Design for manufacturer

Engineering

DESIGN FOR MANUFACTURER Dimensional inspection tools used are simple and elegant solution. However, these devices must be calibrated andcleanedregularly to ensurethatthey are consistentandaccurateresults. Theoperators of thesedevices must be appropriatelytrained to preventhumanerror.

To perform a Quality Assurance inspection, several types of equipment may be required to perform these operations. A Stereomicroscope plays a key role in quality assurance review of the prototype Acrylic display unit. A Stereo microscope examines checks the surface finishes of the display unit and spot minute imperfections on it. Stereomicroscopes are used to examinespecimens under bothreflectedandtransmittedlight. Stereomicroscopes are used for imaging three-dimensional objects1. A Stereomicroscope providesgoodgroundsfor three-dimensional visualization of thesamplebeingtested, in thiscase, theprototype Acrylic displayhence an excellentqualitycontrolinspectiontool.

Stereomicroscopes checksforthecomposition of thematerialscomposingthe acrylic displayunithencedeterminetheamountrequired to be added to enhancemechanicaltolerance of thedisplay.

Reducing complexity of the Acrylic displayunit is a costeffectiveproductionmethod. Unnecessary complexity is a majorcause of hiking costs of production. Production of standardunits would seetherealization of mass production at a lowcost.

Reducingprototypedevelopmenttime is also a costeffectiveproductionmethod. Thedevelopmenttime can be reduced by putting 3-D digital prototyping technology at work that will speed up the prototyping process and foster more innovation.

More technology can also be offered to reducethecost of production. Technology allowsdesignersandotherproductionpersonnel to work as teams, interactingquickly. Cooperation and working as a team give room to the achievement of the best possible solution.

According to Evans & Lindsay (2013), surface hardness is the measure of how a material is resistant to changepermanently in shapewhenapplied a compressive force. Classification of surface hardness measurement can be into three methods, includingscratch, indentation, and rebound. Scratch is themeasure of howresistant a material is to permanent deformation due to friction from a sharpobject. Themostcommontestforscratch is Mohs scale. Mohs scalecharacterizesthescratchresistance of variousmaterialsusingthe sclerometer. Indentation hardness measurestheresistance of a material to deformation due to a compressioneffect of a sharpobject. Rebound hardness is themeasurestheheight of the rebound of a materialwhen an objectis released from thehigherground onto thematerial. A stereoscope is the device used to take measurements for the rebound2.

Elasticity is thetendency of a material to return to its originalshape after beingexposed to externalpressure. Elasticity is determined by two material parameter; modulus, which is themeasurestheamount of force per unitareaandelasticlimit. Elasticity has nodefinitemeasuringequipmentbut is determined by the two material parameters.

Surfacefinish is thenature of a material’s surfacecharacterized by three factorsincludinglay, surfaceroughness, and waviness. Surfacefinishis alsoknown as surfacetextureorsurface topography. Surface measurement is measured by two methods: contactand non-contact method. Whenusing Contact method to measurethesurface finishing, a measurementstylus is

dragged across thesurface. Contactmethoduses profilometers. The non-contact method involves the use of interferometry and confocal microscopy. Interferometry is an electromagnetic technique of extractingwaveinformation from a material by increasingopticalresolutionandcontrast of a micrograph. Confocal microscopy technique is popularity in thescientificandindustrialcommunities as a surfacematerialinspectionmethod.

Themethodchecksforsurfacelayandroughness of a material.

Optical reflectivity of a material is themeasure of its effectiveness to reflectradiantheatandlight. However, . reflectivity depends on the type of the material, chemical composition and structure of the material, wavelength and polarization of the light. A spectrometer is used to measure the incidence light and the reflected light from the material hence determining the reflectivity of that particular material.

Internalstructureintegrityinvolvesthestudy of thesafedesignandassessment of materialstructuresandcomponents. Structureintegrityassuresthatthematerial will perform its plannedoperation by resistingbreakageorbendingandholding its weight. Structureintegrity has nodefinitemeasurementtoolbut is involvesconsideringthemechanicalproperties of a material that includechecking toughness, strength, weight, hardness, andelasticity. Then a suitablesize, thickness, orshape is determined.

References

Evans, J. R., & Lindsay, W. M. The management and control of quality (pp. pp-687). (Mason, OH: South-Western, 2013)

Menq, C. H., Yau, H. T., & Lai, G. Y. Automated precision measurement of

surface profile in CAD-directed inspection. Robotics and Automation, IEEE Transactions on, (8(2), 268-278, 2012)