BlueScope Forrestfield

FSL1 Automation Upgrades

Scope of Work

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1 INTRODUCTION

Slitting line FSL1 is part of BlueScope's Forrestfield Service Centre. On FSL1, large coils are cut into narrower slits to suit customer requirements for manufacturing building structural sections, fencing materials, roofing and guttering products, garage doors, and other similar products.

Packaging processes on FSL1 have some level of automation, but require manual intervention to apply a peripheral restraint device (typically a steel strap), and then later in the process to position timber bearers between the individual slits. Quality control processes are completely manual. The purpose of this project is to provide an automated solution for these tasks, error-proofing the process and improving unit productivity.

1.1 Interfaces

External interfaces at FSL1 include:

- SSC System business scheduling and production system
- Allen Bradley PLC controlling slitting and packaging lines
- Rockwell PLC controlling ITIPack automated radial banding machine
- PILZ safety system

The Contractor will need to interface with each of these systems in order to successfully deliver the project.

1.2 FSL1 Schedule

Production schedules are developed by a planner in the SSC System, accessible to operators via an AS400 interface. The schedule contains a variety of information about the coil to be processed, including:

- Parent coil number
- Required slit coil widths, length, mass, colour and material
- Delivery week / date

Each *Production Planning Item* on the schedule links to a more detailed Operator's Report, which includes details such as:

- Slitter setup
- Thickness and width tolerances
- Minimum / maximum slit mass and length
- Packaging type

The schedule will be exposed to the Contractor via Microsoft SQL Server or arrays in the Allen Bradley PLC.

1.3 Coil sizes

Coils processed through FSL1 include Colorbond®, TRUCORE®, cold-rolled mild steel and Zincalume.

Machine Specifications

Maximum Input Coil Mass:	18t
Maximum Coil Input OD:	2000mm
Output Bore Size:	508mm
Minimum Input Width:	480mm
Maximum Input Width:	1550mm
Minimum Output Width:	50mm
Maximum Output Width:	1550mm
Maximum Slit Count:	21
Minimum Input Thickness:	0.3mm
Maximum Input Thickness:	3.2mm
Maximum Output Mass:	18t
Minimum Output OD:	600mm
Maximum Output OD:	2000mm

1.4 Coil colours

There are approximately 30 different Colorbond® colours processed on FSL1. Additionally, TRUCORE®, Zincalume and cold-rolled steel are not painted and exhibit a variety of surface colours and finishes. A list of the Colorbond® colours in the CIE colour space is presented in Appendix A. Alternative colours spaces and CIE illuminants are available from BlueScope on request.

1.5 FSL1 PLC

The PLC details will need to be provided by the Maintenance team. Will require the model number(s), firmware, I/O network details and some sense of available unused capacity.

1.6 FSL1 SCADA system

The SCADA details will need to be provided by the Maintenance team. Will require the technical specifications, service packs, patches, etc.

1.7 BlueScope supply

Where the Contractor requires BlueScope to provide network connections, power, air supplies, analogue or digital I/O PLC connections, the Contractor shall explicitly define the quantities, locations, magnitude, dimensions and all other information to the Contractor's infrastructure requirements.

1.8 Down time

Major components of this project will need to be completed in not more than a two week. Smaller components that can be completed in 8-72hrs can be individually negotiated on a weekly basis.

2 ENTRY

2.1 Existing processing operations

The entry section of FSL1 has three major pieces of equipment:

- A two-position loading saddle which holds coils to be processed
- A coil car which transfers coils from the loading saddle to the uncoiler mandrel
- The uncoiler mandrel

An overhead crane loads coils from the storage bay onto the loading saddle in the order specified by the production schedule. When the coils are loaded on to the loading saddle they are still minimally packaged, typically with a peripheral steel strap. The two loading positions are aligned with the uncoiler mandrel so that loading of the 2nd coil is not possible before loading of the 1st. Operators are required to move coils forward from the farthest position manually using the coil car.

All coils are supplied with a label which lists, amongst other details, the coil number, width, and thickness. The label includes a 1D barcode which encodes the coil number either in raw terms or in a standard GS1 format.

The entry operator checks the coil number against the schedule, then removes the remaining packaging and labels from the coil. The physical attributes of the coil are measured (width, OD, ID, thickness) and manually entered in to a SCADA screen adjacent the work area (Panel 1). Once the previous coil has been processed an automated loading cycle is initiated whereby the previously entered dimensions are used by the PLC to locate the next coil, align it with the recoiler mandrel, and position it centrally. At this stage the coil is ready to be threaded through the slitting line.

2.2 Automation requirements

2.2.1 Live schedule displays

Two live displays of the current production schedule will be included in the area via SCADA. This if for use by area personnel in selecting the necessary coils to load on to the loading saddles, or for the operator to use in determining that the correct coil has been loaded on to the loading saddles. No user inputs are required for these displays.

2.2.2 Barcoder

Manual verification of the coil number against the schedule shall be deprecated in favour of matching the barcoded coil number against the schedule. A hand-held barcode scanner shall be used to provide this functionality.

2.2.3 HMI functionality

When the coil barcode is scanned, the coil number and relevant information from the schedule shall be presented to the operator on the Panel 1 HMI for review. The HMI shall include three sections for the coils; the top section shall contain ‘current coil’ information, and the lower sections shall display ‘Coil 1’ and ‘Coil 2’ data. A ‘coil complete’ trigger from the Allen Bradley PLC will be accessible to signal that the ‘current coil’ has been processed, which will clear the ‘current coil’ display and allow promotion of ‘Coil 1’ to ‘current coil’. ‘Coil 1’ will represent the nearest position to the uncoiler mandrel, with ‘Coil 2’ representing the position farthest from the uncoiler mandrel on the loading saddle.

The following options shall be available to the slitter operator on the HMI:

- If the scanned coil number does not match a coil on the schedule, the only option available to the operator will be to reject the coil. The scanned coil and associated information will be removed from the 'next coil' display immediately upon acceptance by the operator.
- The slitter operator can reject the coil. The scanned coil and associated information will be removed from the 'next coil' display immediately.
- When the 'coil complete' trigger is received the 'current coil' details will be automatically cleared from the Panel 1 HMI. Facility for the position of coils in 'Coil 1' and 'Coil 2' to be updated automatically will be included (pre-existing inputs from sensory equipment installed on the coil car can be used for this purpose). When an automated loading cycle is commenced the nearest coil will be promoted to 'current coil'. Details will be imported from the production schedule and updated in the 'Width', 'Thickness', 'Inside Diameter' and 'Outside Diameter' fields of the Panel 1 HMI. Outside diameter will need to be calculated by using the physical properties of the barcoded coil. These variables are used during automated loading to position the coil relative to the uncoiler mandrel and centreline.
- If there is no 'next coil' loaded, the slitter operator can manually select a coil number from a list of all coils currently on the schedule. This will provide a means of continuing production in the case of a missing or illegible barcode, scanner hardware fault, or re-processed coil. The selected coil information shall be displayed as 'Coil 1' or 'Coil 2' in the same way as a scanned coil.
- At any point after a coil has been promoted to 'current coil' and the line is stopped, the operator shall be able to 'unload current coil'. This will provide a method to remove coils that were accidentally accepted, partially processed, or could not be processed for any reason. The 'unload current coil' action will only be available if the line is stopped. Performing this action will clear the 'current coil' section in then HMI.

3 FEED-UP

3.1 Existing processing operation

'Feed-up' refers to the process of slowly threading the strip from the uncoiler mandrel through the slitting line and clamping it in the recoiler mandrel. Once the strip is clamped in the recoiler mandrel, it is ready to be processed at high speed. Major equipment in the slitting section of FSL1 includes:

- Uncoiler mandrel
- Snubber roller
- Entry shear
- Entry pinch roller
- Pinch-bridle roller
- Slitting head
- Tension unit including separators
- Pneumatic drag stand
- Tension belts
- Exit shear
- Recoiler mandrel

At the start of feed-up, the coil on the uncoiler mandrel is manually jogged through to the entry pinch roller using the snubber roller. Next the strip is jogged from the entry pinch roller to the pinch bridle roller which is immediately before the slitting head. The coil is then jogged through the slitting head, which cuts the strip into slits, and stopped approximately 1000mm after the slitting head. The operator inspects the strip, edge cut quality, etc. Provided these inspections reveal no issues the operator jogs the strip through to the recoiler mandrel and clamps it.

3.2 Automation requirements

3.2.1 General description

Once the coil has been jogged through the slitting head and stopper, the operator will press the 'measure coil data' button on the Panel 2 HMI screen and the strip colour, slit widths, and thickness will be automatically measured. The actual coil data will be displayed on the HMI screen adjacent to the 'current coil' schedule data for easy comparison.

3.2.2 Colour measurement

The Contractor shall supply, install and commission an instrument capable of accurately measuring the colour of Colorbond® coils. The contractor shall complete all programming and configuration necessary to request a colour measurement from SCADA, check the required colour in the schedule, determine if the colour meets BlueScope specifications, and to display the colour and status against the current coil schedule in SCADA. The Contractor shall also complete all programming and configuration necessary to request a test measurement from the Panel 2 HMI and to display the test results on the Panel 2 HMI test page.

Coils may be mounted on the payoff mandrel in overwind mode (painted surface topmost) or underwind mode (reverse surface topmost). The coils are predominantly (>99.9%) loaded in overwind mode, and consequently, the colour sensor shall be installed to detect coil colour only when the painted surface is facing up.

If the coil being processed is not painted, the colour will not need to be measured. This information will be accessible via the production schedule.

Coils may be laminated, and this CORSTRIP® coating may prevent the paint colour from being accurately measured. The laminate may also have a logo printed at regular intervals, and one of these logos may inadvertently wind up under the colour sensor. These issues will need to be addressed by the Contractor.

In the CIE colour space, if the measured L, a or b values differ by more than 0.6 from the colour standard, or if the ΔE is greater than 1.0 from the colour standard, the coil fails the instrument colour test.

Occasionally new colours are added to the product range. Facility for BlueScope to add, delete or modify colour variables will be included by the Contractor. This could be by updating an array in the Allen Bradley PLC if necessary.

3.2.3 Slit width measurement

The Contractor shall supply, install and commission an instrument capable of measuring the width of each slit to an accuracy of 0.2mm or better. The Contractor shall complete all programming and configuration necessary to request a slit width measurement from the Panel 2 HMI, check the required slit widths in the schedule, determine if widths meed the order specifications, and to display the slit width and status against the current coil schedule SCADA. The Contractor shall also complete all programming and configuration necessary to request a test measurement from the Panel 2 HMI and to display the results on the Panel 2 HMI test page.

The coil being processed is slit in accordance with the production schedule. The coil may be recoiled (i.e. not slit), trimmed (have edges of the coil removed), or slit and trimmed (cut into slits and have the edges removed). The slit width measurements shall be taken after the side trim has been removed. For some slit products, the trim width is excessive and the waste trim is recoiled in the same manner as slit product for later disposal.

The maximum slit width is 1550mm, and the minimum slit width is 50mm. There may be between 1 and 21 slits per coil. Slits may be different widths; for example one 1200mm coil may be cut in to three slits with widths of 430mm, 390mm and 300mm with a 40mm trim on each side. The order of the slits in the schedule (where the slit widths are different) is not critical, as long as all slits required by the schedule are present. The Contractor shall match the measured widths against the scheduled widths and display the measured value and status against the correct slit in the schedule. The Contractor shall modify the order of the scheduled slits to match the physical arrangement, with the slit furthermost from the operator placed at the top of the list. Over-size waste trim will not be matched on the schedule, and the Contractor shall ensure that there is a mechanism developed to mark extra slits as waste product from the Panel 2 HMI.

The required width and tolerance are specified for each customer order. Where there are multiple orders against one coil, the tolerance shall be determined using the most restrictive values.

3.2.4 Post-measurement

Once a measurement has been completed, the operator will be presented with four options on the Panel 2 HMI:

1.) 'Run' will be accessible if the measured coil data matches all relevant 'current coil' data within tolerance.
2.) 'Run with override' will be accessible if the measured coil data matches the relevant 'current coil data' just outside the required tolerance. If this option is chosen, the Panel 2 HMI will require a reason or reason code to be entered against the non-conforming value indicating why the coil was run outside specifications. This will prevent production delays if sensor calibrations are incorrect, or measured values are marginally outside of tolerance, for example. In this scenario BlueScope will ensure the operator manually confirms the required measurements via procedure.
3.) 'Reject coil' will be accessible at all times. This will allow the coil to be reversed onto the uncoiler mandrel and unloaded. This option is necessary to cover instances where the head was built incorrectly, there are problems with the slitting knives, or the coil is actually outside of specifications.

If either of the run options are selected, an enable signal shall be sent to the Allen Bradley PLC to allow the line to run. In the PLC, the run enable signal shall be latched until a new coil is loaded.

3.2.5 Test mode

In order to test the instruments, the Contractor shall design and implement a 'test measurement' HMI page which will include 'test colour', 'test thickness' and 'test slit width' buttons. When one of these buttons is pressed, all pertinent information will be retrieved from the instrument and displayed on the HMI page. For example, when the 'test colour' button is pressed, a colour measurement will be taken and all available information will be presented to the operator, including the Colorbond® colour (if matched), measured L, a and b values, calculated ΔE value, and any other instrument measurement, fault, and status codes available.

The test measurement values and the schedule measurement values shall be independent. Test measurement values shall not clear or overwrite schedule measurement values, and a schedule measurement shall not clear or overwrite test values. The previous test value shall be retained and displayed until a new test measurement is requested.

4 TRANSFER COIL TO 4-ARMED TURNSTILE

4.1 Existing processing operation

The FSL1 exit operator manually operates the exit coil car to transfer slit coils onto one of the arms of the exit capstan. In general, all slits from one parent coil segment will be loaded onto the same capstan arm, although there is no logic to prevent slits from being placed on different arms.

Slits that need to be reprocessed or scrapped can be removed by overhead crane once they have been placed on the turnstile arm.

Major equipment involved in this part of the process includes:

- Exit coil car
- Exit turnstile
- Overhead crane

4.2 Automation requirements

4.2.1 General description

In order to automate the packaging process, the PLC must know which slits have been loaded onto each turnstile arm, and the order in which they have been placed on the arm. These details will be copied from the production schedule provided prior automated measurement of the coil has taken place (to validate slit widths). The measured width of any wide scrap or additional slits not captured on the production schedule will be transferred to the array from the measured value.

4.2.2 Turnstile arm array

The Contractor shall program the PLC to maintain an array of slits loaded onto each turnstile arm. The Contractor shall ensure that the turnstile arm array is correct at all times, with all coils listed in the correct order on the correct arms. This information may be incorporated with data from the production schedule array should that be determined by the Contractor as a clean solution.

The Contractor shall design, configure and implement a method for the operator to manually modify the turnstile arm array should the order become unsynchronised. The operator should be able to add, remove or move any unpacked slit coils to any of the turnstile arms.

5 AUTOMATED PERIPHERAL BANDER

5.1 Existing processing operation

Once product has been transferred from the recoiler mandrel to the turnstile arm using the coil car, operators access the area to manually apply steel strapping. Strapping used is standard 0.8x19mm painted steel strapping (MAGNUS 190080 supplied by Signode). Operators manually wrap lengths of strapping around the circumference of product and feed the ends in to a steel 'clip' used to seal the tensioned strap. An overhead suspended pneumatic strapping gun is used to tension strapping, crimp the clip, then cut the strapping.

Product may require the insertion of a seal pad to protect the surface from indentations sustained as the steel strapping is tensioned. It may also require multiple straps to be applied based on a combination of thickness and width. Product with a thickness < 0.6mm does not require steel strapping as it is secured earlier in the process with an industrial adhesive tape.

For product at the high end of the thickness range (~1.5mm+) a hold-down arm is used to restrain the outer wraps of the product whilst it is transferred from the recoiler mandrel to the turnstile arm (prior to application of steel strapping). Once the coil car has arrived at the turnstile arm a support arm is lowered, and the hold-down arm is raised. This support arm is an overhead part of the turnstile designed to allow removal of the coil car before steel strapping is applied to the product. Once the coil car has been removed a curved strapping plate is lowered behind the slits. The support arm has a series of slots in the contact surfaces for operators to pass steel strapping through, and the strapping plate is designed such that operators can feed the strapping through the slot continuously until it is gravity-fed back to the front of the product at floor-level.

Major equipment involved in this part of the process includes:

- Exit coil car
- Hold-down arm
- Support arm
- Strapping plate

5.2 Automation requirements

5.2.1 General description

In order to remove operators from this process an automated peripheral banding unit will be installed in the area. This unit may be integrated with the turnstile or coil car at the Contractor's preference.

5.2.2 Unit requirements

The automated banding unit will be capable of locating the rough mid-point of slit product (with the aforementioned variability in widths) and applying a 0.8x19mm strap at that position or at a position based on that location – i.e. for a 1000mm slit strapping would be required in two locations across the width of the slit, each spaced 330mm from the midpoint.

The automated banding unit will be capable of strapping the full thickness range of the unit (0.3-3.2mm). For this purpose it will need to either have a tail-restraining component or integrate with the pre-existing support arm as described above.

The unit will need to position strapping across the full 1550mm maximum width range of the FSL1 unit.

The mechanism used to seal straps will provide a minimum joint efficiency of 81%.

As above, one risk whilst tensioning or sealing peripheral strapping is indentations created in the strip surface. The unit will have facility to mitigate / prevent indentations for 0.65mm thickness product with a yield strength of 275MPa. Suggested solutions are insertion of a consumable protection pad or modulating strap tension based on product thickness.

A lookup table or array will be required to store the strapping rules based on product width and thickness. These two variables will determine the number of peripheral straps (0-6), and the position of those straps. If a consumable protection pad is used this would also be added to the rules table.

The unit will occupy a maximum of 2000mm of width and will not impede movement of the coil car whilst in the OUT position.

The unit will be equipped with dual unwinders (i.e. can accommodate two strapping coils simultaneously). These unwinders will be located outside of the guarded space in which the bander is operating such that they can be re-filled by operators without significant operational delays.

The Contractor will design, install and commission a system that suits the aforementioned requirements.

5.2.3 HMI

The Contractor shall supply, install, configure and commission a HMI panel adjacent to the area in which the automated peripheral bander is installed. This panel will have the necessary functions for manual operation of the banding unit, as well as fault reporting by code as well as plain text describing in specific terms the nature of any problem that the machine has encountered. Faults will be logged / archived and operators will have the ability to acknowledge / reset faults from this panel. Details of these faults will be passed back to the Allen Bradley PLC for display at the Panel 3 operating station.

6 PACKAGING CONVEYOR

6.1 Existing processing operation

The FSL1 packaging operator manually rotates the turnstile to select a slit coil to downlay. The operator inputs the individual slit widths in to the Panel 4 HMI and initiates automated operation of the tilt table. The operator can select preset groups of slit widths via the HMI, or edit that list to add or remove standard slit sequences. The operator also has the ability to select basic packaging configuration (presence or absence of intermediary dunnage).

The PLC raises the tilt table and traverses until the coil is detected, then extends the nail (linear device used to lift slits) to a distance equal to the slit width. The tilt table then lifts the slit, returns to the home position, and lays the coil onto the packaging conveyor.

An automated process drives the slit (now bore-vertical) to the weighing station, stops momentarily to allow the operator to record the mass of the slit, then proceeds to the ITIpack automated radial bander (colloquially referred to as 'ITIpack'). When the slit arrives at the weighing station the operator manually transfers the mas indicated by a trade certified weighing device in to an adjacent desktop PC. This process causes the SSC System to print a label specific to this slit at an adjacent printer.

The operators manually configure the ITIpack with the number of radial straps to apply based on the product diameter / width / thickness and pack type. The ITIpack then applies the necessary number of radial straps.

Major equipment involved in this part of the process includes:

- Exit turnstile
- Tilt table
- Packaging conveyor
- Weighing station
- ITIpack automated radial bander

6.2 Automation requirements

6.2.1 General description

The tilt table and radial bander will be fully automated. These stations will select and process slit coils from the turnstile arm in accordance with schedule, PPI and packaging instructions.

6.2.2 Packaging instructions

At the end of the packaging conveyor, slit coils are placed on top of each other, either with timber 75x75mm spacers or without. The number of layers and exact arrangements vary according to the customer, coil width, and coil mass. The packaging and layering requirements will be codified by BlueScope and presented to the Contractor for implementation.

6.2.3 Tilt table automation

The tilt table is already automated to perform one or more lifts as programmed by operators. The Contractor shall enhance pre-existing automation to take advantage of arrays populated earlier in the process. Slit coil width(s) stored in the PLC will be used to set the nail length for the tilt table. These will be used to update the editable lists of slit sequences, but editable by operators to allow for continued operation in cases of sensory calibration issues.

The Contractor will also install, program, calibrate and commission a mechanism via which the tilt table can verify that only a single slit has been lifted (to cater to scenarios where due to an operational issue slits may be slightly overlapped). If the PLC detects this fault, automated operation of the table will cease and operators will be required to complete the current cycle manually.

6.2.4 Tilt table array

The Contractor shall remove the slit coil taken off of the exit turnstile arm by the tilt table from the array of slits loaded on each turnstile arm. The slit coil shall be added to an array of slits currently on the packaging conveyor.

6.2.5 ITIpack automated radial bander automation

The ITIpack PLC already has the facility to receive an input to determine the number of straps required. Currently this input is by manual selection using toggles on the Panel 5 operating station. The Contractor shall enhance pre-existing functionality to allow this information to instead be pulled from packaging requirements on the production schedule. A mechanism will be included via which operators can override this information and instead manually select the number of straps.

6.3 SCADA interface

6.3.1 Packaging screen

The Contractor shall design and implement a SCADA packaging screen for the FSL1 operators. The Contractor shall confirm the details to be displayed with BlueScope, and it is expected that the information will include the list of slit coil numbers to be packed in the order they will be packed, the coil width, colour, PPI, customer and packaging instructions.

7 EXIT CAROUSEL

7.1 Existing processing automation

At the final conveyor station a group of centring rollers raise through the bore of the slit to centre it relative to the magnetic depillar, which then lowers over the slit. Provided a secure lift is detected the magnetic depillar raises to a height determined by the slit width, rotates to the left ~135º, then lowers on to the exit carousel before returning to the home position. This process is repeated based on inputs from the operators.

Stacks of slits at the exit carousel may require timber spacers to be inserted between each layer. If the stack being piled by the magnetic depillar requires timber spacers then manual intervention is required. The operator is required to open a safe access gate (halting operation of the magnetic depillar), carrying two timber spacers to the area, positioning them on the top slit of the stack, then exiting the area and resetting the safe access gate. This allows resumed operation of the magnetic depillar.

The exit carousel is a circular platform comprised of four stations on which slit product can be stacked by the magnetic depillar, located at 90º to one another. There is also a hydraulic evacuation ram at the exit side of the carousel used to push out completed stacks. Prior to initiation of the stacking process operators are required to access the area in a similar way to the above to place timber spacers at the base of the stack. This separates the base slit from the exit carousel, preventing damage to slits.

Once a stack is completed the carousel is rotated 90º to allow a new stack to be initiated. After this the operator takes labels printed earlier in the process in to this area and applies them manually at a fixed location on the circumference of the slits. Each slit receives a single label. As this process is completed inside of the aforementioned safe access area, operation of the magnetic depillar is suspended.

Major equipment involved in the banding process includes:

- Centring conveyor
- Centring rollers
- Magnetic depillar
- Carousel stations 1-4
- Evacuation ram

7.2 Automation requirements

7.2.1 General description

Automation of this final part of the process will include automated placement of 75x75mm timber spacers and automated application of labels to slit product.

7.2.2 Automated placement of timber spacers

The Contractor shall supply, install, configure and commission a device capable of positioning 75x75mm timber spacers at carousel stations 1-4. These timber spacers come in 600mm, 900mm and 1200mm lengths. The 99% majority is 900mm lengths. The position will be determined by the length of the timber and the diameter of the slit. The device will be required to lift timber spacers from a standard 1200x1200mm pallet, cross-stacked. The spacers are wrapped in a 'cling film' like plastic, with a maximum mass of 10kg. The parent pallet will be cross-stacked by layer. The location of this stack should be such that it can easily be replenished with minimal process interruption.

7.2.3 Automated application of labels

The Contractor shall supply, install, configure and commission a device capable of applying labels to the circumference of slits. There will be two positions at which labels will be positioned, determined by packaging instructions. These two positions on the slit circumference are separated by ~45º. An acceptable solution would be for a single robotic arm to both position timber spacers and also apply labels. BlueScope are able to supply a DataMax H6210 (current printer), but any other model required shall be supplied by the Contractor. If a replacement printer is required it will need to have comparable specifications to the DataMax H6210 as print instructions are issued by the SSC System, not the PLC.

7.2.4 HMI

The Contractor shall supply, install, configure and commission an operating panel for the devices described above. This panel will have the necessary functions for manual operation of this equipment, as well as fault reporting by code as well as plain text describing in specific terms the nature of any problem that the machine has encountered. Faults will be logged / archived and operators will have the ability to acknowledge / reset faults from this panel. Details of these faults will be passed back to the Allen Bradley PLC for display at the Panel 3 operating station.

8 APPENDIX A: COIL COLOURS

Batch Name	Current Illuminant Name	Batch CIE L	Batch CIE a	Batch CIE b	Batch CIE C	Batch CIE h
PN12671-D Surfmist	D65 10°	87.1	-1.07	3.81	3.96	105.72
PN12681-D Classic Cream	D65 10°	86.8	2.37	16.4	16.57	81.79
PN22451-D Basalt	D65 10°	46.48	-0.67	-1.15	1.33	239.78
PN22452-D Wallaby	D65 10°	50.75	0.05	1.57	1.57	88.15
PN22524-D Gun Metal Grey	D65 10°	34.71	-0.16	-0.4	0.43	247.43
PN22691-D Dune	D65 10°	71.26	1.16	5.29	5.42	77.67
PN22692-D Windspray	D65 10°	59.59	-2.1	0.43	2.14	168.35
PN22707-D Shale Grey	D65 10°	76.47	-1.31	1.34	1.88	134.45
PN22709-D Bushland	D65 10°	57.18	-1.34	0.62	6.34	102.24
PN227708-D Woodland Grey	D65 10°	41.62	-0.73	1.89	2.03	111.16
PN42412-D Terrain	D65 10°	37.92	12.67	13.29	18.36	46.36
PN42568-D Moss Vale Sand	D65 10°	77.76	-0.16	9.41	9.41	91
PN42693-T Stone	D65 10°	64.42	3.24	10.16	10.67	72.34
PN42734-D Sandbank	D65 10°	71.38	3.27	18.64	18.93	80.05
PN42735-D Ironstone	D65 10°	39.1	-0.56	-4.17	4.21	262.39
PN42736-D Jasper	D65 10°	46.39	2.31	6.52	6.92	70.47
PN42737-D Paperbark	D65 10°	77.12	2.57	13.32	13.57	79.07
PN42790-D Loft	D65 10°	36.34	3.39	1.33	3.64	21.41
PN52617-D Rivera	D65 10°	49.55	-14.8	-2.09	14.94	188.03
PN52665-D Wilderness	D65 10°	50.03	-6.47	5.38	8.42	140.26
PN52688-D Pale Eucalypt	D65 10°	57.07	-5.51	9.33	10.83	120.57
PN52689-D Cottage Green	D65 10°	38.57	-10.76	3.55	11.33	161.74
PN52758-D Mangrove	D65 10°	49.71	-3.44	7.94	8.66	113.43
PN52759-D Gully	D65 10°	53.27	0.76	6.19	6.23	83
PN52760-T Cove	D65 10°	61.57	-0.12	12.73	12.73	90.53
PN62665-D Deep Ocean	D65 10°	37.87	-3.04	-7.55	8.14	248.07
PN72592-D Headland	D65 10°	43.45	25.61	17.01	30.74	33.58
PN72602-D Manor Red	D65 10°	35.32	19.01	10.31	21.63	28.48
PN82516-D Night Sky	D65 10°	26.45	-0.03	-0.64	0.64	267.47

PSSHED06 v3.05 Production Schedule Orders and Stock 06/11/17 11:14 Page 1 (WA)
Unit : FSL1

DW Fwd	Order No	Customer	Ord'd Thick	Ord'd Width	Ord'd Length /Slits	Sh ape	Mass To Proc.	Delivery	W A E D	Stock ID	Stock Width	Top Colour	Floor Loc'n	Mass Alloc.
650.0	17349	ZALG300S												
	574588-04	FIELDERS-W	.60	305.0		3 C	1.77	07/11/17	44	B52454/	925.0	CLASSIC CREAM	FF19K	1.79
						Total	1.77							1.79
651.0	17350	ZALG300S												
	574929-03	METROLL-WA	.60	305.0		3 C	1.72	17/45		B53006/	925.0	MONUMENT	FF19K	1.74
						Total	1.72							1.74
652.0	17351	ZALG300S												
	574621-04	COMB.METAL	.60	305.0		3 C	1.78	07/11/17	44	B52468/	925.0	BASALT	FF19K	1.79
						Total	1.78							1.79
653.0	17431	ZALG300S												
	574958-04	REVOLUTION	.60	305.0		3 C	1.93	17/45		B53676/	925.0	SURFMIST	FF62A	1.95
						Total	1.93							1.95
654.0	17432	ZALG300S												
	574975-06	BGC STEEL	.60	305.0		3 C	1.66	17/45		B49533/	925.0	IRONSTONE	FF62C	1.68
						Total	1.66							1.68
655.0	17433	ZALG300S												
	575059-01	METROOF-BU	.60	305.0		3 C	1.65	17/45		B53823/	925.0	MONUMENT	FF63A	1.66
						Total	1.65							1.66
656.0	17560	ZALG300S												
	575178-03	FIELDERS-W	.60	305.0		3 C	1.82	08/11/17	44	B50974/	925.0	IRONSTONE	FF62C	1.84
						Total	1.82							1.84
657.0	17561	ZALG300S												
	575178-04	FIELDERS-W	.60	305.0		3 C	1.66	08/11/17	44	B53382/	925.0	SHALE GREY	FF63A	1.68
						Total	1.66							1.68
658.3	17137	ZALG300S												
	574466-01	METROLL-WA	.60	305.0		3 C	1.44	08/11/17		B50534/	925.0	SURFMIST	FF63B	1.46
						Total	1.44							1.46
659.0	16921	TCOREG500												
	567972-01	COMB.METAL	1.20	134.0		4 C	5.61	17/45		LO7526/	1085.0		FF17N	11.35
	570829-02	METROLL-WA	1.20	130.0		4 C	5.44	17/46 45	45					
						Total	11.05							11.35
660.2	17356	ZALG300S	*** BRANDED CORSTRIP *** BRANDED CORSTRIP ***											
	P37914	STRAMIT	.40	390.0		3 C	1.93	07/11/17		B53650/	1200.0	SURFMIST	FF61A	3.96
	574929-02	METROLL-WA	.40	390.0		C	1.93	17/45						
						Total	3.87							3.96
661.0	17434	ZALG300S	*** BRANDED CORSTRIP *** BRANDED CORSTRIP ***											
	574958-02	REVOLUTION	.40	390.0		3 C	1.97	17/45		B48268S/4	1200.0	WINDSPRAY	FF12E	2.02
						Total	1.97							2.02
662.2	17643	GSPANG500												
	574620-02	STRAMIT	1.20	295.0		3 C	6.92	07/11/17D2D	44	N64236/	1190.0		FF18L	13.96
	575568-01	METROLL-WA	1.20	295.0		C	3.46	09/11/17	44					
	568013-01	APC ENGG	1.20	88.0		3 C	3.10	17/45						
						Total	13.48							13.96
663.2	17633	GSPANG450												
	574620-03	STRAMIT	1.50	295.0		4 C	3.39	07/11/17D2D	44	N64127/	1190.0		FF18N	13.70
	P50186	SSC WA	1.50	295.0		C	10.19	29/10/17						
						Total	13.58							13.70
664.0	17650	GSPANG450												
	P50317	SSC WA	1.90	295.0		4 C	13.44	29/10/17		N65539/	1190.0		FF18N	13.55
						Total	13.44							13.55

[PSLOOP01 v3.07] PRODUCTION SCHEDULING - Operator's Report As at: 06/11/17 11:15 (WA)

FSL1 - FORRESTFIELD FSL1 SLITTER

PPI no.: 17643 Sequence No.: 662.2

Slitter setup: 3@295.0, 3@88.0

CSA Ref No	Customer Requirement		Feed Coil Requirement		Processing Requirement		Packaging Requirement		Delivery Requirement	
574620-02	Customer	STRAMIT	Quality	PRI	Width Ord'd	295.0	Pack Type	H1M	Mass Ord	7.00
	Shipto: STRAMIT/MADDINGTON		Coating	Z350	Tolerance+/-	0.60/0.00	Unit Mass	0.00/2.00	Mass Bal	5.25/8.75
	Product	GSPANG500	Oil/Dry	D	Thickness Ord'd	1.200	Pack Mass	1.40/4.00	Mass to Proc	6.92
	Surfc/Shape	5/4	Bore	500	Tolerance+/-	0.050/0.050			Del. Week	07/11/17#
	DELIVERY TO THE DAY									
	Special Proc		Thick Tot	1.250	Length Min/Max	0/692			Early Del.	17/44
	End Use	PURLINS/GIRTS			Coil OD Min/Max	0/1163				
					Metres/tonne	346.3				
575568-01	Customer	METROLL-WA	Quality	PRI	Width Ord'd	295.0	Pack Type	H1M	Mass Ord	14.00
	Shipto: METROLLWA/DOOR5/KEWD		Coating	Z350	Tolerance+/-	0.60/0.00	Unit Mass	0.00/1.80	Mass Bal	12.04/15.96
	Product	GSPANG500	Oil/Dry	D	Thickness Ord'd	1.200	Pack Mass	1.40/3.50	Mass to Proc	3.46
	Surfc/Shape	5/4	Bore	500	Tolerance+/-	0.050/0.050			Del. Week	09/11/17
	Special Proc		Thick Tot	1.250	Length Min/Max	0/623			Early Del.	17/44
	End Use	PURLINS/GIRTS			Coil OD Min/Max	0/1114				
					Metres/tonne	346.3				
568013-01	Customer	APC ENGG	Quality	PRI	Width Ord'd	88.0	Pack Type	V1DM	Mass Ord	10.00
	Shipto: APCGROUP/4 HANWELL W		Coating	Z350	Tolerance+/-	0.40/0.00	Unit Mass	0.00/0.60	Mass Bal	7.50/12.50
	Product	ZHITENG500	Oil/Dry	D	Thickness Ord'd	1.200	Pack Mass	1.00/2.50	Mass to Proc	3.10
	Surfc/Shape	5/4	Bore	500	Tolerance+/-	0.050/0.050			Del. Week	17/45
	Special Proc		Thick Tot	1.250	Length Min/Max	0/696			Early Del.	
	End Use	RACKING			Coil OD Min/Max	0/1165				
					Metres/tonne	1160.7				

Stock ID	Mass	Coil Width	Heat No.	Floor Location	Colour	Comment	COM	Length	Metres /tonne
N64236 /	13.96	1190.0	6570979	FF18L				1198.3	85.8

Computer recommendation (check first): Cut at: 599.1 metres, (1/2 of coil)