

Mechanical Demand Specification

(Reference SOP: _____)

Project:		Project No:	
Equipment Description:			
Location:			
Equipment No.:		Protocol No.:	

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The philosophy to reduce the amount of operator required tasks shall be adopted. Control between change overs shall be from the minimum selection switches or adjustments.

Where change overs on equipment is necessary the design shall include the level of mechanisation that will automatically change or adjust components. The typical devices used for adjustment can be by way of pneumatic cylinder moving stops or electric ball screw actuators. Control for such devices shall be from the main machine control and have proximity sensors that confirm the correct position or action has been completed.

Physical adjustments shall only be used where the task is easily marked or colour coded for size. A digital read out could confirm the setting adjustment.

Adjustment shall be carried out with out the use of tools. Levers are preferred for locking clamps rather than knobs.

Where change parts are needed change parts shall be appropriately marked for easy identification.

A list of all change parts shall be provided.

1.4. Accessibility

The equipment must be "self cleaning" in that ledges and catch points shall not exist. If there is a chance that product or items, (from the process or other) could be left lying on flat surfaces or catch points, the designer shall angle the surface so that these items fall to the floor.

Where elements may hold or retain fallen product a system of the element opening or moving by control when required, shall be adopted. The process or an actuator may open to clear the retained items and then close back to position.

Sub frames and bases shall be considerate of blind spots and pockets so that all members of construction are free draining for liquid spills and fallen products.

Segregation of machine elements and production elements shall be considered. Where possible the equipment shall be split into areas that will simplify maintenance and production. It is intended to have motion devices and control equipment on what could be termed a mechanical side of the machine and production elements on an opposite or different area of the machine.

Drive gear and motor compartments, electrical cabinets shall be isolated and covered from the product areas. A clean design approach shall be adopted in that all drive belts, gears etc. are covered and separated from the operation areas of the machine.

Maintenance and replaceable elements are to be easily accessible for replacement, inspection or maintenance. This shall include mechanical and electrical components.

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Self corrosion protecting materials shall be used where possible. The materials selected shall be fit for the purpose intended and may be of the following:

- Stainless Steel 2205, 316L or 304 grade (selection depending on application)
- Anodised aluminium
- Plastics, including glass or carbon Fibre reinforced plastics
- Powder coated mild steel may also be acceptable.

1.6. Lubrication

Lubrication shall be kept to a minimum where it is required. All applications shall use suitable food grade lubricants.

Bearings where possible shall be sealed for life type.

A list of all lubricants shall be prepared with the design for approval by the project co-ordinator before implementation.

1.7. Operator interfaces

Where possible multiple line text displays shall be used as a minimum.

Graphics display of the process to be considered where the operator may need to visually diagnose fault areas or device failures. Process sequence steps can also be communicated through the graphics display.

The overall process will in most cases be monitored by a SCADA system using Wonderwear software. Each item of equipment may have specific details of control that will be specified with respect to the process SCADA package.

1.8. Control

A common control arrangement for Pneumatic and electronic sensors should be used running the full length of the main machine. Interconnectivity between the packaging equipment should be adopted where appropriate. This will include picking up devices for example any inkjet printers to report alarms or status back to the main PLC and operator display.

1.9. Communications

The process communications runs a multi level control system, data from the management software system may be piped through to process equipment such as inkjet printers, vision computer systems and palletising machines.

Most machines would be capable of passing back to the management system defined performance data, run statistics.

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The use of either vacuum or grippers is acceptable on most products. In the event of vacuum cups it may be necessary to consider the effect of picking up on printed surfaces as ink could build up and cause brittlement on suction cups.

Mechanism weights, acceleration and inertia effects are to be calculated and a Factor of safety (FOS = 2) in design employed so that long life can be achieved, over 24 months continuous duty would be acceptable. The designer may be asked to prove the design by way of presenting the calculations used.

In the event that linear cylinders are used refer to the pneumatics section of this document for details.

1.15. Conveyor systems

Use a standard extrusion frame conveyor for product transfers where a standard width fabric belt is to be installed. This conveyor is suitable for most product transfers that do not require high accuracy of positioning. Details of this frame section and full drawings of the mechanical system will be provided on request. Dimensions and tolerances shall be adhered to for spares etc.

All belt lengths and details must be recorded as spares.

Drives are to be wire reinforced timing belts, not chains. The standard pitch used will be specified on the conveyor system drawings along with the drive and motor size.

1.16. Pneumatic devices

Guided rodless cylinders shall use heavy duty ball race guides not bushes. The design shall be as a minimum to have a Factor of Safety (FOS=2). Load application calculations may be requested before acceptance agreed.

In the event that the line emergency switch is activated all pneumatic devices shall be able to release stored energy and become safe.

Where the design of releasing stored energy after activating an emergency switch is not desirable, alternate designs should be considered.

1.17. Spare parts

Stock spare parts are to be defined.

1.18. Documentation

1.18.1. Manuals

Enclosed with the machine there must be a minimum of three copies of the following items in English:-

- list of components :
- maintenance instructions