

Vision Automation Planning & Development Basics

**Avoiding Intereference, Daylight
Problems in Vision Systems**



Typical Interference for Machine Vision Systems are :

- Vibrations
- Dirt, Debris, Smoke, Fog, Water, Condensation
- Heat Problems
- Electromagnetic Interference
- Brightness Fluctuations

Vibration Issues :

- **Blurred Images** - Vibration of machined parts result in blurred edges resulting in poor contrast and negative effect on precession measurement , scratch detection , OCR and 2D decoding.
- **Permanent Vibrations** will reduce life of your electronics such as Camera & Lights

Possible Solutions

- Reduce Exposure/Shutter times.
- Use Strobe Lights with short ON times
- Use physical rubber bumpers to decouple vibrations for camera and lights.
- Physically couple Object and camera to reduce differential vibrations.
- Use Averaging methods to get better results rather than single inspection

Dirt, Debris, Smoke, Fog, Water, Condensation

- Water on Lens, Mist, vapours will disturb Optical paths. This scattering, absorption and reflection will no longer allow correct Image Captures.
- Varying temperatures and humidities due to weather, poor HVAC also cause build up of condensates on the Lens and lights, very similar to fogging in automobiles.
- Flying dust, debris, volatile organics will cause destruction of Lens coatings and reduce life of camera electronics.

POSSIBLE SOLUTIONS

- Use enclosures as per IP requirement
- Use dry compressed air to blow away dust, water particles and keep Positive Air pressure in enclosure.
- Use an Air curtain in front of lens to keep dust away
- For continuous pollution use a motorised plastic film which is always rotating.
- Backlights may be protected by using skewed cover plates which allow particles to fall off or are cleaned using compressed air or linear brushes

Heat, Humidity and Condensation :

- Higher temperatures cause higher noise in the imaging sensors.
- Higher temperatures will reduce service life dramatically
- High humidity and temperature variations will cause condensate to form on Lens and camera.
- Condensate will eventually cause fungus, electrical damage resulting in extremely short equipment life.
- Lighting Diffusers , lens, polarisers and reflectors will be damaged due to high condensation
- Discoloration of light lens due to high heat

POSSIBLE SOLUTIONS

- Increase distance from heat source
- Use large focal length lens
- Use dry compressed air for cooling
- Use liquid or water cooled enclosures
- Use heat resistant glass to shield the heat and humidity away.

Electromagnetic Interference :

- Faulty Triggering of Cameras
- Faulty strobing of lights
- Noisy images and color imbalances
- Blurred images
- Color noise
- Brightness variations in lighting and dark bands
- **EMI is ususally ALWAYS neglected by most designers**

POSSIBLE SOLUTIONS

- Increase working distance away from Noise sources
- Star point grounds to power sources
- Isolate ground loops
- Ensure proper earthing practises
- Use filters and de-noise trigger and strobe signals
- Use shielded video, data and control cables
- Use shielded housings for camera and block all entries/exits with EMF shields

Brightness Variations :

- Images appear sometimes Dark and sometimes bright
- Dark Bands observed in captured images
- Random reflections and flares observed
- First few images appear brighter
- Illumination system should preferably be Strobed by camera
- If PLC is used to strobe lights, timing should be such so as lights are switched on, then the image captured and lights switched off.
- Stabilised power supplies with constant current controllers should be used for lighting.
- Thermal consideration for lights should be paramount.
- CCD cameras which have not captured images for some time acquire static charges making the first few images appear bright.
- Take some random images when starting the machine to remove static.
- Polarisers deteriorate over time. Replace them periodically.
- Minimise extraneous lights. This is usually a Last Mile problem occurring on Final Installation at Site. Take care for doors opening, incidents Sodium vapor, haogen or fluorescent lights in the vicinity.
- Non electronic or choke driven lamps cause 50Hz dark bands to appear on images. Use Electronic Drivers.

Checklist for First Time Right Installations :

- ✓ Plan for Vibration
- ✓ Plan for Contaminants
- ✓ Plan for Optics & Lens
- ✓ Plan for Site Based Light Pollution
- ✓ Plan for Allignment & Calibration
- ✓ Plan for Precision & Repeatability
- ✓ Plan for earthing and grounding cables
- ✓ Plan for Maintenance
- ✓ Plan your EMI solutions



**PLEASE DO CONTACT US BY EMAIL FOR
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