/controllable and that equipment will be installed in a clean, dry, non-explosive, and standard-temperature area. Products to be inspected and defects to be detected are (only) per the provided samples or defined examples and there are no other unspecified factors that would make the application or mission more difficult. And one of the listed "implementation by" choices will apply. Of course, these default assumptions can be revised later as required!