VISION INSPECTION STATION WITH PLC – HMI AND SMART VISION SYSTEM

Hytech Didactic Vision Inspection Station is a Mechatronics based training system designed to provide training on PLC HMI integrated Vision Inspection System. This station is equipped with Smart Vision system mounted on a single axis robot which can travel at least 500mm in linear axis making the total focal envelope of the vision system of at least 900 x 200mm.

User is expected to carry out vision inspection of test jobs by programming PLC, HMI, Servo Motor based liner slide and smart vision system. Vision Inspection Station is an individual station which can be integrated with Hytech Computer Integrated Manufacturing System. When integrated with Computer Integrated Manufacturing system, test jobs are loaded in the Vision Inspection Station by gantry mounted robot whereas in an individual system, these test jobs are loaded manually.

User can change the process as well as the PLC ladder and HMI screens depending on training requirements. This station is designed to provide students with real time industrial automation process and integration of various automation components such as PLC, HMI, Servo motors, Smart Vision Inspection System etc

Technical Details of Vision Inspection Station:

	Structure
Total Dimensions	2000mm x 720mm x 1670mm (HT)
Approximate Weight	150 KG
Worksurface	Made in aluminum extrusions with minimum dimensions of 1000mm x 720mm
Operation Surface	Made in MDF of minimum 25mm thickness with minimum dimensions of 800mm x 720mm
Mobility	4 Qty castor wheels with brakes

	Servo Slides
Servo Slide 1	Servo Slide with ball screw and LM Block
	Minimum stroke of 500mm
	Servo Motor (AC Digital Servo) with minimum capacity of 400 Watt
	Servo Motor amplifier with PT Logic
	Drag Chain for Servo Slide 1
	Aluminium profile based structure for servo slide mounting

Vision System	
Vision Camera	Cognex Vision System
Communication	Profinet
Vision Type	2D Vision System
Software	Perpetual software for vision camera teaching and integration

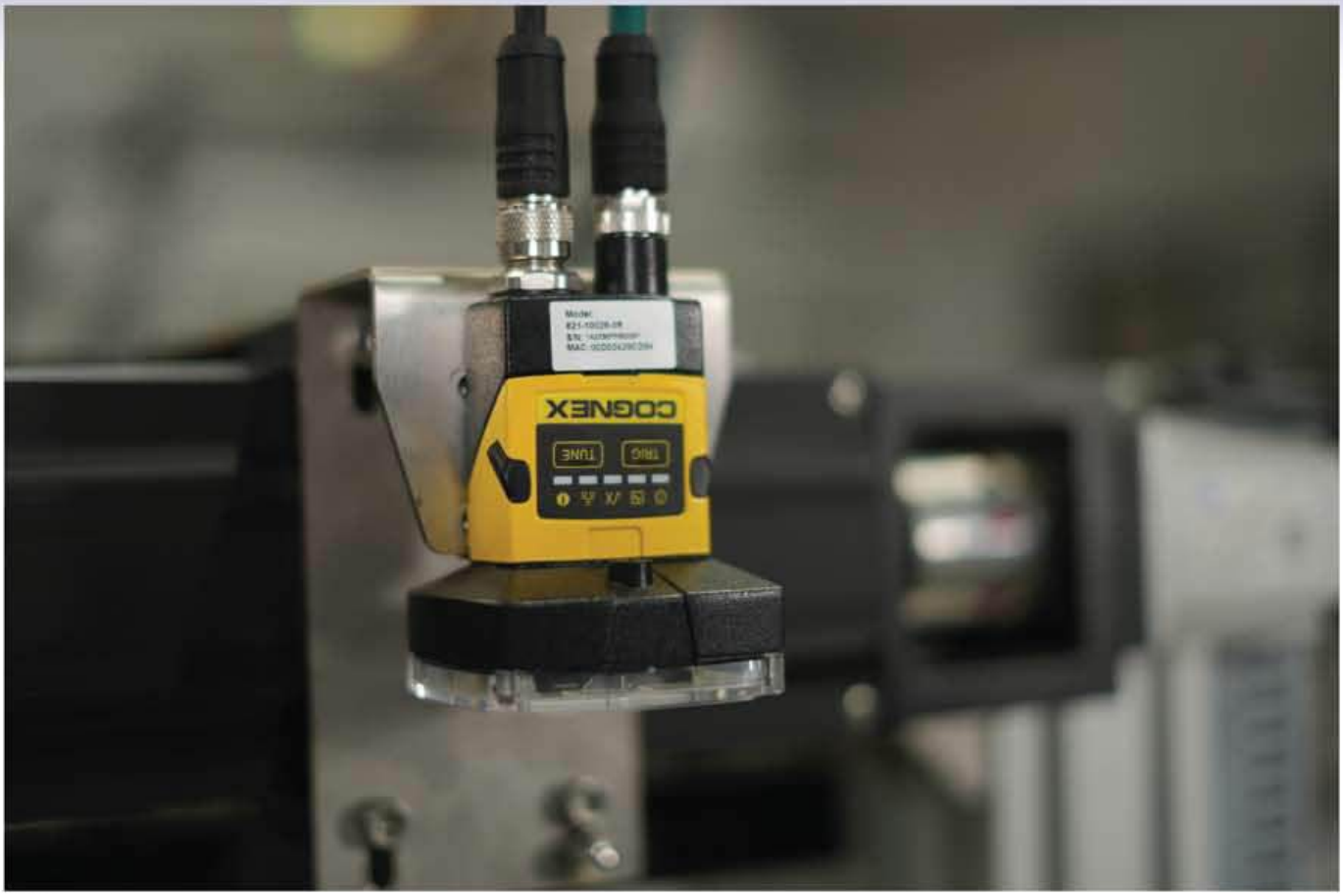
Controller	
PLC	Siemens S7 1200
HMI	Siemens KTP 700 HMI (Basic)
Switch	5 Port unmanaged switch

I/O Link Infrastructure	
Master	i/o link based master with minimum 8 ports - M12
Hub	i/o link based hub with minimum 8 ports - M12 (Suitable for 16 inputs / outputs)
Smart Light	i/o link based smart light with minimum 7 colours

Visoin Pallet	
No of Cells	4
Sensors	Inductive Sensor for each cell
Rotary Vane motor	Rotary vane motor with minimum bore of 25 mm and FCV
Auto Feeder Station - Bearing Auto Feeder	Pneumatic Guided Cylinder
	Inductive Proximity sensor to sense metallic objects
Pneumatic Gripper	Parallel gripper with minimum stroke of 10mm for each finger

Workstation	
CPU	Cognex Vision System
Operating System	Profinet
Monitor 1	2D Vision System
Monitor mounting stand	Dual monitor mounting stand

Software	
PLC	Siemens TIA Basic - Perpetual



Vision Inspection Station Experiments:

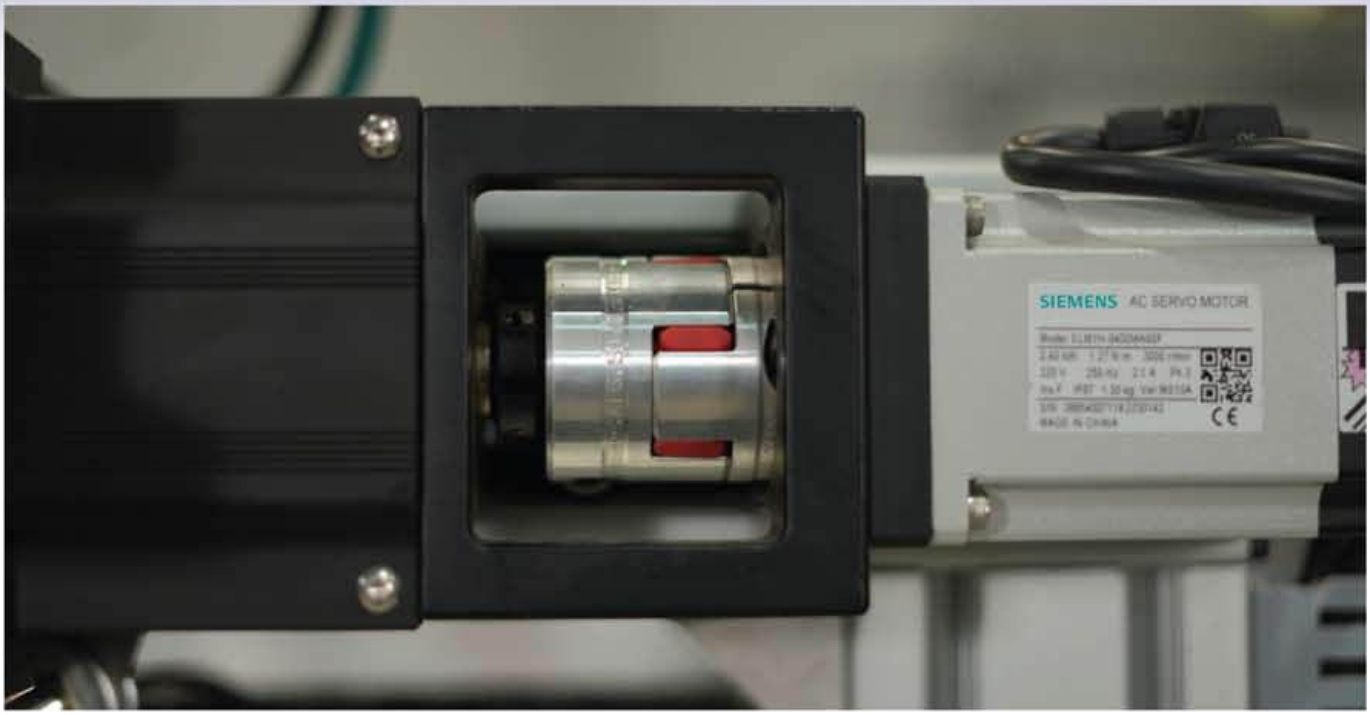
Vision Inspection Station can be used individually as well as in integration with the entire CIM Setup. Vision Inspection Station is equipped with PLC as well as HMI and relevant software necessary for the PLC and HMI programming.

Even in integration setup with CIM, Vision Inspection Station will initiate the process once it receives the signal from Central Control Unit. It will complete entire task of Vision Inspection and pass on the signal of process completion to CCU (Master PLC) for further process.

For experimentation, user is expected to carry out all process cycles or experiments on Vision Inspection station in individual mode. In ideal scenario, Vision Inspection station is programmed individually and then integrated with the CIM setup.

There are 3 jobs which are to be inspected in Vision Inspection Station before they are assembled together.

1. Mill Job 1 – Pocket Job
2. Mill Job 2 – Male Job
3. Turning job – Shaft



List of Experiments:

1. Provide a screen on HMI to JOG the servo slide in both directions.
2. Provide a screen on HMI to reference the Servo Slide
3. Provide a screen on HMI with a provision to enter coordinates for servo slide representing three different positions of the vision pallet. Each position should be ideally suited for the vision inspection of the job placed in the vision pallet.
4. Teach the vision camera to inspect the turning job. Set Accept / Reject limit from the Vision camera software for the machined turning job. Once the inspection is done, process the output to PLC as pass or reject.
5. Repeat the same exercise for Mill Job 1 and Mill Job 2.
6. Provide a screen on HMI with a button to carry out the complete inspection of commanded cell on vision pallet. For example, if user wants to inspect Mill Job 1, Servo slide should first move to the respective position; Vision system should carry out the inspection and provide feedback to PLC and Servo slide should return to home position.
7. Repeat above Exercise for remaining two cells as well.

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