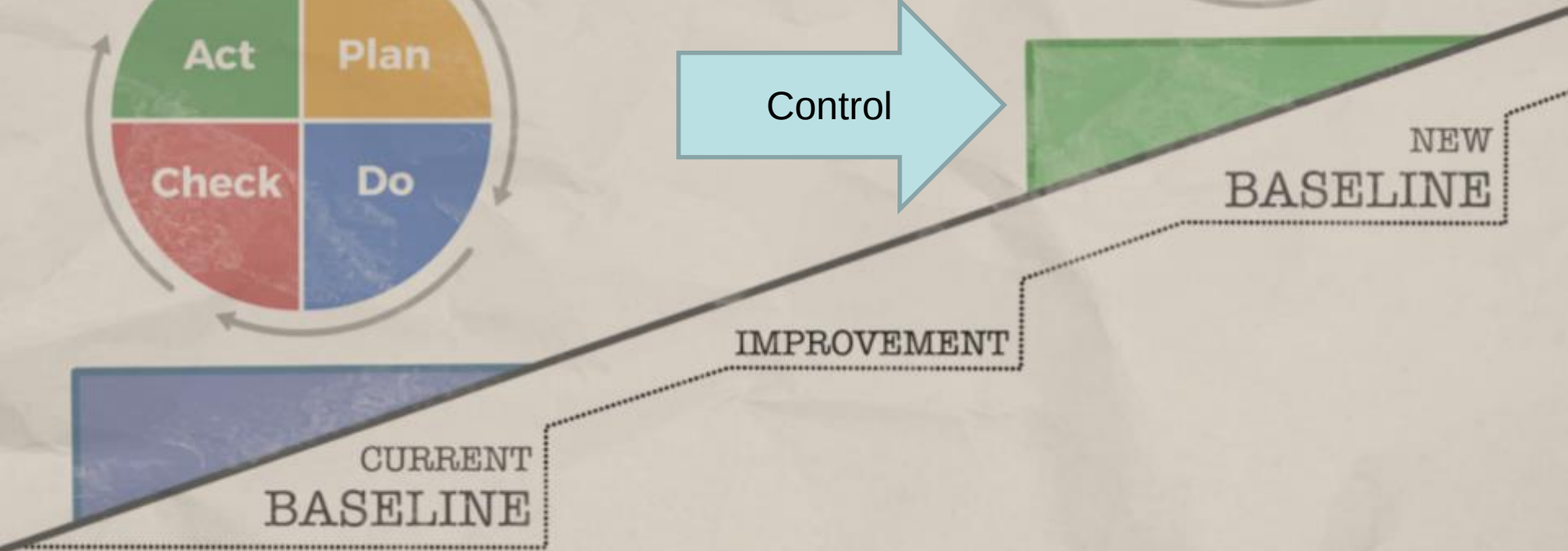
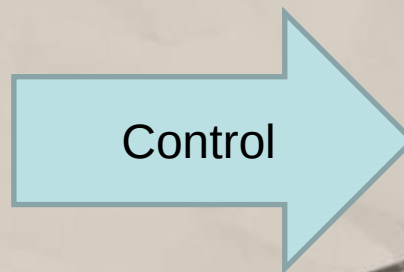




Level 5 – Continuous Improvement with Industry 4.0

Control 1 – Control Plans

- To find ways to maintain process improvements and develop robust systems so the wins are not lost



What are we going to cover in the next sessions;

- Process Re-design recap
- Document the Changes (FMEA/Control Plan/SOP)
- Implement/Improve measurement system
- Measure and monitor the process (VoP/CpK)
- Training
- Lessons learnt
- Recognition

- Minimise approvals
- Try to build in controls
- Reduce repetitive decisions by defining policy to all stakeholders
- Police these policies through audit processes

- Minimise responsibility movement
- Reduce the work-flow across departmental boundaries if possible
- Minimise number of personnel required
- Let customer facing employees be empowered to make decisions

- Try to build Quality control into each step of the process
- Minimise defects
- Prevent adding value to products which are already non-conforming

- Balance workflow to avoid overloading bottleneck constraints
- Try to smooth customer demand
- Process by FIFO (first in first out)

- Reduce the size of batches
 - Operate 'finish job, move job'
 - Detect errors sooner, if possible immediately after that characteristic is changed
-
- Design process to handle the routine not the exceptions
 - Use specialists to handle exceptions
 - Problem solve root causes of the exceptions to minimise and fix

- Automate handling and reduce movement (TIM WOODS)
 - Optimise manual systems first
 - Eliminate the 'hidden factory'
-
- Hidden Factory
 - Unofficial re-working of parts
 - Not recorded does not appear on process planning systems
 - Uses more resources than planned
 - Takes more time than expected

- Use problem solving techniques, 5 why, Is/Is Not, 8D, fishbone diagrams
- Brain storm solutions

- A way to ensure process gains are held and the 'old' ways of doing things don't reappear
- A method of documenting and formalizing the functional requirements of quality control to be implemented so that quality standards are met for a particular task or service
- Is a link between FMEA's and work instructions

- This may include:-
- Frequency a process is reviewed
- Verification that MSA is acceptable
- Typical corrective actions
- History of process capability

- Identify the process owner
- Involve the team in the control plan
- Gain agreement between the process owner and the team
- Create or update work instructions (SOP)
- Notify and train the personnel
- Place control plan in the appropriate quality system document

- Control plans list the product and process characteristics monitored during manufacturing including the measurement methods and necessary reaction plans for deviants
- Generally, they do not improve quality but play an important part in sustaining product quality long after a process has been developed or modified

- Without control plans most processes will slip and drift into a state of disrepair due to knowledge loss, staff turnover and short-term production priorities

- FMEA's have been conducted on all of the process steps and the team fully understands the quality risks with each of these steps
- Process and product measurement methods clearly defined and are repeatable
- An overall quality system ensures that new employees are trained in following the control plans (via shopfloor process instructions)

- Prevent defects at the point of origin is the most efficient form of process control
- This is known as 'poka yoke' as previously discussed
- Another example is the larger diesel pump nozzle preventing diesel being put into a petrol car

Control Plan Example

Control Plans

CONTROL PLAN

Control Plan Number ARC101-23			Key Contact/Phone John Stone - Mfg Engineer, x5412			Date (Orig.) 1/1/10		Date (Rev.) 12/11/11				
Part Number/Last Change Level Sub-Assembly 987-00			Core Team C. Stone, J. Leard, D. Moores, G. Boyd, S. Miller			Customer Engineering Approval/Date (If Req'd.) N/A						
Part Name/Description Leg, Support, and Armrest Asm			Supplier/Plant Approval/Date 12/9/11			Customer Quality Approval/Date (If Req'd.) N/A						
Buyer/Supplier In-House (Kansas City)			Supplier Code N/A			Other Approval/Date (If Req'd.) Ed Stumpek, Eng VP (12/10/11)		Other Approval/Date (If Req'd.) N/A				
PART/ PROCESS NUMBER	PROCESS NAME/ OPERATION DESCRIPTION	MACHINE/ DEVICE JIG, TOOLS FOR MFG.	CHARACTERISTICS				METHODS				REACTION PLAN	
			NO.	PRODUCT	PROCESS	CTQ?	PRODUCT/PROCESS SPECIFICATION/ TOLERANCE	EVALUATION/ MEASUREMENT TECHNIQUE	SAMPLE SIZE	FREQ.		CONTROL METHOD
1	Place leg, support, and armrest in assembly fixture	Fixture 987-01F1	1D		Parts placed properly in fixture per drawing 987-00	N	Parts oriented correctly (reference drawing 987-00 with any questions)	Error proofed - parts cannot be mis-oriented	N/A	N/A	Error proofed	None required
2	Drive two screws to secure side support	Electric screwdriver 987-01A1	2D	Final screw depth		N	Screw heads sub-flush	Flush gage	5	Hourly	P-Chart	Re-inspect all product since last inspection and rework if needed
			2P		Drive torque on screw	Y	Torque between 10 in-lb and 13 in-lb	Automatically monitored with electric screwdriver - alarm will sound if torque is out of range	100%	N/A	100% monitoring	If torque alarm sounds, stop production, verify proper screws, check pilot hole diameter. If correct, contact maintenance and engineering.
3	Drive three screws to secure arm rest	Pneumatic screwdriver 987-01A2	2D	Screws seated sub-flush		N	Screw heads sub-flush	Slide flushness gage over screw locations - must move freely	5	Hourly	P-Chart	Re-inspect all product since last inspection and rework if needed



Level 5 – Continuous Improvement with Industry 4.0

Control – Standard Operating Procedures (SOP)

- A SOP is a document which describes a set of operational steps in-order for a routine to be undertaken uniformly and safely
- They aim to optimize quality and performance
- They can act as an aid to training operators - although they are not a substitute for training
- They are the workplace link with FMEA's and control plans

- Should be generated as part of a team with area operator involvement
- Include any area specific safety requirements ; PPE, specific permits, special equipment etc
- Itemise the operation step by step
- Include any care points to maintain quality (might be generated by FMEA and highlighted by control plan)

- Pictures can be included to clarify specific actions or care points
- Signed off as approved by area supervisor
- Can be approved by area HS&E representative
- Show approved date and revision number
- Displayed within the work area so easily accessible for clarification

Standard Operating Procedures (SOP)

STANDARD OPERATING PROCEDURE				Document Ref: QP - draft	
Title	Measurement of Membrane on Planar Measuring Machine			Revision	1
Area	W Bay - Sheet Finishing	Owner	N.Bourton <th>Date</th> <td>20/07/2017</td>	Date	20/07/2017
Purpose	Measuring Membrane			Page	1 of 5

Ensure all appropriate PPE is worn

Environmental Responsibility:

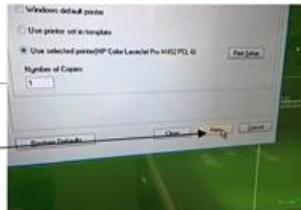
No	Steps	Equipment	Explanation / Example / Comment
1	<u>General</u> Planar Measurement Machine - before using check machine within calibration <u>Check machine bed is clean of all debris</u> <u>Check that panel edges are clean and free of debris (particles and hydraulic oil) which could give false readings</u>		 
2	Turn on main power power to RH side Turn on projector by pressing white button Turn on computer by pressing 'blue' button		
3	Main power isolator		
4	Sockets for main power supply to unit and computer		
5	Screen can be turned on by either remote control or by pressing button on LH side of screen		

Authorisation:

Signature:

Quality & Technical HS & E Manager Manufacturing

Standard Operating Procedures (SOP)

STANDARD OPERATING PROCEDURE.				Document Ref:	QP - draft		
Title	Measurement of Membrane on Planar Measuring Machine			Revision	1		
Area	W Bay - Sheet Finishing			Date	20/07/2017		
Purpose	Measuring Membrane			Page	4	of	5
16	Load panel onto machine bed - does not need to be perfectly square but within the black dots on edges Inspect membrane by pressing 'Autoinspect' button from RH side Tool Bar						
17	Screen will either show 'Pass' or 'Fail' - if fail refer to inspection report and SPC chart to identify non conforming characteristic and either wipe component and re-measure or adjust shears						
18	Each characteristic measurement will be plotted on SPC chart - if there is drift on any measurements there may be action needed i.e. compensation on shears due to blade wear To inspect another panel repeat steps 12-16 - DO NOT FORGET TO CHANGE PANEL BATCH OR ID						
19	<u>Printing Report</u> Move cursor to large screen and click on 'print report' from pull down menu on 'report' task bar						
20	Choose number of records to print (this will be batch size)						
21	Press 'print' for report to be sent to printer - ensure printed record is complete with all panels inspected - add to WOT package						

- Do SOP's exist for the process being reviewed?
- Are they simple and understood?
- Are they being followed?
- Are they current and up to date?
- Is the operator trained and is this documented?
- Is there a process audit schedule?

- SOP's not an alternative to 'on the job' training
- Training must be appropriate to the task being undertaken
- Cover all aspects of the job
- Undertaken by suitably experienced and trained personnel
- Long enough for the trainee to experience the majority of situations which could be encountered
- Include documented sign-off of all the competencies required to satisfy regulatory requirements
- Records held by HR and displayed within work areas

Standard Operating Procedures (SOP)/Training

Team Member	Role					
		Six Sigma Microsoft Office PC Hardware Infrastructure Other				
Trevor Janes	BI Analyst	Advanced	Competent	Basic	Basic	Advanced
Maria Suttkey	Python Programmer	Basic	Basic	Advanced	Basic	Trainer
Nero Crowley	BI Analyst	Advanced	Advanced	Basic	Basic	Advanced
Czyzy Mainbach	Server Technician	Basic	Advanced	Trainer	Competent	Basic
Seth Sirkin	PMO	Advanced	Trainer	Basic	Basic	Basic
Louisa Kent	Python Programmer	Basic	Advanced	Advanced	Basic	Trainer
Hector Iniesta	Java Programmer	Competent	Competent	Basic	Basic	Competent

Legend	
Basic	Requires Basic Training
Advanced	Requires Adv Training
Competent	No Training Necessary
Trainer	Expert Level

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Standard Operating Procedures (SOP)/Training



INITIAL COMPETENCY ASSESSMENT SKILLS CHECKLIST— OCCUPATIONAL THERAPIST

Name: _____

Date of Employment: _____ Date Completed: _____

Self Assessment				Competency for the Occupational Therapist	Proficiency Required	Evaluation Method	Competency Validation Indicated by Preceptors Initials and Date
Do you have experience with this skill?		Are you competent performing the following?					
YES	NO	YES	NO				
				VITAL SIGNS/ BP & PULSE			
				a. Demonstration of BP & Pulse testing			
				b. Verbalization of alternate measure placements			
				c. Pulse Ox reading			
				d. Verbalization of HR/Pulse parameters			
				e. Indications for taking vital signs			
				ROM/GONIOMETRY			
				a. Demonstration of using goniometer at selected joints			
				b. Demonstration of checking functional ROM (recognizing pain limitations)			
				c. Demonstrate assessment of end feel/joint integrity			
				d. Verbalization contraindications for ROM testing			
				MMT/STRENGTH			
				a. Demonstration of testing muscle strength at selected joints (use of dynamometer as indicated)			
				b. Verbalization of testing functional strength			
				c. Verbalization contraindications for MMT testing			
				BALANCE			
				a. Verbalization of balance assessment during functional activities			
				COORDINATION			
				a. Examples of coordination/gross motor function tests (finger to nose, heel to shin, heel to toes, alternating rapid movement, cross body movement)			
				b. Fine motor-functional dressing, buttoning, managing zippers			
				SENSATION/PROPRIOCEPTION			
				a. Verbalization of examples of sensation tests (Hot/Cold, Two point, Sharp/Dull, Light Touch/Pressure)			
				b. Recognize deficits in proprioception and provide treatment strategies			