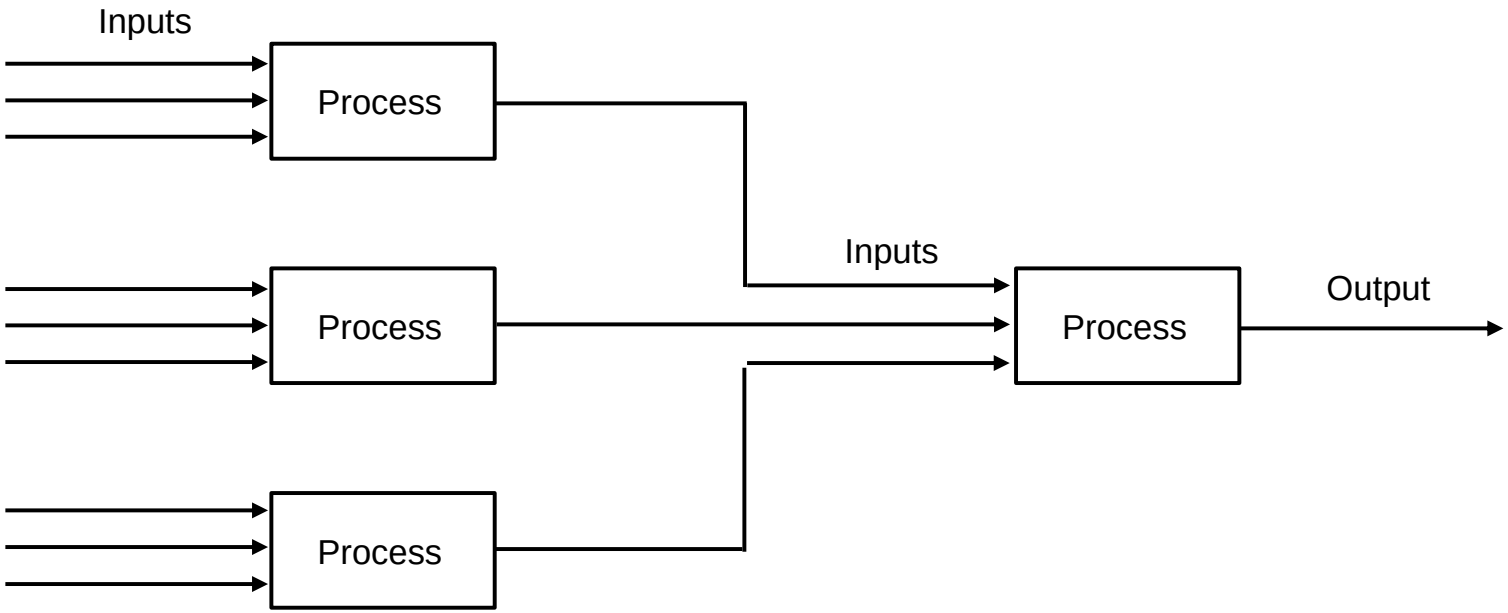
Module 6 - RFT
Input Control Training Pack

Input Control – Definition of a Process

- Process defined as having a single output
- Process can have many inputs, which may be outputs from previous processes



Input Control – Step 1: Define the Output from the Process

- Work with multi-disciplinary team who cover all aspects of the process
- Precisely define and quantify the output from the process
- Use Physical, Information and Quality issues as a checklist

Input Control – Step 2: Define the Inputs to guarantee the Output

- Precisely define and quantify the inputs to the process in order to guarantee the defined output from the process
- Use the grid on the following page as a checklist
- Work down the rows of the grid in sequence
- Aim to brainstorm out around more than 30 inputs if possible

Input Control – Inputs Requirements Grid – any business process

	Physical Issues	Information Issues	Quality Issues
Material or Information	Orientation	Supply schedule	Defect free
Operator	Ability	Work instructions Output schedule	Training Motivation
Machine or Equipment	Set-up Functionality	Work instructions Output schedule	Capable of meeting spec
Environment	Conditions Work centre layout	In context	Encouraging Prev maint'ce

Input Control – Step 3: Categorise Inputs

- Categorise the Inputs into one of three categories as follows –
  - Category N – can action a fix now – no further info required
  - Category O – one step away from being able to implement a fix – need more info
  - Category P – too complex an input to fix – need to reiterate the analysis process

Input Control – Step 4: Prioritise Category O Inputs

- Prioritise the category O inputs using the B-C=D analysis
- Rate all category O inputs in terms of their relative Benefit on a scale of 1 to 10
- Rate all category O inputs in terms of their relative Complexity on a scale of 1 to 10
- Calculate benefit minus complexity to get rating of Desirability, ie where the most positive result indicates the greatest benefit for the least effort.

Input Control – Step 5: Prepare and Implement Action Plans

- Prepare an action plan to implement the category N inputs
- Allocate resource to resolve them, ie who and when
- Prepare a Gantt chart plan to implement the category O inputs
- Use a rule of thumb of one week per degree of complexity
- Allocate number of teams, ie who, when and how, to implement category O inputs within required timescale

Input Control – Step 6: Repeat Analysis for Category P Inputs

- Take each category P input and redefine it as the output from the previous process as in step 1
- Brainstorm out the inputs to this previous process using the grid as in step 2
- Again categorise the inputs as in step 3
- Repeat until all inputs are either category N or O
- If only one or two category P inputs from original analysis, this step may be omitted in this sequence at the discretion of the facilitator and team, provided they deal with category P inputs as above later.

‘Elite’ Case Study

Applying Input Control Analysis

Electronics

Assembling Surface Mount Board - Output Requirements

- Board must be damage free, with correct components properly orientated in correct location, with good electrical connection, and produced at the "drumbeat" rate.
- Board and components must have no scratches and no chipped edges.
- Solder paste must not be smudged.
- Components must have minimum 75% overlap with pad in any direction.
- Components must be pressed into wet solder paste by half the thickness of the paste.

Assembling Surface Mount Board - Input Requirements

Material	R	B	C	D	Operator	R	B	C	D	Mach/Equ	R	B	C	D	Environment	R	B	C	D

Assembling Surface Mount Board - Input Requirements

Material	R	B	C	D	Operator	R	B	C	D	Mach/Equ	R	B	C	D	Environment	R	B	C	D
All components must be in correct packaging					Must have IQ > 100					Feeders must be correct					Ambient temp must be between 20 and 25 deg C				
All components must have correct value and voltage					Must be nimble and dexterous					Software must match feeders					Ambient humidity must be between 25 and 40%				
All components must be correctly identified					Must have good eyesight (with glasses)					Nozzle size and type must be correct					Good lighting inside and outside machine				
Board and components must be damage free					Must not be colour blind					Vacuum level constant between ? and ?					Dust free				
Trays must be designed for vacuum pick-up					Must not be deaf or dumb					Camera light at correct brightness (spec)					Draught free				
Boards must be flat					Must be numerate and literate					Clamper height set up correctly					6ft access to front and rear of machine				
All material supplied at "drumbeat " rate					Must be able to carry and load feeders					Machine calibration valid					Must have easy access to both sides of machine				
Board must be correctly orientated					Must be no more than 30% over ideal weight					Correct nozzle length					Work area must be clean tidy and uncluttered				
Board locating hole must be right size					Must be earthed					All feeder parts working both vac and elec					Area must be litter free				
Solder level must be to specification					Must be trained in - - product - machine - problem solving - teamwork - material handling - SPC - changeovers - quality standards - software - health & safety					Conveyors in line and running smoothly					All cables must be secured				
Board must be assembled within 30 mins of pasting										Compressed air clean with constant supply					Floor must not be slippy				
Software program must be correct										All machine parts clean and clear					Lockers available at place of work				
										Machine earthed									

Assembling Surface Mount Board - Input Requirements

Material	R	B	C	D
All components must be in correct packaging	O			
All components must have correct value and voltage	O			
All components must be correctly identified	O			
Board and components must be damage free	O			
Trays must be designed for vacuum pick-up	P			
Boards must be flat	O			
All material supplied at "drumbeat " rate	O			
Board must be correctly orientated	N			
Board locating hole must be right size	N			
Solder level must be to specification	O			
Board must be assembled within 30 mins of pasting	N			
Software program must be correct	O			

Operator	R	B	C	D
Must have IQ > 100	N			
Must be nimble and dexterous	O			
Must have good eyesight (with glasses)	N			
Must not be colour blind	N			
Must not be deaf or dumb	N			
Must be numerate and literate	N			
Must be able to carry and load feeders	N			
Must be no more than 30% over ideal weight	N			
Must be earthed	N			
Must be trained in -				
- product	O			
- machine	N			
- problem solving	O			
- teamwork	O			
- material handling	O			
- SPC	O			
- changeovers	O			
- quality standards	O			
- software	O			
- health & safety	O			

Mach/Equ	R	B	C	D
Feeders must be correct	N			
Software must match feeders	N			
Nozzle size and type must be correct	N			
Vacuum level constant between ? and ?	O			
Camera light at correct brightness (spec)	O			
Clamper height set up correctly	N			
Machine calibration valid	N			
Correct nozzle length	O			
All feeder parts working both vac and elec	O			
Conveyors in line and running smoothly	N			
Compressed air clean with constant supply	N			
All machine parts clean and clear	N			
Machine earthed	N			

Environment	R	B	C	D
Ambient temp must be between 20 and 25 deg C	O			
Ambient humidity must be between 25 and 40%	O			
Good lighting inside and outside machine	O			
Dust free	O			
Draught free	O			
6ft access to front and rear of machine	N			
Must have easy access to both sides of machine	O			
Work area must be clean tidy and uncluttered	N			
Area must be litter free	N			
All cables must be secured	N			
Floor must not be slippy	N			
Lockers available at place of work	N			

Assembling Surface Mount Board - Input Requirements

Material	R	B	C	D
All components must be in correct packaging	O			
All components must have correct value and voltage	O	10		
All components must be correctly identified	O			
Board and components must be damage free	O			
Trays must be designed for vacuum pick-up	P			
Boards must be flat	O			
All material supplied at "drumbeat " rate	O			
Board must be correctly orientated	N			
Board locating hole must be right size	N			
Solder level must be to specification	O			
Board must be assembled within 30 mins of pasting	N			
Software program must be correct	O			

Operator	R	B	C	D
Must have IQ > 100	N			
Must be nimble and dexterous	O			
Must have good eyesight (with glasses)	N			
Must not be colour blind	N			
Must not be deaf or dumb	N			
Must be numerate and literate	N			
Must be able to carry and load feeders	N			
Must be no more than 30% over ideal weight	N			
Must be earthed	N			
Must be trained in -				
- product	O			
- machine	N			
- problem solving	O			
- teamwork	O			
- material handling	O			
- SPC	O			
- changeovers	O			
- quality standards	O			
- software	O			
- health & safety	O			

Mach/Equ	R	B	C	D
Feeders must be correct	N			
Software must match feeders	N			
Nozzle size and type must be correct	N			
Vacuum level constant between ? and ?	O			
Camera light at correct brightness (spec)	O			
Clamper height set up correctly	N			
Machine calibration valid	N			
Correct nozzle length	O			
All feeder parts working both vac and elec	O			
Conveyors in line and running smoothly	N			
Compressed air clean with constant supply	N			
All machine parts clean and clear	N			
Machine earthed	N			

Environment	R	B	C	D
Ambient temp must be between 20 and 25 deg C	O			
Ambient humidity must be between 25 and 40%	O			
Good lighting inside and outside machine	O			
Dust free	O			
Draught free	O	1		
6ft access to front and rear of machine	N			
Must have easy access to both sides of machine	O			
Work area must be clean tidy and uncluttered	N			
Area must be litter free	N			
All cables must be secured	N			
Floor must not be slippy	N			
Lockers available at place of work	N			

Assembling Surface Mount Board - Input Requirements

Material	R	B	C	D
All components must be in correct packaging	O	7		
All components must have correct value and voltage	O	10		
All components must be correctly identified	O	9		
Board and components must be damage free	O	9		
Trays must be designed for vacuum pick-up	P			
Boards must be flat	O	9		
All material supplied at "drumbeat " rate	O	8		
Board must be correctly orientated	N			
Board locating hole must be right size	N			
Solder level must be to specification	O	8		
Board must be assembled within 30 mins of pasting	N			
Software program must be correct	O	9		

Operator	R	B	C	D
Must have IQ > 100	N			
Must be nimble and dexterous	O	5		
Must have good eyesight (with glasses)	N			
Must not be colour blind	N			
Must not be deaf or dumb	N			
Must be numerate and literate	N			
Must be able to carry and load feeders	N			
Must be no more than 30% over ideal weight	N			
Must be earthed	N			
Must be trained in -				
- product	O	7		
- machine	N			
- problem solving	O	6		
- teamwork	O	3		
- material handling	O	7		
- SPC	O	2		
- changeovers	O	3		
- quality standards	O	7		
- software	O	8		
- health & safety	O	4		

Mach/Equ	R	B	C	D
Feeders must be correct	N			
Software must match feeders	N			
Nozzle size and type must be correct	N			
Vacuum level constant between ? and ?	O	7		
Camera light at correct brightness (spec)	O	8		
Clamper height set up correctly	N			
Machine calibration valid	N			
Correct nozzle length	O	7		
All feeder parts working both vac and elec	O	8		
Conveyors in line and running smoothly	N			
Compressed air clean with constant supply	N			
All machine parts clean and clear	N			
Machine earthed	N			

Environment	R	B	C	D
Ambient temp must be between 20 and 25 deg C	O	6		
Ambient humidity must be between 25 and 40%	O	6		
Good lighting inside and outside machine	O	7		
Dust free	O	8		
Draught free	O	1		
6ft access to front and rear of machine	N			
Must have easy access to both sides of machine	O	4		
Work area must be clean tidy and uncluttered	N			
Area must be litter free	N			
All cables must be secured	N			
Floor must not be slippy	N			
Lockers available at place of work	N			

Assembling Surface Mount Board - Input Requirements

Material	R	B	C	D
All components must be in correct packaging	O	7		
All components must have correct value and voltage	O	10		
All components must be correctly identified	O	9		
Board and components must be damage free	O	9		
Trays must be designed for vacuum pick-up	P			
Boards must be flat	O	9		
All material supplied at "drumbeat " rate	O	8		
Board must be correctly orientated	N			
Board locating hole must be right size	N			
Solder level must be to specification	O	8		
Board must be assembled within 30 mins of pasting	N			
Software program must be correct	O	9		

Operator	R	B	C	D
Must have IQ > 100	N			
Must be nimble and dexterous	O	5	1	
Must have good eyesight (with glasses)	N			
Must not be colour blind	N			
Must not be deaf or dumb	N			
Must be numerate and literate	N			
Must be able to carry and load feeders	N			
Must be no more than 30% over ideal weight	N			
Must be earthed	N			
Must be trained in -				
- product	O	7		
- machine	N			
- problem solving	O	6		
- teamwork	O	3		
- material handling	O	7		
- SPC	O	2		
- changeovers	O	3		
- quality standards	O	7		
- software	O	8		
- health & safety	O	4		

Mach/Equ	R	B	C	D
Feeders must be correct	N			
Software must match feeders	N			
Nozzle size and type must be correct	N			
Vacuum level constant between ? and ?	O	7		
Camera light at correct brightness (spec)	O	8		
Clamper height set up correctly	N			
Machine calibration valid	N			
Correct nozzle length	O	7		
All feeder parts working both vac and elec	O	8		
Conveyors in line and running smoothly	N			
Compressed air clean with constant supply	N			
All machine parts clean and clear	N			
Machine earthed	N			

Environment	R	B	C	D
Ambient temp must be between 20 and 25 deg C	O	6		
Ambient humidity must be between 25 and 40%	O	6	10	
Good lighting inside and outside machine	O	7		
Dust free	O	8		
Draught free	O	1		
6ft access to front and rear of machine	N			
Must have easy access to both sides of machine	O	4		
Work area must be clean tidy and uncluttered	N			
Area must be litter free	N			
All cables must be secured	N			
Floor must not be slippy	N			
Lockers available at place of work	N			

Assembling Surface Mount Board - Input Requirements

Material	R	B	C	D
All components must be in correct packaging	O	7	5	
All components must have correct value and voltage	O	10	4	
All components must be correctly identified	O	9	4	
Board and components must be damage free	O	9	6	
Trays must be designed for vacuum pick-up	P			
Boards must be flat	O	9	3	
All material supplied at "drumbeat " rate	O	8	6	
Board must be correctly orientated	N			
Board locating hole must be right size	N			
Solder level must be to specification	O	8	8	
Board must be assembled within 30 mins of pasting	N			
Software program must be correct	O	9	2	

Operator	R	B	C	D
Must have IQ > 100	N			
Must be nimble and dexterous	O	5	1	
Must have good eyesight (with glasses)	N			
Must not be colour blind	N			
Must not be deaf or dumb	N			
Must be numerate and literate	N			
Must be able to carry and load feeders	N			
Must be no more than 30% over ideal weight	N			
Must be earthed	N			
Must be trained in -				
- product	O	7	2	
- machine	N			
- problem solving	O	6	4	
- teamwork	O	3	5	
- material handling	O	7	4	
- SPC	O	2	7	
- changeovers	O	3	9	
- quality standards	O	7	3	
- software	O	8	4	
- health & safety	O	4	3	

Mach/Equ	R	B	C	D
Feeders must be correct	N			
Software must match feeders	N			
Nozzle size and type must be correct	N			
Vacuum level constant between ? and ?	O	7	5	
Camera light at correct brightness (spec)	O	8	5	
Clamper height set up correctly	N			
Machine calibration valid	N			
Correct nozzle length	O	7	6	
All feeder parts working both vac and elec	O	8	7	
Conveyors in line and running smoothly	N			
Compressed air clean with constant supply	N			
All machine parts clean and clear	N			
Machine earthed	N			

Environment	R	B	C	D
Ambient temp must be between 20 and 25 deg C	O	6	4	
Ambient humidity must be between 25 and 40%	O	6	10	
Good lighting inside and outside machine	O	7	4	
Dust free	O	8	8	
Draught free	O	1	4	
6ft access to front and rear of machine	N			
Must have easy access to both sides of machine	O	4	5	
Work area must be clean tidy and uncluttered	N			
Area must be litter free	N			
All cables must be secured	N			
Floor must not be slippy	N			
Lockers available at place of work	N			

Assembling Surface Mount Board - Input Requirements

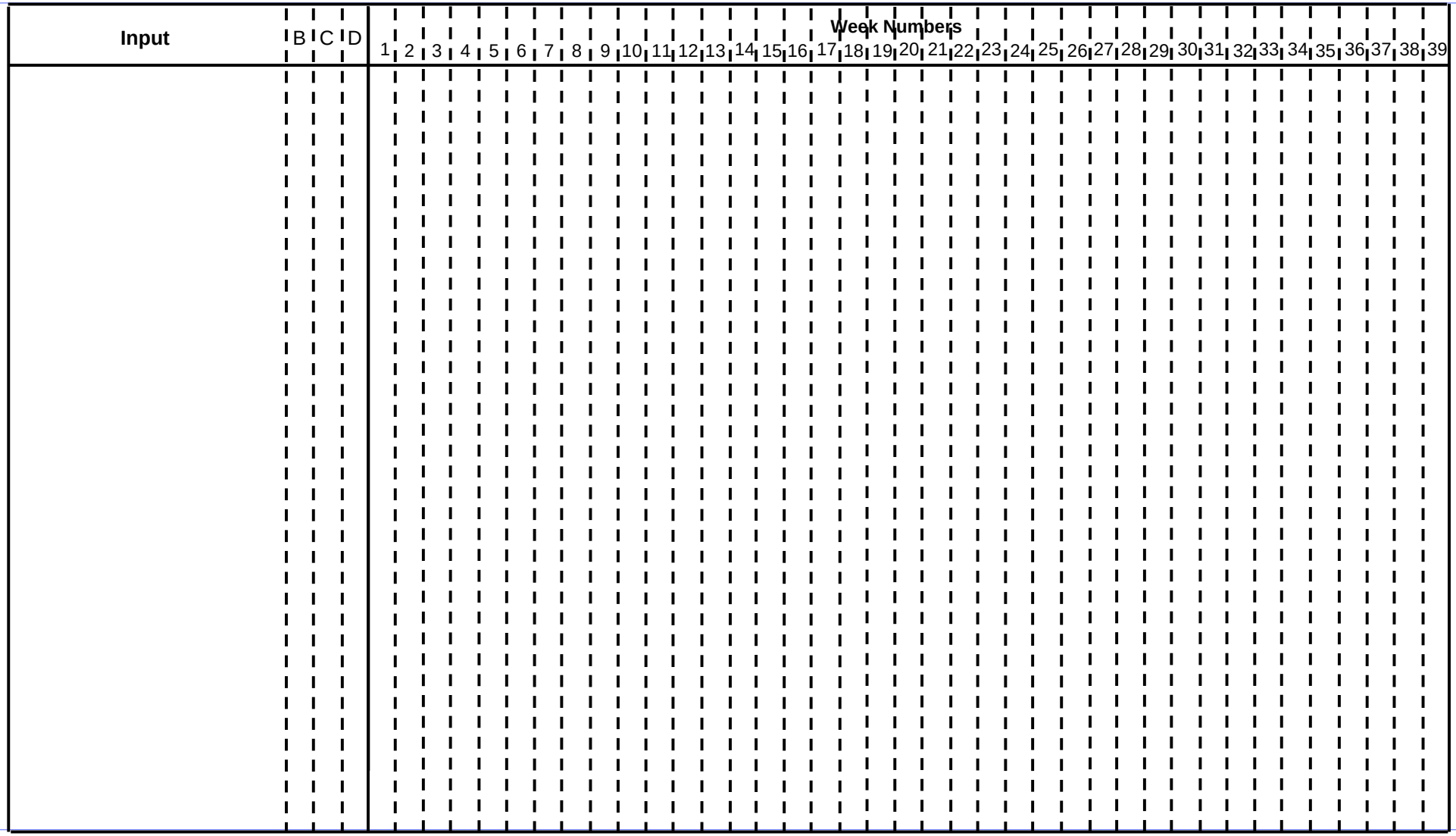
Material	R	B	C	D
All components must be in correct packaging	O	7	5	+2
All components must have correct value and voltage	O	10	4	+6
All components must be correctly identified	O	9	4	+5
Board and components must be damage free	O	9	6	+3
Trays must be designed for vacuum pick-up	P			
Boards must be flat	O	9	3	+6
All material supplied at "drumbeat " rate	O	8	6	+2
Board must be correctly orientated	N			
Board locating hole must be right size	N			
Solder level must be to specification	O	8	8	0
Board must be assembled within 30 mins of pasting	N			
Software program must be correct	O	9	2	+7

Operator	R	B	C	D
Must have IQ > 100	N			
Must be nimble and dexterous	O	5	1	+4
Must have good eyesight (with glasses)	N			
Must not be colour blind	N			
Must not be deaf or dumb	N			
Must be numerate and literate	N			
Must be able to carry and load feeders	N			
Must be no more than 30% over ideal weight	N			
Must be earthed	N			
Must be trained in -				
- product	O	7	2	+5
- machine	N			
- problem solving	O	6	4	+2
- teamwork	O	3	5	-2
- material handling	O	7	4	+3
- SPC	O	2	7	-5
- changeovers	O	3	9	-6
- quality standards	O	7	3	+4
- software	O	8	4	+4
- health & safety	O	4	3	+1

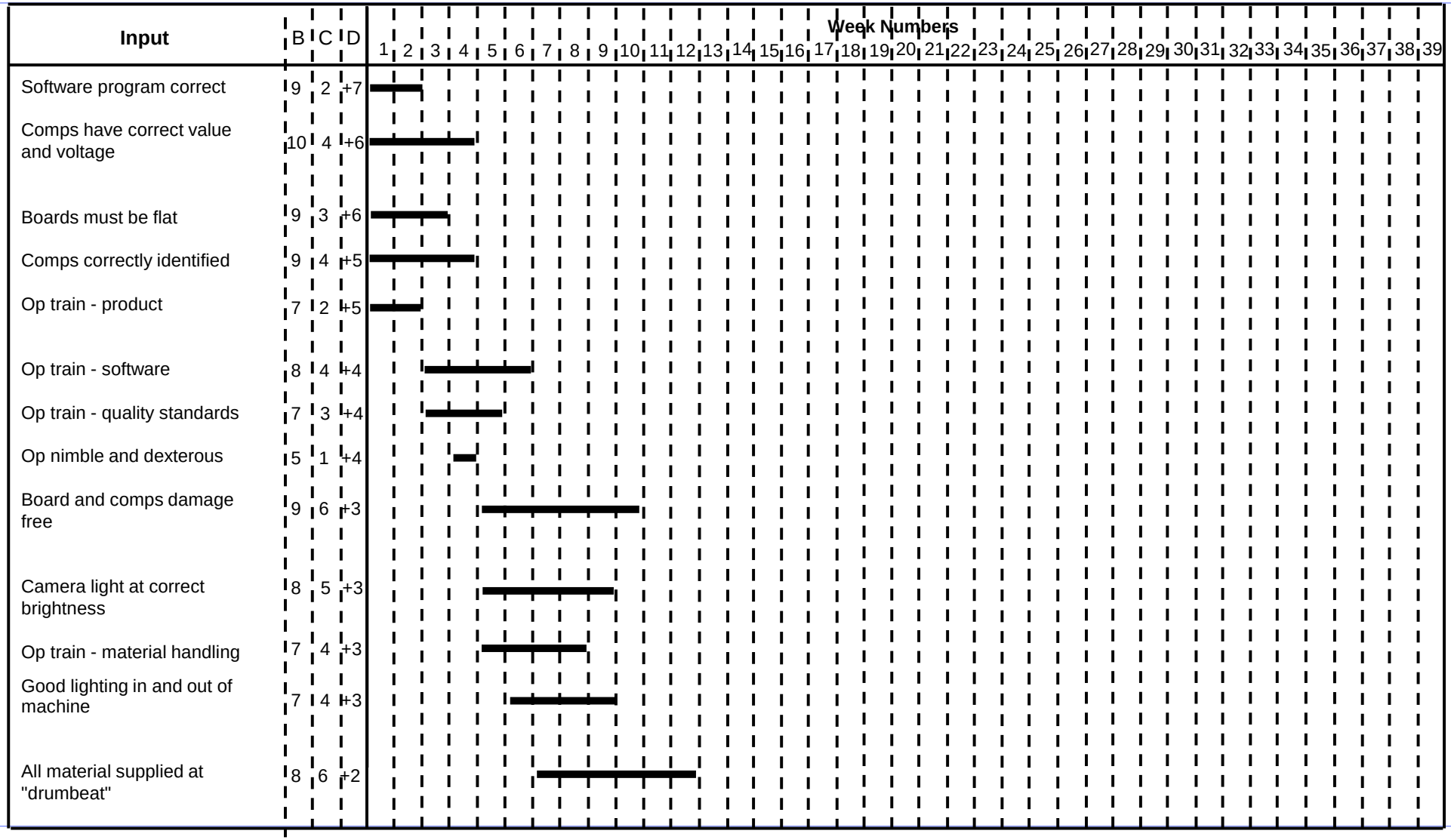
Mach/Equ	R	B	C	D
Feeders must be correct	N			
Software must match feeders	N			
Nozzle size and type must be correct	N			
Vacuum level constant between ? and ?	O	7	5	+2
Camera light at correct brightness (spec)	O	8	5	+3
Clamper height set up correctly	N			
Machine calibration valid	N			
Correct nozzle length	O	7	6	+1
All feeder parts working both vac and elec	O	8	7	+1
Conveyors in line and running smoothly	N			
Compressed air clean with constant supply	N			
All machine parts clean and clear	N			
Machine earthed	N			

Environment	R	B	C	D
Ambient temp must be between 20 and 25 deg C	O	6	4	+2
Ambient humidity must be between 25 and 40%	O	6	10	-4
Good lighting inside and outside machine	O	7	4	+3
Dust free	O	8	8	0
Draught free	O	1	4	-3
6ft access to front and rear of machine	N			
Must have easy access to both sides of machine	O	4	5	-1
Work area must be clean tidy and uncluttered	N			
Area must be litter free	N			
All cables must be secured	N			
Floor must not be slippy	N			
Lockers available at place of work	N			

Assembling Surface Mount Board - Input Requirements - Gantt Chart



Assembling Surface Mount Board - Input Requirements - Gantt Chart



Assembling Surface Mount Board - Input Requirements - Gantt Chart