E N G I N E E R E D   S O L U T I O N S

Columbia

PSC300 Operation Manual

Version 9.10

General information

Prior to any attempt to operate this Columbia PSC 300, operator should read and understand the complete operation of the cubing system. It is very important for all operators understand the equipment is a fully automatic machine. It is also very important to follow all safety procedures of this equipment.

This manual is intended to provide the information to successfully operate, maintain and trouble shoot the PSC 300 control system.

It is important that the owner of this machine has assigned operators and service people with sufficient technical expertise to understand and interpret operation of the fully automatic cubing system.

The PSC uses three forms of energy to operator. (Hydraulic, Electric, Pneumatic) The energy must be turned off before operator attempts to perform any type of maintenance or adjust the machine. Follow the Plants lock out tag out procedure at all time before entering the machine.

MODE OF OPERATION

The machine is designed to handle a wide range of concrete block sizes. The versatility of the machine operation is very important to Columbia Machine. This is the reason for the 3 Modes of Operation. Also very important to Columbia Machine is the safety of the operator. Understanding the machine and the Modes of operation will help the operators in the safety of operation and the efficiency of the machine.

1) Manual Mode
2) Automatic Mode
3) Semi-Automatic Mode

Manual Mode

The manual mode gives the operator the ability to control each of the movements manually. The machine is designed with each movement having a physical selector switch. The selector switches are located on the main control panel. In the cast of the pallet injector or a part of the machine in a remote location, there will control station located in that area of the machine.

In the manual mode the operator can move the equipment into any position. The machine uses position control actuators to control the position of each movement. In manual mode the operator can override each limit in the cast of a jam or to do maintenance on the machine.
NOTE: The override will only work in manual mode.

Automatic Mode

The Automatic mode is control by one main push/pull button located on the main panel of the machine. Once the machine is placed in automatic the machine will use the sequential logic to control the operation of the machine. The programmable logical controller or PLC uses to control the machines program and the pattern from the cube editor to determine the cycle of the machine. Important to understand how the machine uses the sensor to determine the position of the movement and to advance the sequence of the current operation.

Semi-Automatic Mode

The semi-automatic mode is a designed to move one part of the machine in automatic. The operator interface or HMI has cycle buttons on the main screen. Each cycle button allows the operator to start the cycle. For example: if you want to cycle the hoist the operator will chose the hoist cycle button, this will start the hoists cycle. The hoist will then do a complete cycle and return down to home position. This Semi-Automatic mode also is helpful when trouble shooting or doing maintenance. The most common way this mode is used is when changing patterns. The operator will stop the income block by turning off the pattern maker clamps. Then cycle the pattern flight bar this will empty the product from the pattern maker without having the operator do this manually. This also will speed up the pattern change process.

General Layout

CUBE EXIT

PALLET INJECTOR SECTION

CUBE MAKE-UP

HOIST SECTION

SIDE PUSHER SECTION

PATTERN MAKER SECTION

INFEED SECTION

PRODUCT FLOW
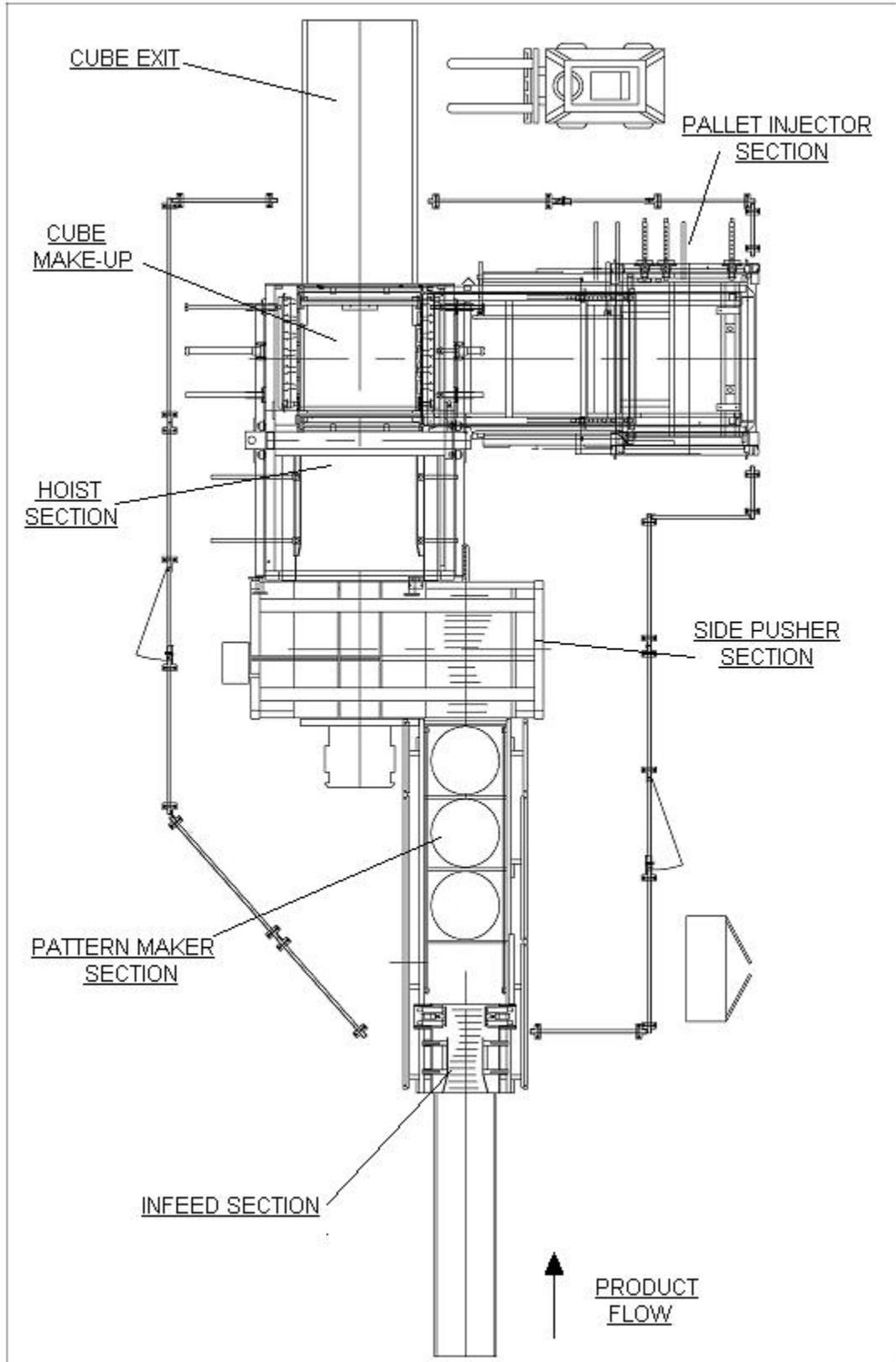
General Layout of Equipment:

The PSC 300 Automatic cuber is broken up into sections of operation. This allows the operator to control and adjust each section without have to look through the HMI (operator interface) to find the part of the machine that may need to be adjusted.

- **In Feed Section**
- **Pattern Maker Section**
- **Side pusher Section**
- **Hoist Section**
- **Pallet Injector Section**

Each section of the machine has a manual selector switch for each movement in that section. Below is a written description of the selector switch and description of operation.

Description of each Movement by Section

In Feed Section

Line Shaft Rollers: (Midget Rollers)
The line shaft rollers are the rollers that move the product from the Pallet handling (turnover) to the cuber. Some plants have the conveyors broken into section. Common conveyor sections; 1, 2, 3, and 4. There will be a selector switch for each section of conveyor on the panel (Auto-Off-Man).

In Feed conveyor:
The in feed roller conveyor is used to move the product into the pattern maker. This set of conveyor rollers is a positive driven section of conveyor. The conveyor also has two speeds. This allows the conveyor to ramp up and ramp down to move the product fast and accurate into the pattern maker. The In Feed conveyor also has the option of reversing to place the curved product on the pattern maker table (or shift Plate) and back up the other product to allow the pattern maker bar to pick up the oversized or curved blocks. The in feed conveyor is a two speed operation, with flow controls located at the hydraulic valves. The selector switch is a spring return (Rev-Auto- Fwd).

In Feed Clamps:
The in feed clamps are used to hold the incoming block on the in feed conveyor. This set of clamps open to allow the product to enter the pattern maker for measure then close to hold the incoming product until the machine is ready to accept the next set of Blocks. The Clamps are adjustable to allow for different size product. The clamps can also be turned ON and OFF as needed. The clamps are also used to control the flow of product into the cuber. The selector switch on the main panel is a 3 Position switch. This allows the operator to turn OFF the clamps at any point of operation to stop the flow of product entering the cuber. The clamps selector switch is also what the operator should use during a product change or rest of the pattern. This allows the cubing line to accept product and the operator to cycle out the cuber during the change. The in feed clamps are a pneumatic with flow control located on each cylinder. The selector switch is a maintained. (Close-Off-Open).

Pattern Maker Section

Shift Plate:

The shift plate is used to accumulate product for measure. Once the product reaches the correct Photocell or laser. The shift plate will move the current block forward to allow the flight bar to pick up the block and move it forward to the turntables. Once the Flight bar encoder value reaches a set position the shift plate will reverse to home position. The shift plate is a one speed operation with the flow control valve located at the hydraulic valve. The selector switch is spring return (Rev-Auto-Fwd)

Flight Bars:

The flight bar is used to move the product from shift plate to turntables thrn to the side pusher conveyor. The flight bar is also used to place the block in the correct position on the turntables. Once the flight bar places the blocks on the turntable it will then reverse to center position to allow the turntables to rotate.

The Flight Bar is operating on an encoder position counter. The position of the Flight bar is found in the flight bar section of the HMI. There is a proximity switch on the bottom rail of the flight bar track used to rest the counter of the encoder. This switch also is the position for the bar to reverse allowing the turntables to rotate. The flight bar is a proportional control hydraulic valve. The speed control is found in the flight bar section of the HMI. There is a selector switch it is a spring return (Fwd-Auto-Rev).

Turntables: (2-3-4 turntable pattern maker)

The pattern maker can have 2,3,or 4 turntables. Most plants have 3 tables. The turntable closest to the shift plate is the first turntable. The turntables are used to rotate the product to match the pattern from the cube editor. The flight bar moves the block to the turntables each step in the pattern. As the controller follows the pattern it will then signal to the flight bar to place the block at turntable position for rotation. The cube editor software decides when each block will turn. The pattern always tries to have as many turntables to cycle each time it will rotate. This will optimize the cycle time of the pattern maker.

Each Turntable has it own motor to rotate. The table will rotate the same direction each time it needs to cycle. The table will rotate 90,180 or 270 deg. The rotation is controller by the pattern made by the cube editor.

Each turntable may rotate a different degree or at a different time in the pattern. Each turntable has a flow control valve located at the Hydraulic valve. There is a selector switch for each turntable it is spring Return (Auto-Turn).

Side Pusher Section

Side Pusher Rollers:
At the end of the pattern maker is the side pusher Roller. This set of roller conveyor is designed to move the product into a row for each section of the layer. Each roller on the conveyor is turning by a rubber band belt. The belts allow roller to pull the product into position, but also stop turning once the product is in position. The conveyor will start and stop as the product moves onto the conveyor. There is a Photocell at the end of the pattern maker frame that controllers the conveyor. In the side pusher section of the HMI can be found a timer. This times will controls how long the roller will run after the photocell is clear of the product. Adjust the speed of the roller at the hydraulic valve manifold located at the opposite end of the side pusher frame. Note: It is important to make sure the belts are working at the roller closest to the pattern maker. The first rollers help pull the product away from the pattern maker. The selector switch is spring Return (Rev-Auto-Fwd).

Side Pusher:
The side pusher is used to transfer the rows of product into a layer. Once the row is complete the side pusher moves the row onto the table of layer pusher. The side pusher will lift and return for the next row of product. Once the last row of product is ready the side pusher will move the complete layer onto the table for the layer Pusher.

The side pusher is also controller by the pattern from the cube editor. The pattern tells the side pusher the row is complete. It also tells the pusher to what position the move the product to. The side pusher has 1 to 4 stop positions available to set in the cube editor.

Stop positions
First   (1st stop on screen, default value)
Second (2nd stop on screen)
Third   (3rd stop on screen)
Last   (always used, last push of layer)

The side pusher is operating on an encoder counter. This counter controls the position the side pusher forward position. The position of the side pusher is found in side pusher section of the HMI. Also in side pusher section of the HMI is the speed control of the side pusher. There is a selector switch for the forward and reverse movement. Spring Return (Rev-Auto-Fwd) There is a selector switch for the up and down movement. Spring Return (up-Auto-down).

Layer Pusher:
The layer pusher is used to push the complete layer from the accumulation table onto the Hoist stripper Plate. The layer pusher start signal is controlled by the side pusher full push signal. The layer pusher is a two speed operation with flow controls located at the Hydraulic valve. There is a selector switch for the forward and reverse movement. Spring Return (Fwd-Auto-Rev).

Hoist Section

Hoist:

The hoist is the section of machine that lifts the layer and stacks them on the roller make-up conveyor. The Hoist also allows if selected the pallet injector to place a pallet on the conveyor before it builds the cube. The pattern from the cube editor is what controls the how many layers are placed on each cube.

After each layer is placed on the stripper plate the hoist will pusher the completed cube out of the machine and start building I new cube. The hoist cycle includes the stripper plate, product gate, long and stroke clamps, exit roller conveyor. The hoist in a two speed operation with flow controls located at the Hydraulic valve. There is a selector switch for the up and down movement. Spring Return (Up-Auto-Down).

Hoist Stripper Plate:

The stripper plate is the main plate on the hoist. The stripper plate carries the layer from the layer push side of the hoist to the make-up cube side of the machine. The hoist will lift the plate to the top of the cube. Then the plate will travel over the top of the cube clamp and stripper the product off the plate. The stripper plate in a two speed operation with flow controls located at the Hydraulic valve. There is a selector switch for the forward and reverse movement. Spring Return (Fwd-Auto-Rev).

Hoist Gate:

The hoist gate is located on the main frame of the hoist. The gate is designed to hold back the product as the stripper plate is removed from under the product. The gate is a speed control is located at the hydraulic valve. There is selector switch for the up and down movement. Spring return (Up-Auto-Down).

Hoist Short Clamp:

The hoist short clamp is located on the main frame of the hoist Cube make-up side. The short clamp design is to be used as the straight side of the cuber clamps. The clamps are controlled by to hoist cycle and not the pattern. The clamp speed control is located at the hydraulic valve. There is a selector switch for the open or hold position. Spring Return (Open-Auto-Hold).

Hoist Long Clamp:

The hoist long clamp is located on the main frame of the hoist Cube make-up side. The Long clamp is used as the adjustable side of the cuber clamps. The clamp is controlled by to hoist cycle and not the pattern. The clamp speed control is located at the hydraulic valve. There is a selector switch for the open or hold position. Spring Return (Open-Auto-Hold).

Cube Make-up Brake:

The cube make up brake is used to stop the cube make up rollers when building the cube. The brake is a long rubber pad that presses against the make up conveyor rollers. The speed control is located at the hydraulic Valve. The brake is always on until the cube is ready to send out. When running the machine in manual it is important to release the brake before sending the cube out. There is a selector switch to release the brake. Maintained position (Auto-Release).

Pallet Injector: (Option)

To use the pallet Injector ON/OFF selector switch to On. This will activate the pallet Injector cycles and modify the Hoist cycle to use a pallet under each cube. The pallet injector has manual remote station located at the Injector outside the guarding. This remote station allow the operator or Forklift operator to control the pallet injector cycle to allow the loading of the pallet injector without stopping the cuber. Please review your current pallet injector remote control stations, because many injectors are designed to fit the pallet of the plant.

Main Screen
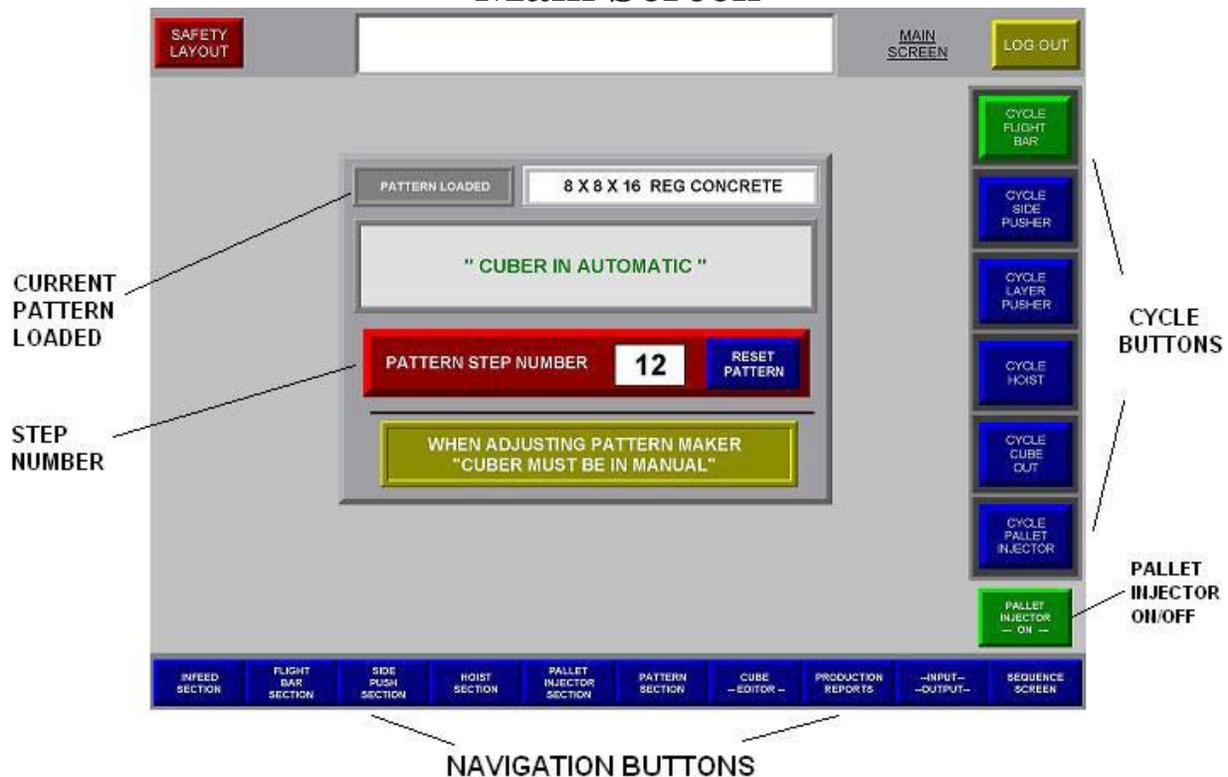
- The Main Screen of the HMI allows the operator to monitor and alter the various machine operations. This screen is designed to tell the operator the current pattern run in the machine and it current step number.

- An important part of the HMI is the **NAVIGATION BUTTONS** located at the bottom of every screen. The navigation buttons are used to take the operator to different sections of the machine.

> ### Sections of the Machine
> - INFEED SECTION
> - FLIGHT BAR SECTION
> - SIDE PUSHER SECTION
> - HOIST SECTION
> - PALLET INJECTOR SECTION
> - PATTERN SECTION
> - CUBE EDITOR
> - PRODUCTION REPORTS
> - INPUTS AND OUTPUTS
> - SEQUENCE SCREENS

- The current pattern loaded is the name of the pattern the operator saved the pattern into the memory of the controller. To see all the patterns save in the machine refer, to the pattern section.

- The machine will display to pattern step number. The step number is the current position the machine is at in the current pattern loaded. The machine will always increase the pattern number as it work through the pattern loaded. When the pattern is complete the machine will reset the pattern to (0). The number 0 is the first step in the pattern.

Changing Pattern Step Number:
- When changing the "Pattern Step Number"
  1) Stop "Automatic Mode"
  2) Adjust the block in the machine to match the pattern.
  3) Place the correct number in the Pattern Step Number on the main screen.
  4) If the correct number is in the pattern step number, change the number in the pattern step number to a larger number then current number. Example: if the number in the pattern step number is 12 change the number to 13 and enter. Then change the number back to 12 this will make the controller reset all the valves correctly in the machine.
  5) Put the machine back in the "Automatic Mode"
  6) The step number can be found in the Cube Editor, in each pattern. Refer to the cube editor manual for details.

Rest the Pattern:
- Before the reset of the pattern it is important to clear the pattern maker of all product. This can be done using the pattern Maker cycle Button on the Main Screen. Once the product is removed from the pattern maker, check to make sure the correct pattern is sent into the machine. Remove "Automatic Mode" and press Rest Pattern. Note: A common practice is the place the pattern maker clamps in close position and then restart Automatic. This will stop the flow of product and give the operator time to make the last check of the system before allowing product to restart.

Cycle Buttons:
- Also located on the main screen of the HMI s the cycle buttons. The cycle buttons are used to move the machine through each cycle automatically. This makes it easier for the operator to clean out the machine. Each button is just a start signal to that section of the machine. This function will only work in Automatic Mode.
- Also located on the Main Screen is the Pallet Injector On-Off. This button will charge from Red (Off) to Green (On). The pattern does not control the pallet injector. The pallet injector will cycle at the start of every cube if turned on.

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Pattern Screen

- **The Pattern Screen:** This screen is used to controller the all the patterns that come in from the Cube Editor. Understanding this screen is important for the operator to understand. There are two ways to get patterns into the controller, one directly from the cube editor and one from the pattern Screen.

- **From the Cube Editor:** All the patterns for the PSC come from the cube Editor. To get to the cube editor there is a button on the bottom of this screen, and also on the main screen. This button will take you to the desktop of the Panel View CE. From the desktop will be the cube editor Icon CUBE EDITOR the icon will bring up the cube editor software. After the pattern is built and sent to the controller it arrives in the main Storage File.

- **The Save Button:** The save button is used to store the pattern the Controller. This function allows the operator to place the pattern in a file inside the controller. Using the pattern number button enter the pattern number to store the pattern. The number entered will display in the pattern number to save on the button. Once the correct number is in the window then press the save button. The status bar will give the operator feed back when the operation is complete.

- **Pattern Name:** This button is used to allow the operator to name the pattern. To enter the

name for each number the operator can select the display box next to the number. This will bring up a keypad and allow the operator the name or code to go with this product.

- **Send The Pattern:** When it is time to change the pattern in the machine the operator has two options. The first option is to use the cube editor the second option is to use a pattern that has been saved in the controllers memory.

  - **Cube Editor:** Sending the pattern from the cube editor the operator selects the cube editor button from screen. Once the cube editor software is open, then select Open or create New. Once the correct pattern is selected, the operator needs to SEND the pattern to the Controllers Storage file. Return to the main screen of the HMI. When the pattern maker is empty. Remove Automatic and reset pattern. Turn off Pattern maker clamps and restart Automatic. When Ready the operator can place clamps back into automatic.
  - **Controllers Memory:** Sending the pattern from the controllers memory the operator needs to enter the pattern number into the pattern number to send box and press SEND. The status bar will indicate when the pattern send is complete. Return to the main screen of the HMI. When the pattern maker is empty. Remove Automatic and reset pattern. Turn off Pattern maker clamps and restart Automatic. When Ready the operator can place clamps back into automatic.

Infeed Section

- **The infeed section** is setting used to control the product feeding into the pattern maker. One of the very important parts of an automatic cuber is how well the product is feed into the machine to be measured and separated. When making changes to the machine always remember what the value was when you started.

- **Pattern maker Infeed Clamps [on-off]:** This function will turn the clamps on and off. Some products because of there shape will cause if clamped to catch on the clamp pads or twist the product. Other product may get chipped form the clamps.

- **Infeed Conveyor Fast [on-off]:** This function will turn in feed roller fast on and off. Some products you want to feed the machine only slow to prevent them from chipping.

- **Infeed Reverse After Loading [on-off]:** This function will allow the in feed conveyor to reverse after loading product on table. This function is commonly used for loading retaining wall. A lot of retaining wall have a angle to both ends of the product this causes the block to twist as it loads on the table. When the shift plate moves forward the block will hang up on the in feed conveyor and get pulled back. Then the flight bar will go under the retaining wall at pick up. This function will allow the product to load further on the shift plate and pull back to block behind the on loading to help create a gap.

- **Pattern Maker Clamps Close Delay:** This is a delay timer to tell the controller the pattern maker clamps are closed.

- **Infeed Conveyor Delay Fast At Start:** This is a delay timer at start to allow the product start moving before the in feed conveyor will turn the fast valve on.

- **Infeed Conveyor Reverse After Block Is Loaded On Table:** This timer is how long the in feed will reverse after loading product on table. Function must be turned on.

- **Delay To Start Cuber After The Block Are At The Pattern Maker:** This timer is used to allow the product to accumulate at the cuber before the cuber will start loaded the pattern maker.

Flight Bar Section

- **The Flight Bar Section** is the setting used to adjust the pattern maker flight bar. The flight bar is operating by an encoder position counter. The flight bar is also proportional controlled this allows the bar to ramp up and ramp down. There is a navigation Button on the bottom of the screen to get to the Flight bar speed control screen.

- **Flight Bar Actual Position:** The flight bar has an encoder position counter that feeds the controller the actual position the bar is in at all times. This value is displayed at the top of the screen as a reference to help adjust the positions of operation.

- **Flight Bar Home Position:** This is the position that the flight will stop and wait for the shift plate to be loaded with new product. A good position is when the bar is stopped 1" to 2" from the bottom of the shift plate table.

- **Flight Bar Slow at Block Pick-up:** This is the position the Flight bar will start to slow down when picking up the block off the shift plate.

- **Flight Bar slow Zone width at Pick-up:** This value is used to control how long the flight bar will stay in slow after the bar has picked up the block off shift plate.

- **Flight Bar position to start slow before rotation position:** This position will start the flight bar ramp down before the rotation position.

- **Flight Bar Position to place block on Turntable:** This the position the flight bar will used to place the block on the turntable before it is rotated.

- **Flight Bar slow to Pick-up Block after Rotation:** This is the position the Flight will start to slow down to pick up the black after they have rotated.

- **Flight Bar slow zone Width after Rotation:** This the Zone size used to keep the Flight bar in slow speed after it picks up the block.

- **Flight Bar Position to Start Slow at End of table:** This position will start the flight bar in slow speed at the end of the table as the bar goes down. This setting is used to help prevent the bar from chipping the bottom edge of the product.

- **Pallet Layer Hole Check:** The Hole check is a feature built into the cube editor software. This allow the machine to check to make sure the block turned on the screen when building a pattern is check at the end of the pattern maker table.

- **Flight Bar position to check for Hole Check:** This is the position that the machine uses to check the block for the Hole check Function.

Flight Bar Speed Control
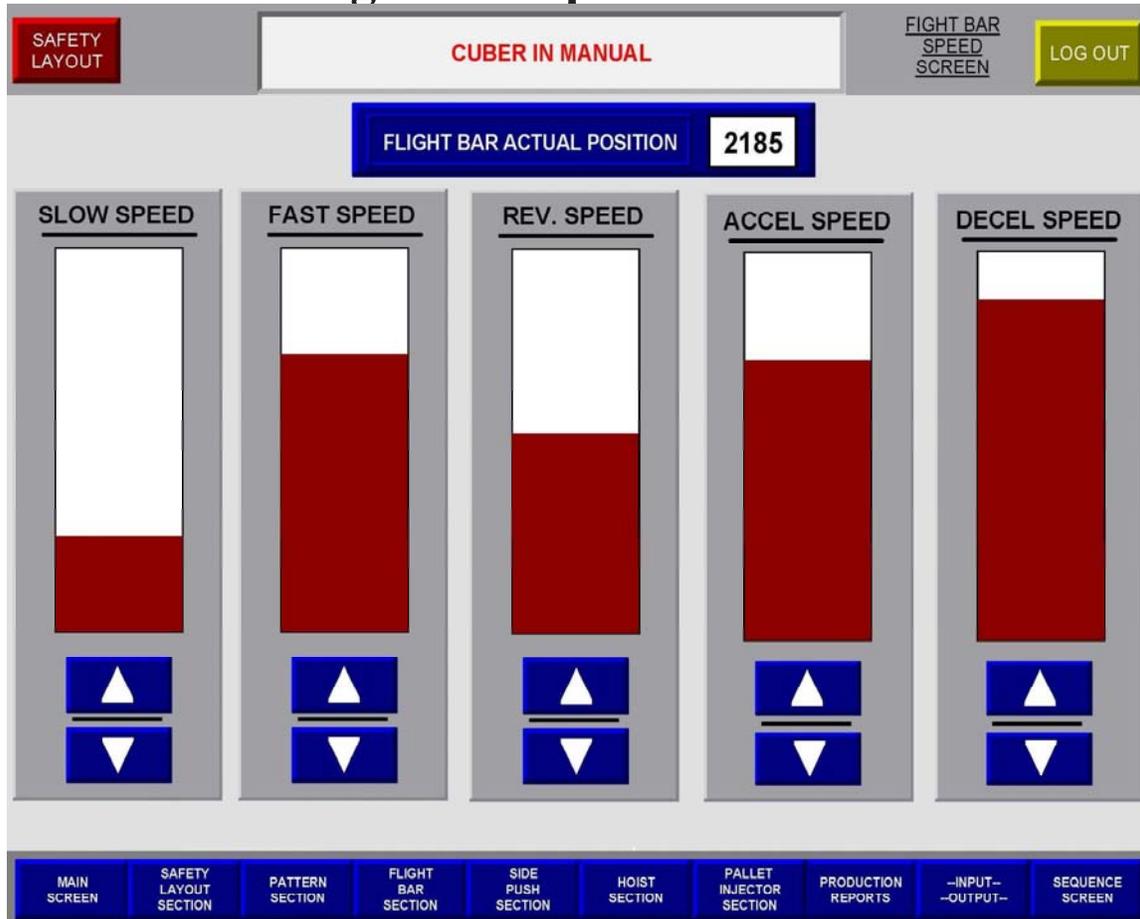
- **The Flight Bar Speed** is the setting used to adjust the pattern maker flight bar speed. The flight bar a proportional controlled valve this allows the bar to ramp up and ramp down. This screen gives the operator control of fast the machine needs to be to handle the product. There is a navigation Button on the bottom of the screen to get to the Flight bar section screen.

- **Flight Bar Actual Position:** The flight bar has an encoder position counter that feeds the controller the actual position the bar is in at all times. This value is displayed at the top of the screen as a reference to help adjust the positions of operation.

- **Navigation of the speed Screen:** At the bottom of each graph there is an arrow up and an arrow down. The up arrow will increase the speed of the function, and the down arrow will decrease to speed of the function.

- **Slow Speed:** The slow speed graph is the speed the flight bar used when operating in slow speed.

- **Fast Speed:** The Fast speed graph is the speed the flight bar used when operating in Fast speed.

- **Reverse Speed:** The Reverse speed graph is the speed the flight bar used when operating in Reverse speed.

- **Acceleration Speed:** The Acceleration speed graph is how fast the flight bar will accelerate to the required speed.

- **Deceleration Speed:** The Deceleration speed graph is how fast the flight bar will Decelerate to the required speed.

Side Pusher Section

- **The Side Pusher Section** is the setting used to adjust the Side Pusher. The Side Pusher is operating by an encoder position counter. The Side Pusher is also proportional controlled this allows the Pusher to ramp up and ramp down. There is a navigation Button on the bottom of the screen to get to the Side Pusher speed control and Side Pusher Stop Positions screens.

- **Side Pusher Actual Position:** The Side Pusher has an encoder position counter that feeds the controller the actual position the Pusher is in at all times. This value is displayed at the top of the screen as a reference to help adjust the positions of operation.

- **Side Pusher Roller Conveyor Run Time:** This timers is used to allow the roller to run after the product is clear of the Photocell at the end of the pattern maker table (this is also used as the Hole Check Photocell)

- **Position To Start Slow To Place Block On Table:** This Value is used by the controller to calculate when the pusher will start slow before reaching the current stop position. Example; If the pusher will push the row to 1800 counts, it will take the number From the slow to place block on table (75) and start to slow the pusher at 1725.

- **Side Pusher Slow Position When Running Reverse:** This Value is used by the controller to calculate when the pusher will start slow before reaching the reverse stop position. The pusher always returns to (0) when running reverse. The value entered will start slow when the side pusher position is less than this value.

- **Side Pusher Used as a Guide [on-off]:** The side pusher can be used as a guide when the layer pusher is moving the layer onto the hoist plate. This function is commonly used when the machine is interlocking retaining wall for handling odd shapes.

- **Side Pusher Guide Position For layer Pusher:** This value is the stop position for the side pusher when used as a guide for the layer pusher. Note: when adjusting this position be care full not to set value too high to prevent the layer pusher from catching the side pusher blade.

- **Side Pusher Maximum Forward Position:** This value is the maximum value the side pusher is allowed to move when traveling forward. This value is used in manual and Automatic operation. If there is any problem with the encoder on the side pusher this value may be used to override the forward operation to help correct the problem with the counter.

ENGINEERED SOLUTIONS

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Side Pusher Speed Control
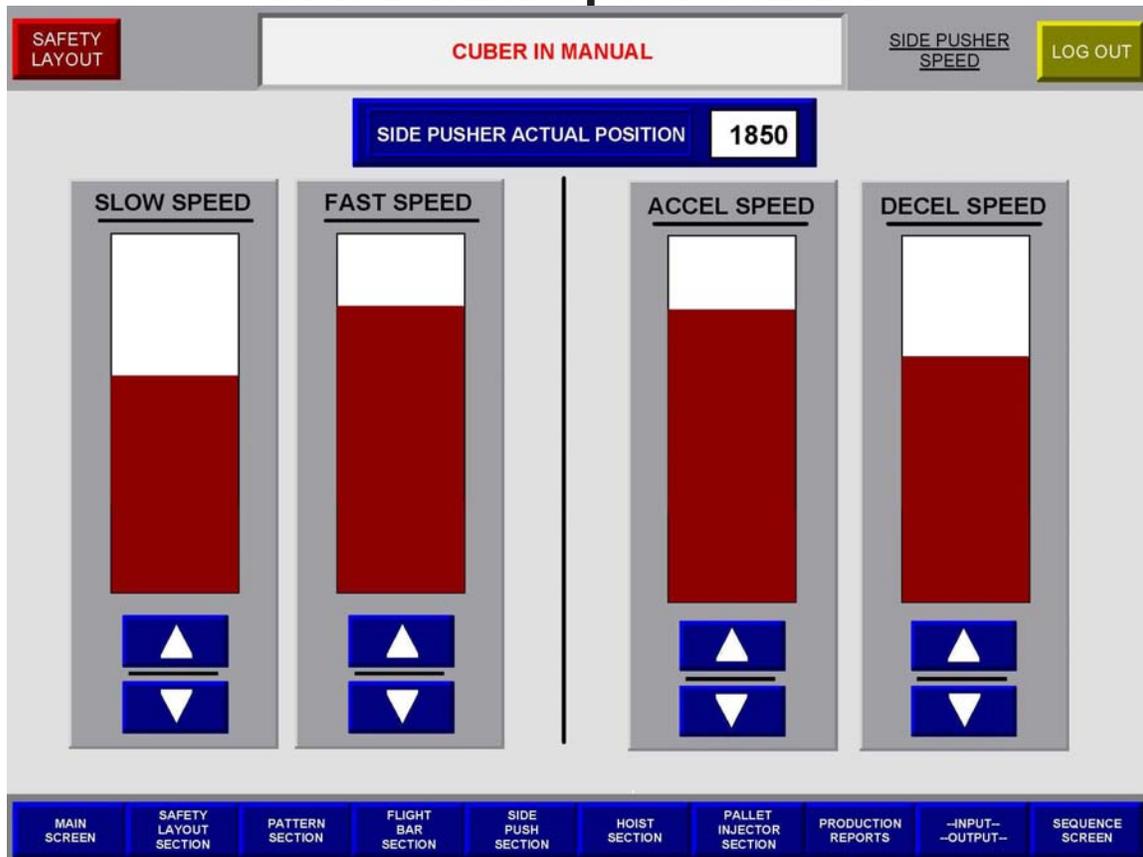
- **The Side Pusher Speed** is the setting used to adjust the pattern maker side pusher speed. The flight bar a proportional controlled valve this allows the bar to ramp up and ramp down. This screen gives the operator control of fast the machine needs to be to handle the product. There is a navigation Button on the bottom of the screen to get to the Flight bar section screen.

- **Side Pusher Actual Position:** The Side Pusher has an encoder position counter that feeds the controller the actual position of the Pusher is in at all times. This value is displayed at the top of the screen as a reference to help adjust the positions of operation.

- **Navigation of the Speed Screen:** At the bottom of each graph there is an arrow up and an arrow down. The up arrow will increase the speed of the function, and the down arrow will decrease to speed of the function.

- **Slow Speed:** The slow speed graph is the speed the Side Pusher used when operating in slow speed.

- **Fast Speed:** The Fast speed graph is the speed the Side Pusher used when operating in Fast speed.

- **Reverse Speed:** The Reverse speed graph is the speed the Side Pusher used when operating in Reverse speed.

- **Acceleration Speed:** The Acceleration speed graph is how fast the Side Pusher will accelerate too the required speed.

- **Deceleration Speed:** The Deceleration speed graph is how fast the Side Pusher will Decelerate too the required speed.

Side Pusher Stop Positions
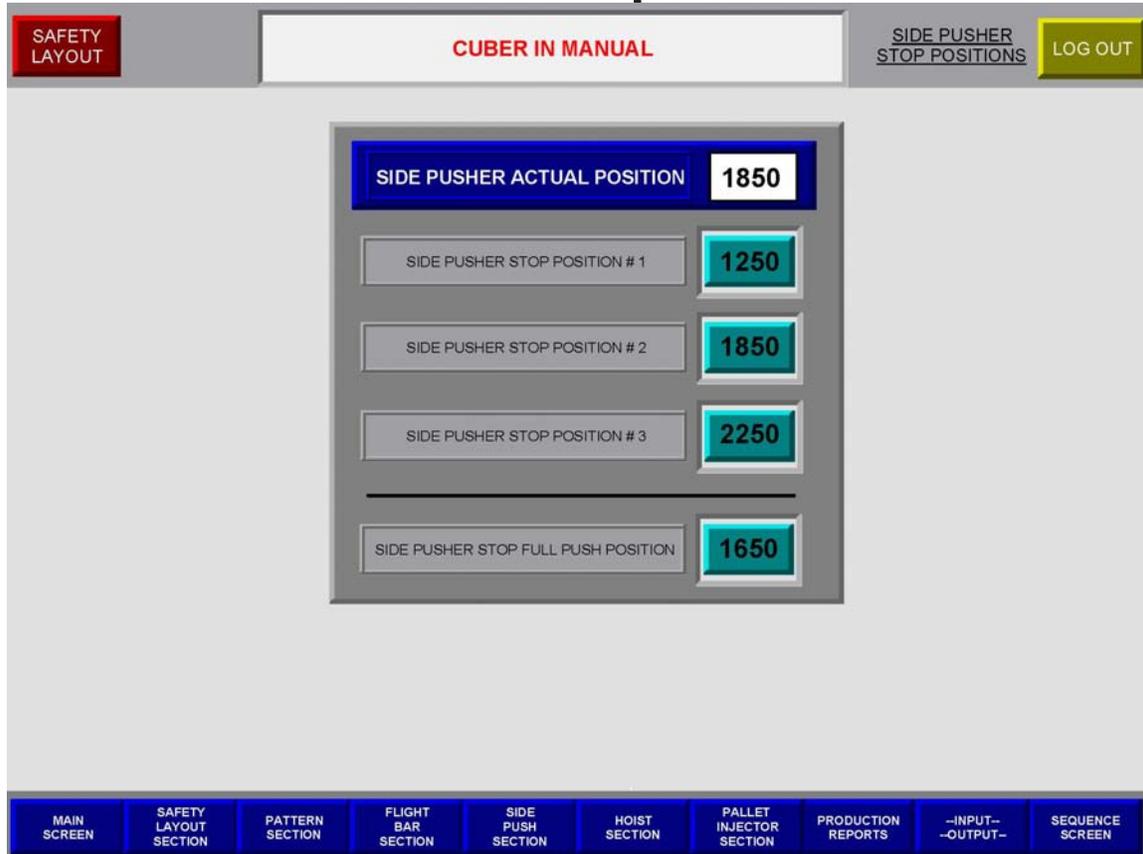
- **The Side Pusher Stop Positions:** The stop positions are used to control the forward position the side pusher will stop at in end cycle or (Row of Product). Each time the pattern sends the signal to the side pusher to cycle it also tells the pusher to what position the move the product to. The side pusher has 1 to 4 stop positions available to set in the cube editor. Ref to the cube editor manual for the setting the stops in the pattern

<u>Stop positions</u>
First   (1st stop on screen, default value)
Second (2nd stop on screen)
Third   (3rd stop on screen)
Last or full   (always used, last push of layer)

- **Side Pusher Actual Position:** The Side Pusher has an encoder position counter that feeds the controller the actual position the Pusher is in at all times. This value is displayed at the top of the screen as a reference to help adjust the positions of operation.

Hoist Sections

- **The Hoist Section** is the setting used to adjust the Hoist, Hoist Gate and Hoist Clamps. There is a navigation Button on the bottom of the screen to get to the Hoist gate and Hoist Clamps control screen.

- **Hoist Position Counter**: The Hoist also has a position counter that feeds the controller the actual position the hoist is in at all times. This value is displayed at the top of the screen as a reference to help adjust the position of operation.

- **Delay to Stop Hoist Going Up After Clearing Top of Cube:** This delay timer controller when the hoist stop after it clears the top of the cube with the new layer. As soon as the hoist is above the top of the cube it will start into slow speed, at that same time the timer will start. After it reaches the value it will then allow the stripper Plate to move forward.
  - **Increasing the Value:** Keeps the Hoist moving up slow longer after it is above the cube.
  - **Decreasing the Value:** Stops the Plate soon after the photocells is clear the top of the cube.

- **Delay to Stop Hoist Down at Top of Cube Stripper Plate Forward:** This delay timer controller the hoist moving down when the stripper plate is forward. This allows the hoist to move down to bring the stripper plate close to the top of the cube. Common setting brings the bottom of the stripper plate and the top of the cube about ½" to ¾" to the top of the cube.

When making adjustments to this value be care full not to increase the value to large and have the plate make contact with the top of the cube. This will cause the plate to pull back the cube toward the hoist frame.

- **Increasing the Value:** Moves the Plate closer to the top of the cube.
- **Decreasing the Value:** Keeps the Plate further from the top of the cube.

- **Delay to Stop Hoist Moving Down to Set Layer on Cube:** This delay timer controls the hoist moving down to set the layer on the cube. After the stripper plate moves reverse and the layer is still clamped the hoist will move down in slow speed until the delay timers is complete. Then the clamps will open and finish cycle.
  - **Increasing the Value:** Moves the Layer closer to the cube.
  - **Decreasing the Value:** Keeps the Layer further from the top of the cube.

Hoist Clamps

- **The Hoist Clamp Section** is the setting used to adjust the Hoist, Hoist Clamps. There is a navigation Button on the bottom of the screen to get to the Hoist section.

- **Hoist Position Counter**: The Hoist also has a position counter that feeds the controller the actual position the hoist is in at all times. This value is displayed at the top of the screen as a reference to help adjust the position of operation.

- **Hoist Clamps [on-off]:** This function will turn the clamps on and off. Some products because of there shape will be better if clamps are turned off. Other product may get chipped form the clamps. Also if you want to off set the layer it may be an option to use.

- **Hoist Clamps Use as a Guide [on-off]:** This button will turn on and off the guide function. Some products because of the shape will be better if clamp go in but not clamp the product. Other product may get chipped from the clamps.

- **Hoist Clamps Hold Layer [on-off]:** This Button turns on and off the hold Function. The hold Function will clamp the Layer and not stop on the switch. The only control to the operator will be the hydraulic bypass setting on the valve. Some of the retaining wall or heavy products use this option.

- **Re-clamp Base Layer [on-off]:** This Button will turn on and off the re-clamp base layer function. This function is used to re clamp the base layer after it is set on the wood pallet. After the layer is set on the pallet the normal cycle will happen, when the hoist is completely down the clamps cycle will re clamp and make the product square up on the pallet.

- **Delay to Stop short clamp on guide switch:** This delay timer controller when the short clamp will stop clamping after the switch is triggered.
  - **Increasing the Value:** will allow the short clamp moving in longer [increase hold]
  - **Decreasing the Value:** will allow the short clamp moving in sooner [decrease hold]

- **Delay to Stop Long clamp on guide switch:** This delay timer controller when the long clamp will stop clamping after the switch is triggered.
  - **Increasing the Value:** will allow the long clamp moving in longer [increase hold]
  - **Decreasing the Value:** will allow the long clamp moving in sooner [decrease hold]

- **Delay to Stop short clamp on Hold switch:** This delay timer controller when the short clamp will stop clamping after the switch is triggered.
  - **Increasing the Value:** will allow the short clamp moving in longer [increase hold]
  - **Decreasing the Value:** will allow the short clamp moving in sooner [decrease hold]

- **Delay to Stop Long clamp on Hold switch:** This delay timer controller when the long clamp will stop clamping after the switch is triggered.
  - **Increasing the Value:** will allow the long clamp moving in longer [increase hold]
  - **Decreasing the Value:** will allow the long clamp moving in sooner [decrease hold]

Hoist Gate Settings

- **The Hoist Gate Section** is the setting used to adjust the Hoist, Hoist Gate. There is a navigation Button on the bottom of the screen to get to the Hoist section.

- **Hoist Down Delay Timer:** This delay timer controller when the Hoist Gate will stop going down after the switch is triggered.
  - **Increasing the Value:** will allow the Hoist gate to move down longer.
  - **Decreasing the Value:** will stop the Hoist gate to moving down sooner.

- **Hoist Gate Off Set [on-off]:** This button will turn on and off the Hoist gate off set function. The hoist gate off set is used to off set the back of the cube with the gate. Some products the layers are not square after they are built. This function allows the operator to center the layers on the cube.

  By turning on this function each layer will follow the off found in each Hoist Gate Off Set Layer #. This value will allow the gate to close in a different position pre layer.

Diagnostic Section

- The PSC 300 is a Fully Automatic Machine. The machine uses a (PLC) Programmable logic controller to handle all of its operations. The controller is given a program by Columbia Machine to control all of the Sequences of operations. The controller controls all the movements of the machine by sending out signal to the hydraulic system, electric system, and the Pneumatic system. The Controller receives signal back from the sensors of the current positions of the movements of the machine.

- Columbia Machine has designed the HMI to provide the operator the ability to monitor adjust the machines program. From the main screen of the HMI is a navigation button labeled Sequence screens. Also from the main screen is the Input and output navigation button. It is important for the operator to always read and understand that adjusting the operation of the sequence of operation could damage the machine if the product is not clear. The operator should take the time to under the machines sequence before adjusting. The machines sequence can be adjusted in Automatic or in Manual Mode. The last VERY IMPORTANT always for all safety lock out tag out procedures before enter inside the machines safety guarding.

Sequence Screen

- The main sequence screen is like a index of the systems sections. Like the navigation button on the main screen this screen also has navigation buttons. The Navigation button will take the operator to different sequence sections of the machine. Each section of the machine has its own sequence of operation. Also on this screen is the current sequence of operation. There is also navigation button to bring the operator to the desired section of operation. Again the machine is operating by sequence of operation

Sections of the Machine
- FLIGHT BAR SECTION
- SIDE PUSHER SECTION
- HOIST SECTION
- PALLET INJECTOR SECTION

Pattern Maker Sequence

PATTERN MAKER SEQUENCE

0	PATTERN MAKER SHIFT PLATE MOVE REVESRE WAIT FOR PRODUCT
ON	PATTERN MAKER IN AUTOMATIC
ON	BLOCK AT PATTERN MAKER ON MIDGET ROLLS
1	LOAD PATTERN MAKER WITH PRODUCT
OFF	PATTERN MAKER IN AUTOMATIC
ON	SHIFT PLATE IN REVERSE POSITION

PHOTO CELL 1 2 3 4 5
OFF OFF ON ON OFF

| 2 | INFEED REVERSE FOR LARGE PRODUCT (IF TURNED ON) |
| ON | INFEED REVERSE ON/OFF |

2000 ← EQUAL → 1000

3	PATTERN SHIFT PLATE MOVE FORWARD
OFF	SHIFT PLATE FORWARD
4	PATTERN MAKER FLIGHT BAR REMOVE BLOCK
ON	FLIGHT BAR CLEAR SHIFT PLATE

ADJUST SEQUENCE 1

| MAIN SCREEN | INFEED SECTION | FLIGHT BAR SECTION | SIDE PUSH SECTION | HOIST SECTION | PALLET INJECTOR SECTION | SIDE PUSHER SEQUENCE | HOIST SEQUENCE | PAL. INJECTOR SEQUENCE | SEQUENCE SCREEN |

- This is the screen for the pattern maker. The pattern maker controls the incoming of the product into the cuber. The cycle on this section starts at 0 and ends at 4 then returns to 0. The bottom right is the location to adjust the sequence when the trouble shooting a problem. The machine is using the different switches to move through the sequence of operation. The screen is operating directly off the controller program.

Side Pusher Sequence
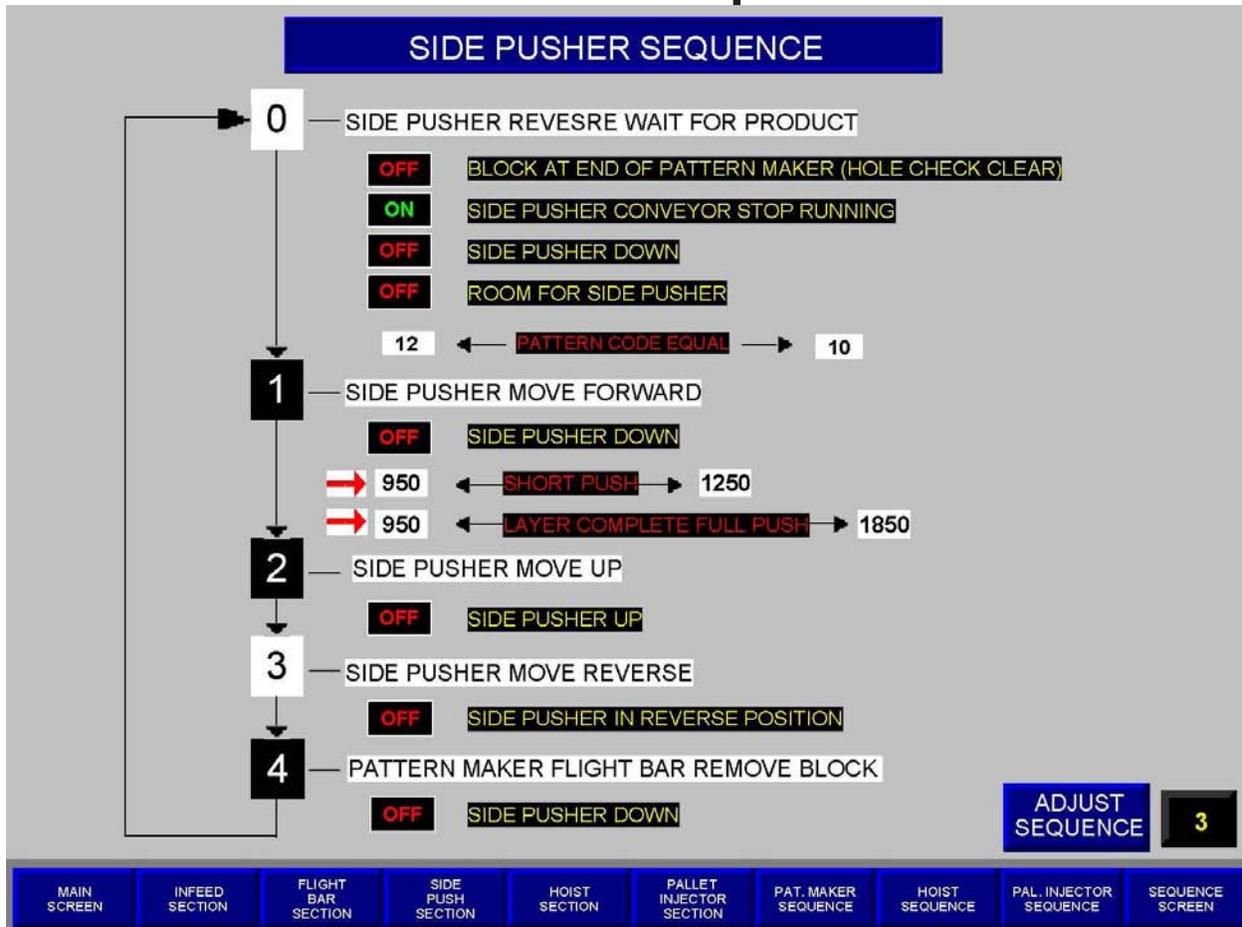
- This is the screen for the Side pusher. The side pusher controls the moving of the rows of block from the pattern maker to the layer pusher table. The cycle on this section starts at 0 and ends at 4 then returns to 0. The bottom right is the location to adjust the sequence when the trouble shooting a problem. The machine is using the different switches to move through the sequence of operation. The screen is operating directly off the controller program.

Hoist Sequence
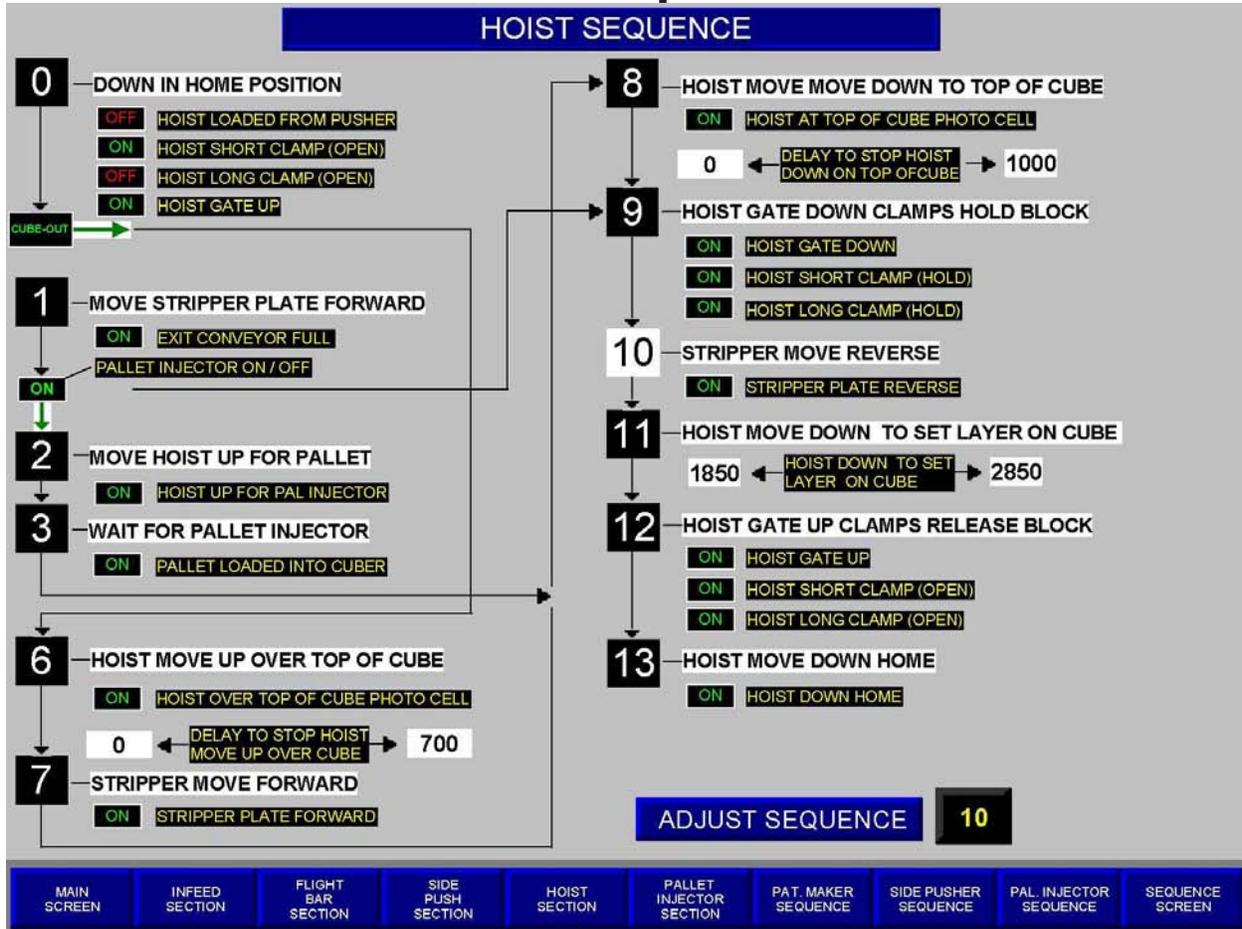
- This is the screen for the Main Hoist. The main hoist controls the building of the layers of cube. The cycle starts after the layer pusher places the layer on the hoist. The cycle on this section starts at 0 and ends at 13 then returns to 0. The bottom right is the location to adjust the sequence when the trouble shooting a problem. The machine is using the different switches to move through the sequence of operation. The screen is operating directly off the controller program.

Pallet Injector Sequence
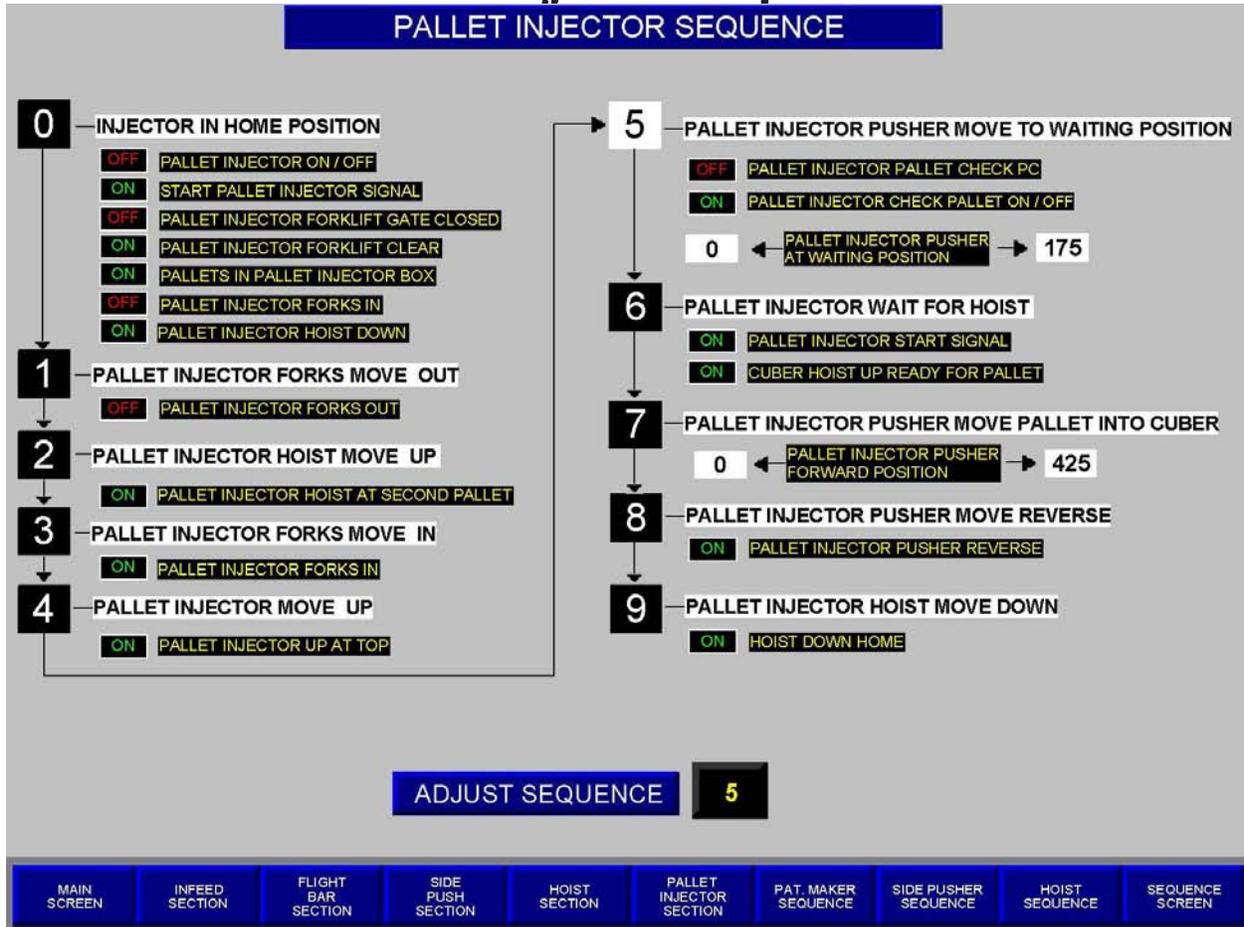
- This is the screen for the Pallet injector. The pallet injector controls the placing of the pallet into the cuber. The cycle on this section starts at 0 and ends at 9 then returns to 0.the bottom right is the location to adjust the sequence when the trouble shooting a problem. The machine is using the different switches to move through the sequence of operation. The screen is operating are directly off the controller program.

Input Cards

- This is one of the Input screens on this machine. Understanding on how to read and follow the input card is very important in trouble shooting a problem on the machine. When the operator is working on a problem this screen can make is easier to check the status of an input without using a meter or without opening the safety gate and stopping the machine. The input and output screens are Read Only.

Output Card
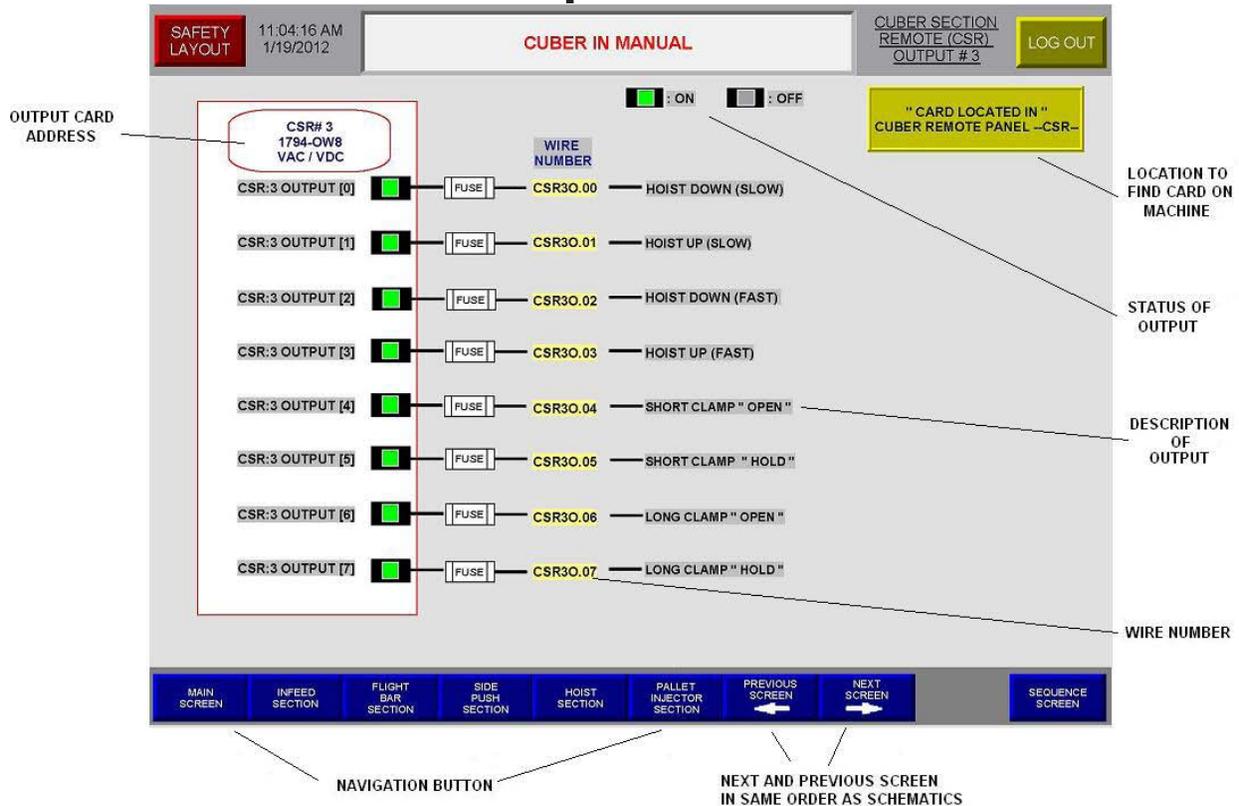
- This is one of the Output screens on this machine. Understanding on how to read and follow the Output card is very important in trouble shooting a problem on the machine. When the operator is working on a problem this screen can make is easier to check the status of an output without using a meter or without opening the safety gate and stopping the machine. The input and output screens are Read Only.

Columbia Machine

Cube Editor

User's Manual

Table of Contents

1   Introduction

1.1   Overview

The Columbia Machine Cube Editor is the software tool to be used in the creation of patterns for the Automatic Series Cuber. Its intuitive and simple interface allows user to easily create cube patterns and transfer them to the Machine for execution.

The present manual covers the description, and use of the Cube Editor.

1.2   Scope of this document

The main objective of this document is to assist the user of the Columbia Machine Cube Editor.

☐   The Manual shows step by step how to use the Cube Editor.
☐   Known problems, workarounds and fault tracing are covered in the fourth part.

This document is designed to be as graphical as possible to ensure that users be rapidly familiar with the software.

Columbia Machine has put great efforts into the creation of this manual to ensure it is detailed, complete and accurate. However, if you find any error or omission, please contact your Columbia representative so that they can be corrected promptly.

2   Description of the Columbia Cube Editor

2.1   General Description

This software allows a user to perform the following tasks:

☐   Create new cube patterns
☐   Create different designs for cube layers, using different type of tiers and blocks
☐   Download the patterns to the Cuber, through the Cuber PLC
☐   Specify different loading sequence to the Cuber

2.2   Minimal Requirements

The Columbia Cube editor is designed to run under the Windows 98, Windows NT, Windows 2000 or Windows XP operating systems.

2.3   Ways to Use the Cube Editor

The Columbia Machine Cube Editor Software is designed to work with a many different PLC programs. The Machines program takes the data that the software make and uses it to create the pattern.

2.4   Control over the Machine

It is important to understand that the cube editor does not control the operation of the machine. It just makes the data for the pattern.

Important information before you start making patterns

1)   Build Patterns that will fit in the machine.
2)   Build the patterns to allow the machine to take as many block into the pattern maker as possible.
3)   When Naming your pattern use common names 6"reg, 8" Lite Weight , 4" solids.
4)   Build the main pattern first into the cube editor.
5)   Use the copy Function as often as possible.
6)   Print each pattern and save paper to file. Also print a copy to have at the Panel.
7)   When using the print function try to print the pattern with the steps.
8)   Save the most commonly used patterns into the Machines Controller

3   Using Cube Editor

Shown below is an overview of the Cube Editor environment.
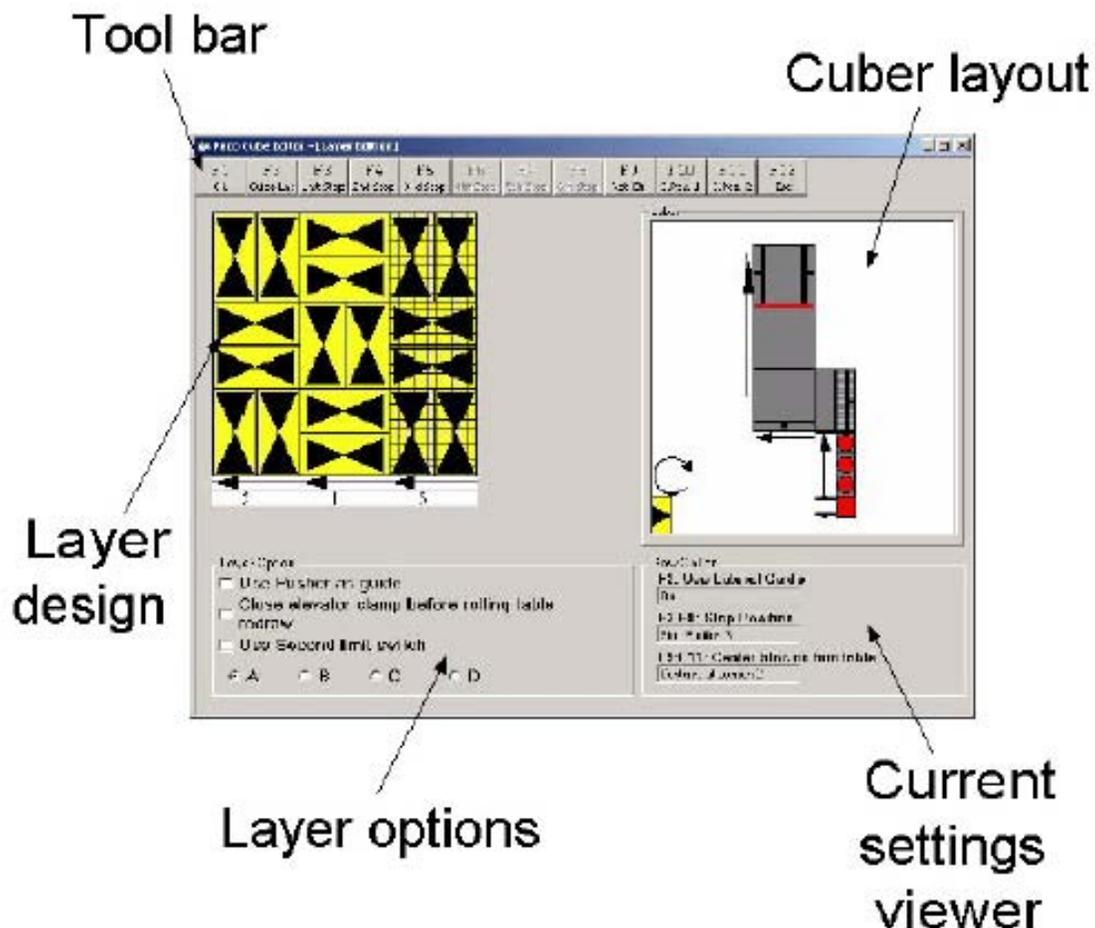
Figure 3.1 - The Cube Editor environment

3.1   Main Screen

When you start the Columbia Machine Cube Editor, you will be presented with the main screen, shown in figure 5.2.
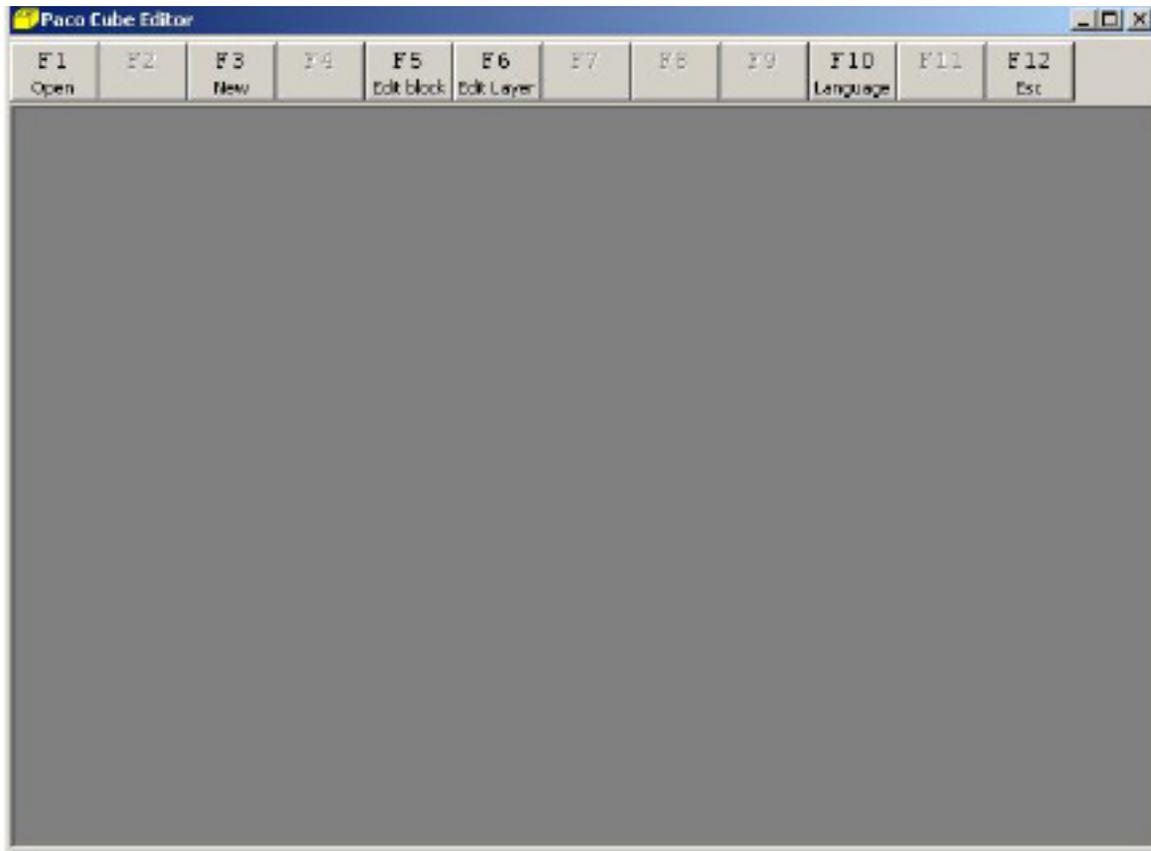
Figure 3.2 - Main screen

When the form is resized, the content of the window will be resized by a factor equal to the form's resize ratio. However, the menu bar's size doesn't change.

At this point, you can either

-      Open an existing Cube pattern (Open - F1)
-      Create a new Cube pattern (New - F3)
-      Edit a Block (Edit Block - F5)
-      Edit a layer (Edit Layer - F6)
-      Change language (Language - F10)
-      Exit Cube Editor (Esc - F12)

3.1.1 Selecting the "Open (F1)" option from the Main Screen

If the user selects "Open", he will be presented with this screen where he can visualise the existing cube patterns.

☐ Id: identification number for a particular pattern
☐ Description: short description of the pattern
☐ Block name: name of the type of block used for that pattern
☐ W: the blocks' width
☐ H: the blocks' height
☐ L: the block's length
☐ Nb Layer: number of layer in that pattern
☐ Pallet Name: name of the pallet type used in that pattern
☐ X: pattern's dimension for the X axis
☐ Y: pattern's dimension for the Y axis

Figure 3.3 - Opening an existing cube pattern

☐ To open an existing cube pattern, select the appropriate line and click Ok (F1) from the toolbar. The cube editor window will open next. There, you can edit all the layers for that particular pattern.
☐ To delete a cube pattern, select the appropriate line and click Delete (F7) from the toolbar.
☐ To go back to the main screen, click Esc (F12) from the toolbar.

3.1.2 Selecting the "New (F3)" option from the Main Screen

This option allows you to create a new pattern from scratch where you can design each layer for the cube. See Section 5.2 for complete details on how to create a new pattern.

3.1.3 Selecting the "Edit Block (F5)" option from the Main Screen

This option allows you to edit an existing block pattern. You will be presented with the Block Selection dialog box from which you select the appropriate block pattern. See Section 5.2 for complete details on editing blocks.

3.1.4 Selecting the "Edit Layer (F6)" option from the Main Screen

This option allows you to edit an existing layer. You will be presented with the Tier Selection dialog box from which you select the appropriate block pattern. See Section 5.2 for complete details on editing layers.

3.1.5 Selecting the "Language (F10)" option from the Main Screen

This option allows you to switch between available languages for the Cube Editor. The Select Language window will appear, from which you select the desired language.

Figure 3.4 - Select Language window

3.1.6 Selecting the "Esc (F12)" option from the Main Screen

To quit the Columbia Machine Cube Editor, press Esc (F12). A confirmation window will appear. Click Yes to quit the application. All non-saved designs are lost when quitting the application.

3.2 Creating or editing a layer

3.2.1 Steps for creating or editing new layer

This section presents the steps to follow for creating a new cube pattern.

- From the main screen, press New (F3).
- The following screen displays the existing tiers (or layers). When no tier exists, the list is left blank and a new tier must be created to continue. Each line contains the tier's ID, name, and size according to the X and Y axis.
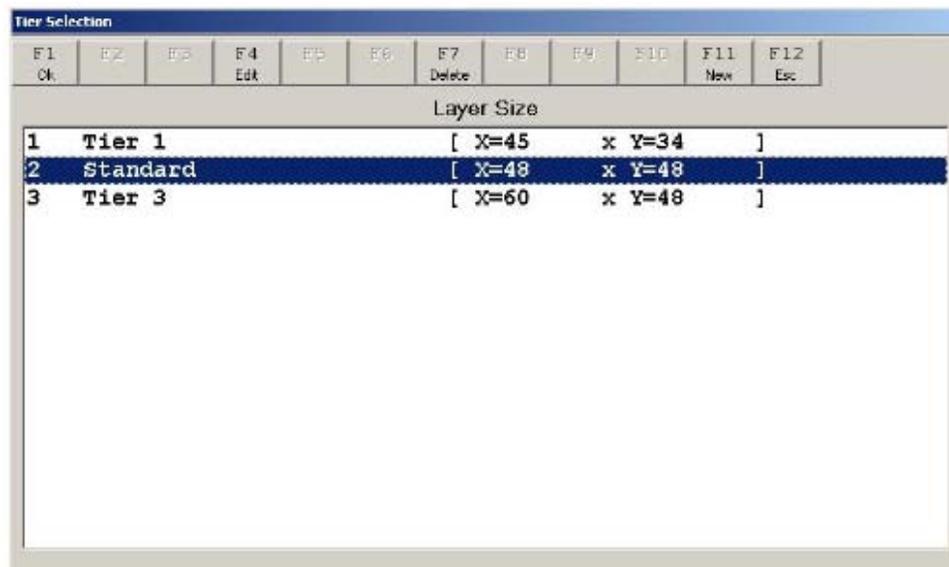
Figure 3.5 - Tier Selection window

If you want to create a new tier, press New (F11). See Section 5.4 for further explanations on how to create a new tier.

To go back to the main screen, press Esc (F12).

☐   Select the appropriate tier.
☐   Press OK (F1).
☐   The following screen displays the available blocks. If no block exists, the list is left blank and a new block must be created to continue.
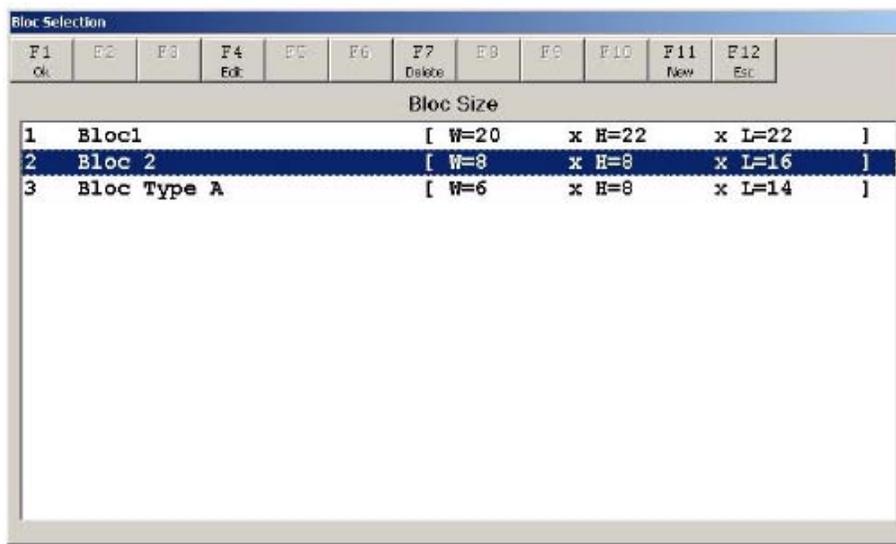
Figure 3.6 - Block Selection window

If you want to create a new block, press New (F11). See Section 5.4 for further explanations on how to create a new block.

To go back to the main screen, press Esc (F12).

☐   Select the appropriate block.
☐   Press OK (F1)
☐   The following window will appear. If you want to use the Pre-Pattern Maker option, click Yes.
See Section 5.5 for detailed explanations on using the Pre-Pattern Maker.
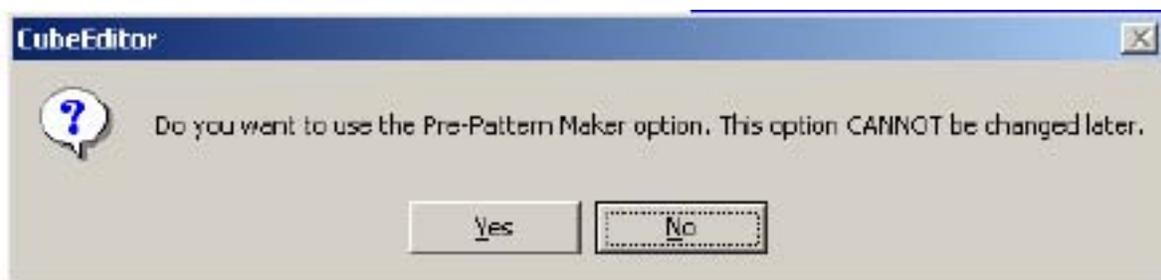
Figure 3.7 - Pre-Pattern Maker window

◻ The following screen appears next. Cube Height indicates the current height for the cube and Maximum Cube Height indicates the maximum possible height for the cube (values are in inches).
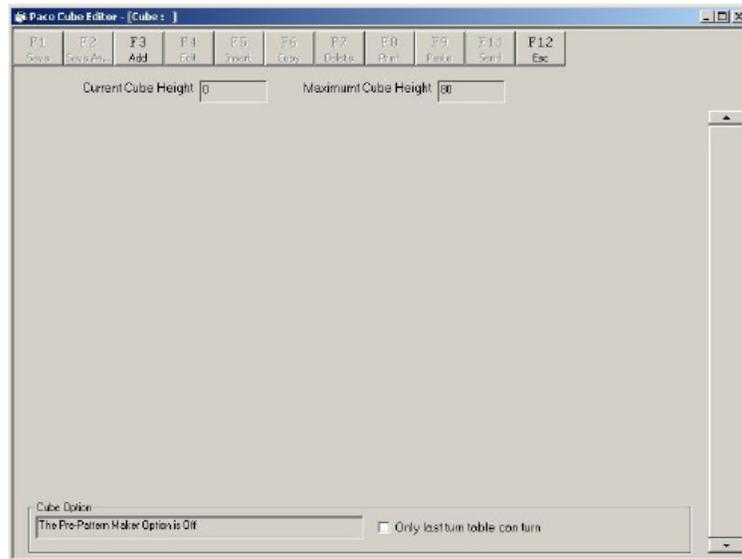
Figure 3.8 - Cube editor

To go back to the main screen, press Esc (F12).

◻ In the Cube Option frame at the bottom, you can see whether the Pre-Pattern Maker option is On or Off.
◻ If you wish that only the last turntable be turned, check the check box on the right. Some patterns require this option to be enabled.
◻ To add a new layer to the cube, press Add (F3).
◻ The Layer Edition screen will be displayed.
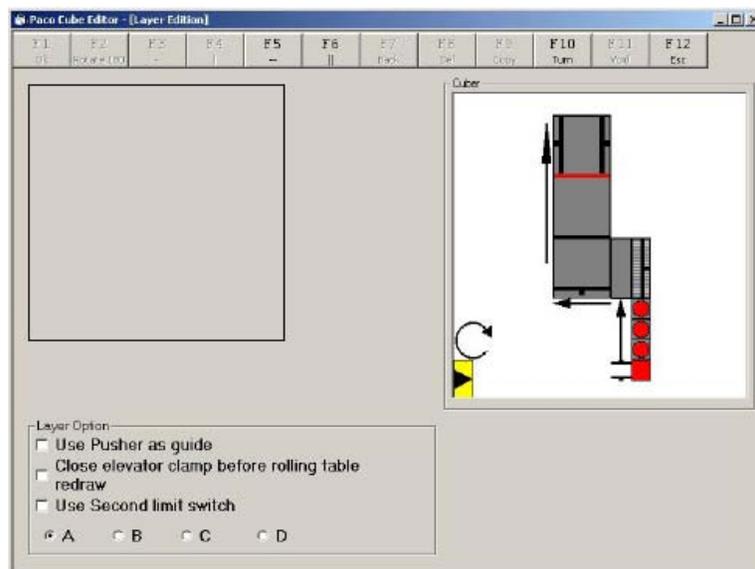
Figure 3.9 - Layer edition (Example 1)

☐ The frame at the bottom of the screen contains possible settings that can be applied to the current layer. Here are the possible options:

Use Pusher as guide. When this option is selected, the Side Feed Pusher will be used as a lateral guide when the Tier Pusher pushes a layer onto the elevator.

Close elevator clamp before rolling table redraw. Select this option to make sure all the blocks are hold still when the rolling table redraws.

Use the second limit switch. It is possible to specify two stop position for the elevator clamps. This option specifies the second position.

Two examples, using different settings for the Cuber, will be used to explain the layer creation.

EXAMPLE 1

For the following screen, the current settings in the Cuber.ini file indicate that blocks will be added in columns instead of rows.

☐ IncomingAngle = 1, which means that the loading clamps are located at the left of the loader i.e. the blocks will be inserted vertically into the Cuber. It is then possible to turn the blocks using the turntables.

☐ Transformation = 1, which means that series of blocks will be coming from the bottom and that the Side Feed Pusher will be needed to push the blocks onto the layer space. Thus, blocks are added to the layer in columns.

☐ TurntableRotation = 0, which means that the turntables rotation direction is clockwise.
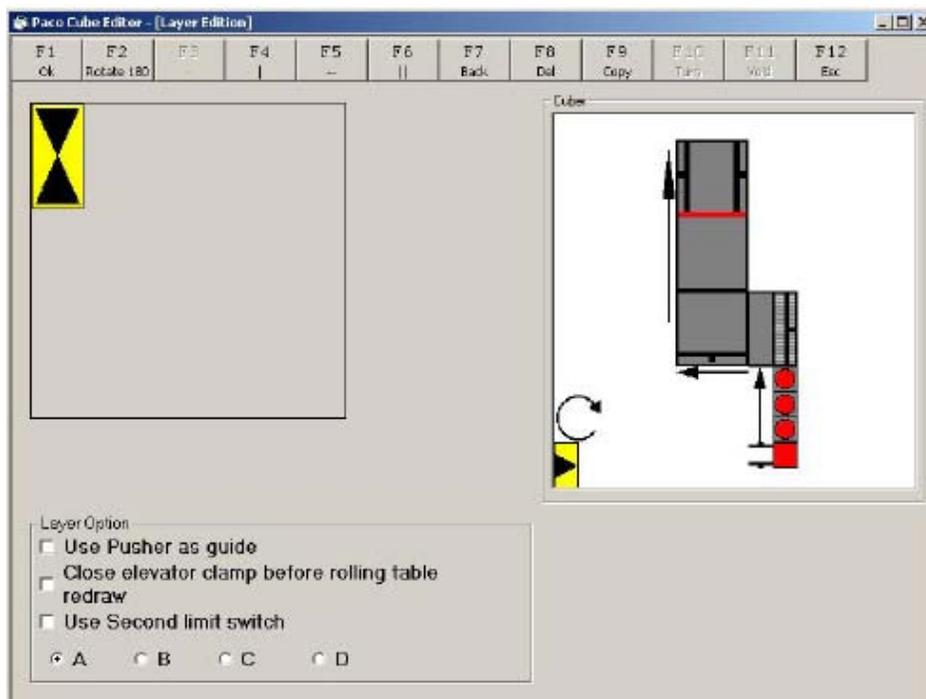
Figure 3.10 - Layer edition, blocks added in columns (Example 1)

☐   To add a new horizontal block [image] , press -- (F5).

☐   To add a new vertical block [image] , press || (F6).

☐   To add a new vertical block next to another vertical block while remaining in the same column, press | (F4). You can add up to 2 other blocks next to an existing one. This option is available only if a vertical block has just been inserted. The next screen shows an example for a column.

☐   Here is an example of a complete column for this example.
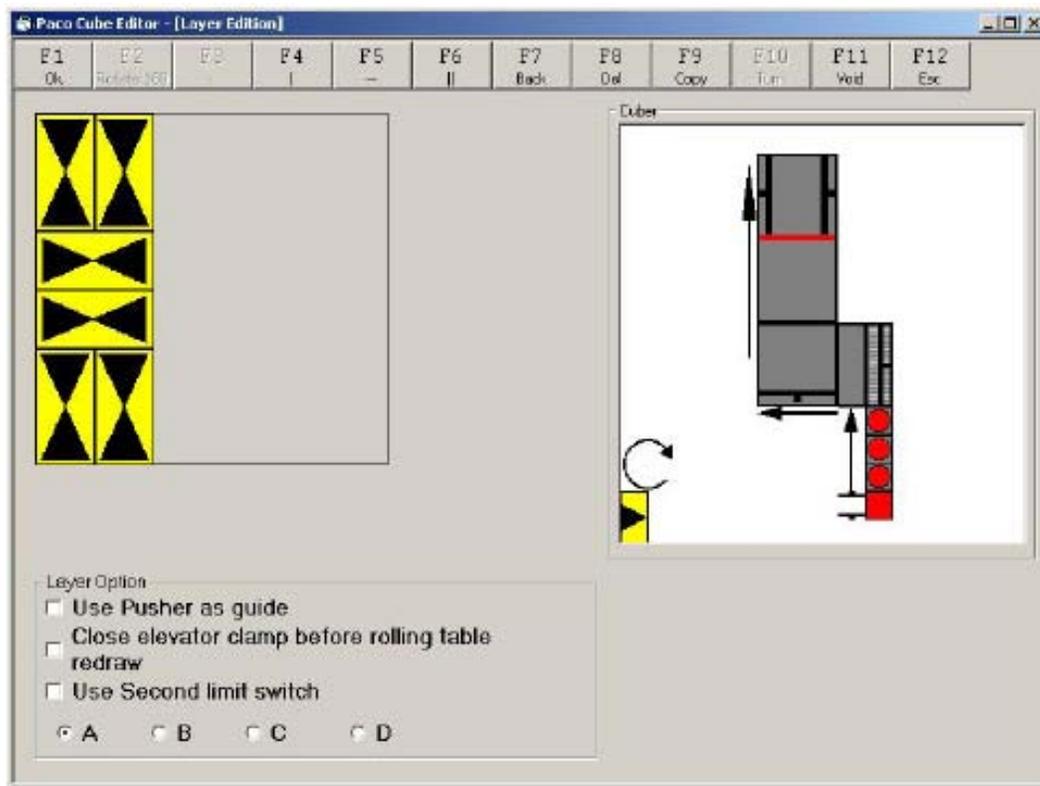
Figure 3.11 - Layer edition, complete column (Example 1)

EXAMPLE 2

Here is another example of a layer creation, using different settings.

☐   Incoming angle = 3, which means that the loading clamps are at the bottom of the loader i.e. the blocks are loaded horizontally into the Cuber. Again, the blocks can then be turned using the turntables.

☐   Transformation = 2, which means that series of block will be coming form the left. Thus, no Side Feed Pusher is required to push them onto the layer space so they will be added in rows.

☐   TurntableRotation = 0, which means that the rotation direction for the turntables is clockwise.
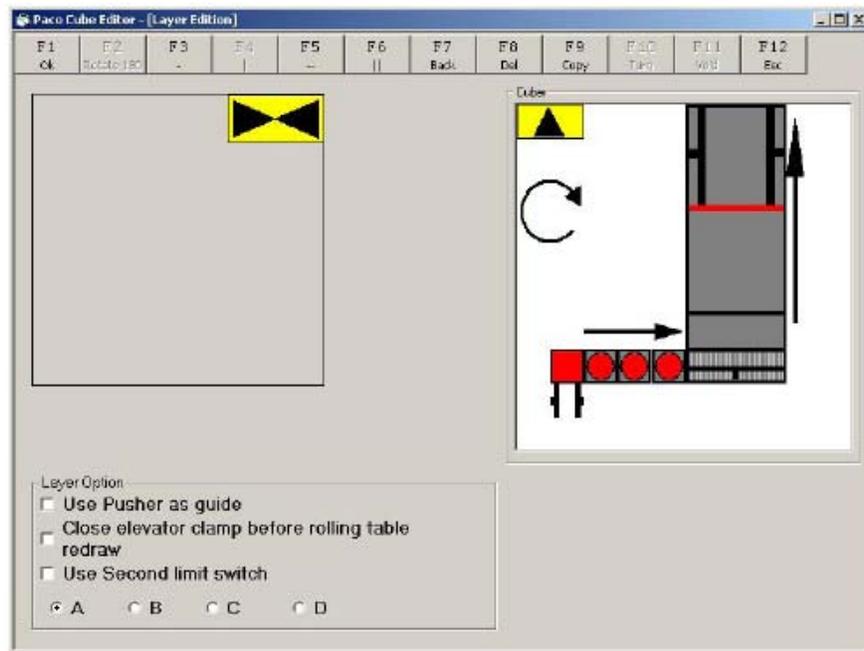
Figure 3.12 - Layer edition, blocks added in rows (Example 2)

☐ To add a new horizontal block under another horizontal block while remaining in the same row, press - (F3). You can add up to 2 other blocks under an existing one. This option is available only if a horizontal block has just been inserted.

☐ The next screen shows a complete row.
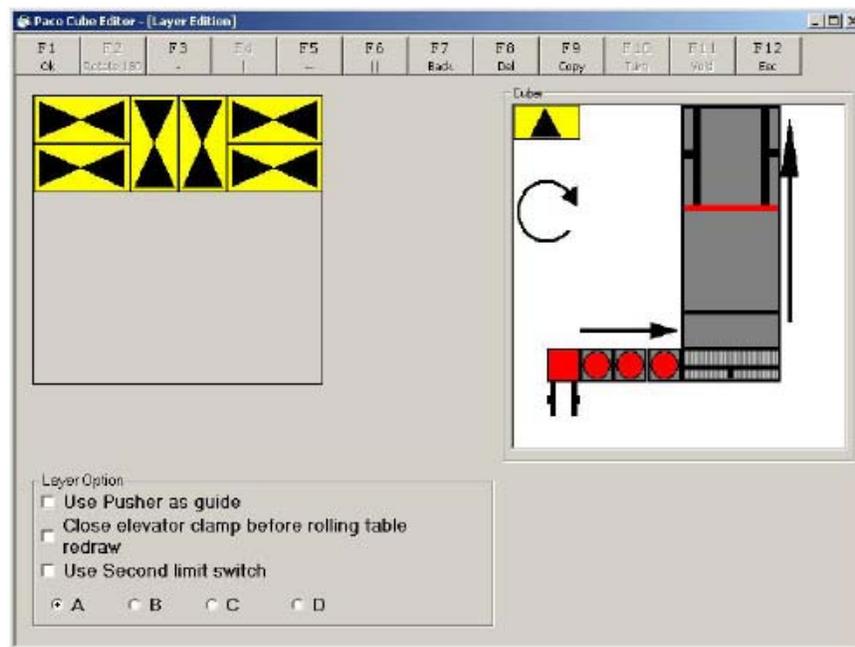
Figure 3.13 - Layer edition, complete row (Example 2)

For specific blocks, rotation can be enabled. Rotation is used when non-symmetric blocks must be placed in a way that wouldn't be possible using the normal rotation process. When this option is enabled, the block is rotated 180 degrees more than usual in order to match the appropriate pattern.

☐   To specify that a block will be rotated 180 degrees, press Rotate 180 (F2). Rotation can be applied only to the current block, one block at a time. The block will be marked with a 180.

☐   To delete the last inserted block, press Back (F7).

☐   To delete a column, press Del (F8). A conformation window will appear. Press OK to confirm deletion. The last edited column will be deleted.

☐   To copy a column, press Copy (F9). The last edited column will be copied to the next available space for a column. If not enough space is available for a column to be copied, the Copy button will be disabled.

☐   To turn over a block, press Turn (F10). This option is only available at the beginning of the layer edition for the entire blocks of the layer must be turned. Shown here is the representation for a turned block. A turned block is pivoted around its X axis.
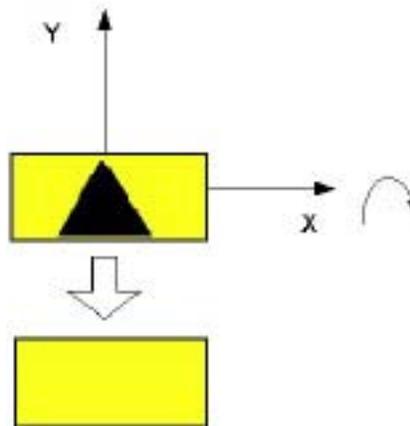
Figure 3.14 - Pivoted block

On screen, this gives you the following results for the horizontal and the vertical blocks.

It is possible to insert an empty space, or void, between columns, in order to match a specific pattern.

☐ To insert a void in the layer, press Void (F11). This option is only available when inserting columns.

After pressing Void (F11), the following screen appears.
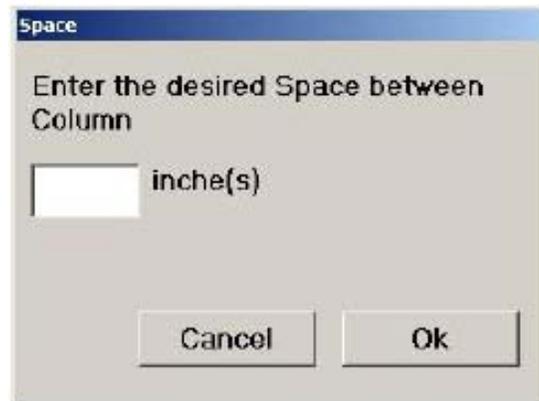
Figure 3.15 - Void dialog window

Enter the desired width for the void in inches and press OK.
A void is inserted in the layer.
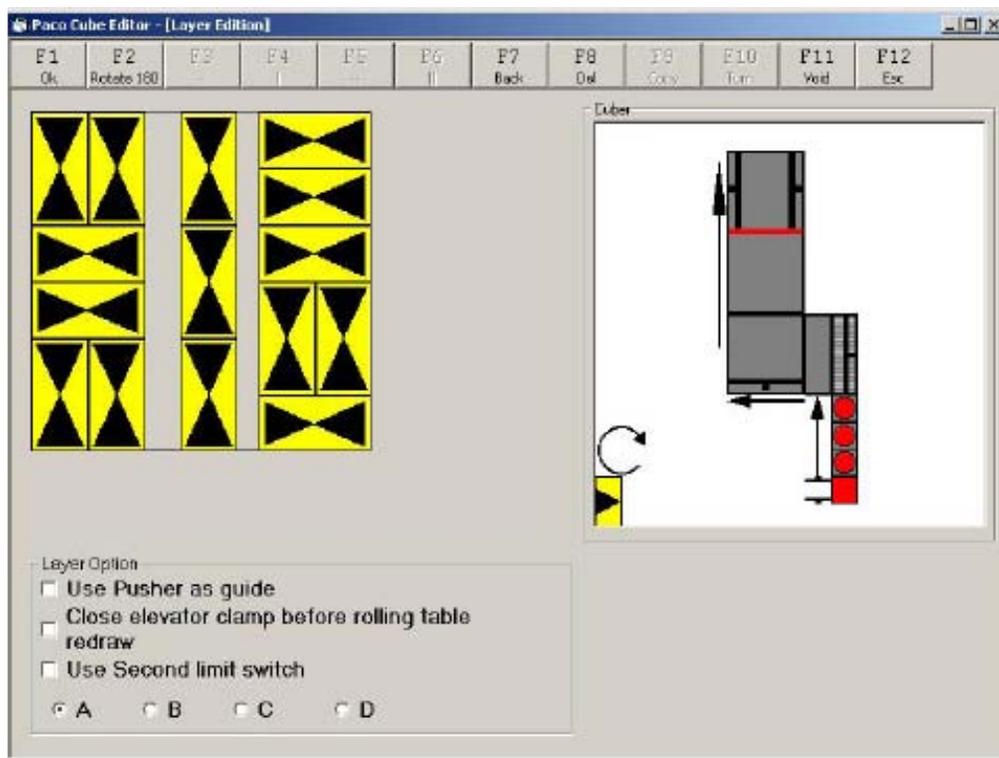
Figure 3.16 - Layer edition, void insertion

☐ To accept the current layer design, press OK (F1).

☐ To go back to the Cube Editor screen, press Esc (F12).

3.2.2   Applying settings to a layer

After creating a new layer, further settings can be applied to the layer. The following screen shows the possible settings that can be applied to the layer. Settings are applied to each row or column. Settings are always applied to the current selected row or column. The current selected row or column is covered with a grid.
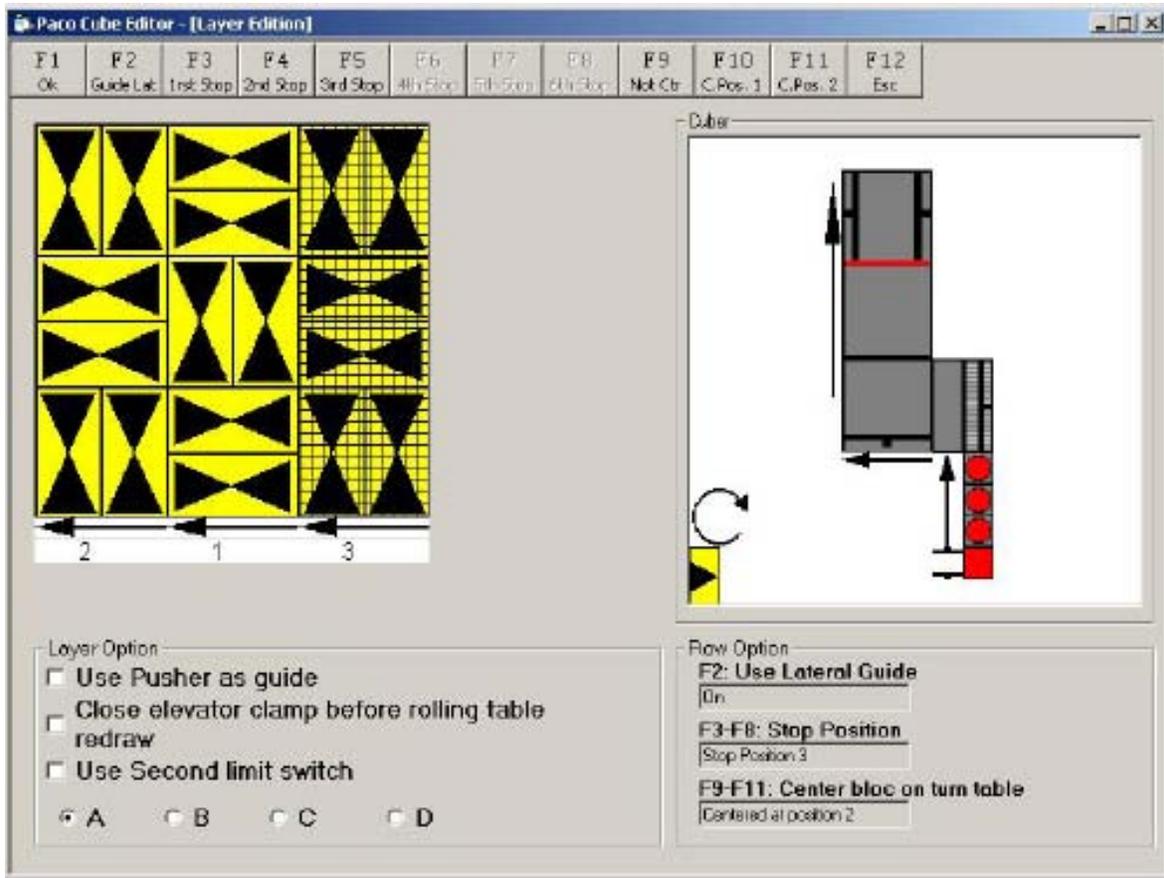
Figure 3.17 - Layer edition (applying settings)

☐   To enable the use of the lateral guide, press Guide Lat (F2). The text in the F2: Use Lateral Guide text-area will change from Off to On. Press Guide Lat (F2) to keep switching between both values.

☐   To set the Side Pusher Stopping Positions, select between first, second or third position (F3 thru F8).

☐   When the layer is completed, press OK (F1). You will be presented with the Cube Editor section where you can add multiple tiers to a block. See section 5.3 for further details on how to create or edit a new cube.

3.3   Creating a new cube

3.3.1   Creating a new cube
 □   After you created a new layer, the Cube Editor screen appears.
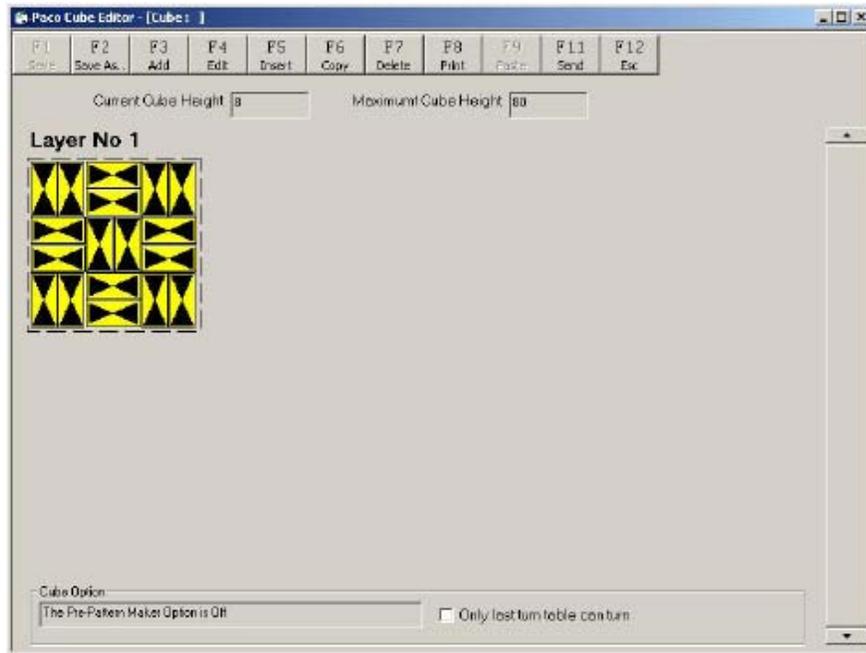
Figure 3.18 - Creating a cube pattern

 □   When you create new layers, they will be added here.
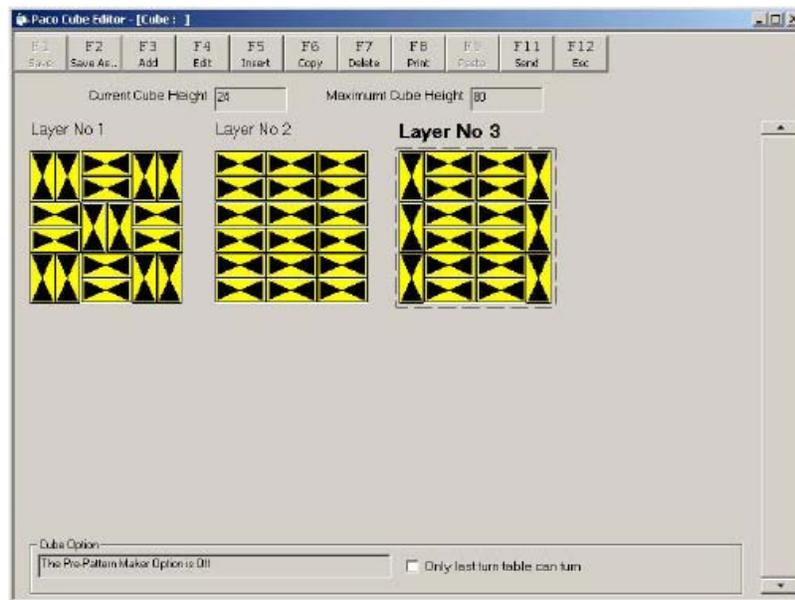
Figure 3.19 - Adding layers to a cube

To save the current block, press Save As…(F2). Note that the Layer 1 will be at the bottom of the cube.

☐ To copy a layer, select the layer, press Copy (F6) and press Paste (F9).

☐ To copy a layer over an existing layer, select the layer to copy, press Copy (F6), select the layer to be replaced and then press Paste (F9).

☐ To delete a layer, press Delete (F7).

☐ To print the current layers, press Print (F8).

☐ To send the following cube pattern to the PLC, press Send (F11). Make sure a PLC is connected to the computer. See Section 5.6 for explanations on connecting the PLC to the computer. The following screen will appear.
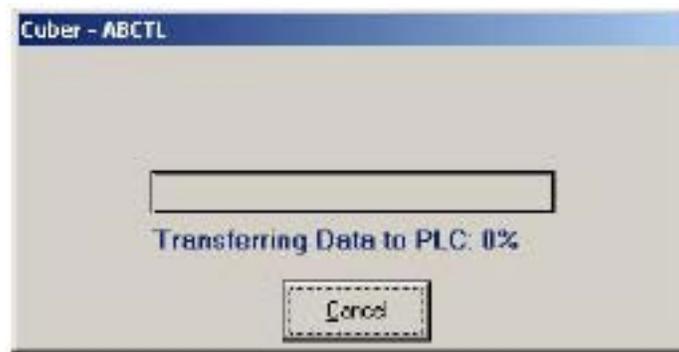
Figure 3.20 - Sending pattern to the PLC

3.4   Creating new tiers and new blocks

Before explaining tiers and blocks creation, it should first be explained what are these elements. A cube is formed of multiple tiers, or layers, and each tier is formed of multiple blocks. The following diagram shows a cube constitution.
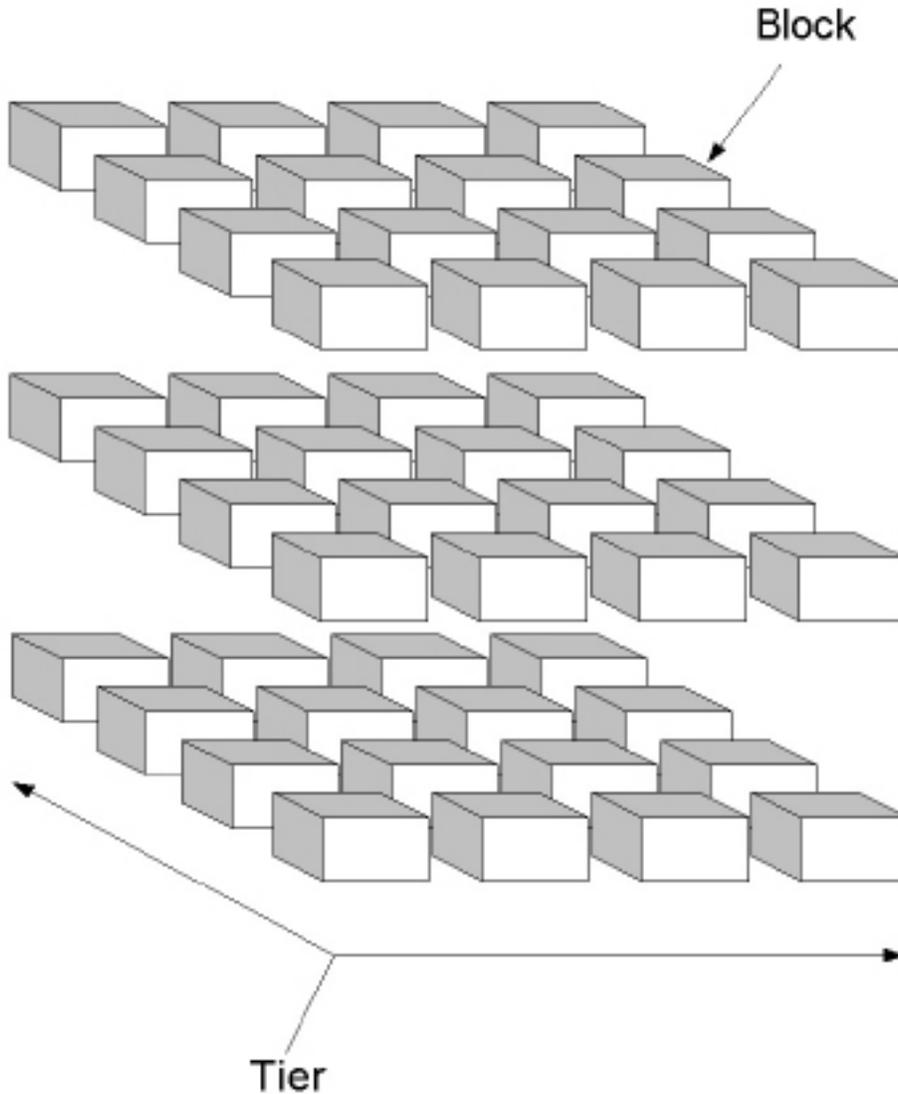
Figure 3.21 - A cube is formed of tiers, which are formed of blocks

In order to create a new cube, you must first define your tiers and blocks' dimensions and settings. You then create all the layers, which, when put together, will form the cube. The following is a description of how to create tiers and blocks.

3.4.1 Creating a new tier

☐ From the main screen, press New (F3). The Tier Selection screen appears.
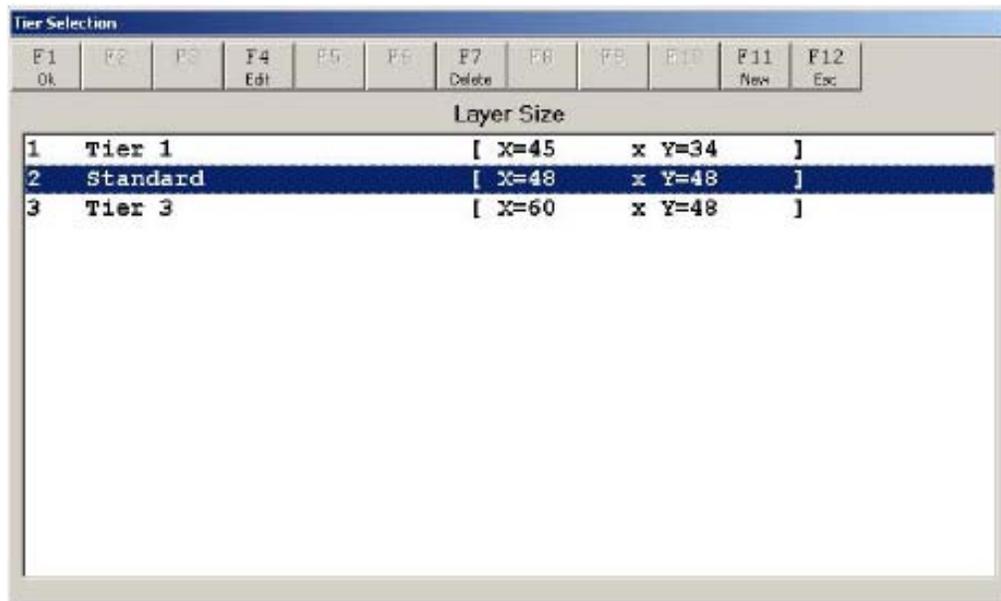
Figure 3.22 - Tier Selection window

☐ Press New (F11). You will be presented with the Tier Creation dialog box.
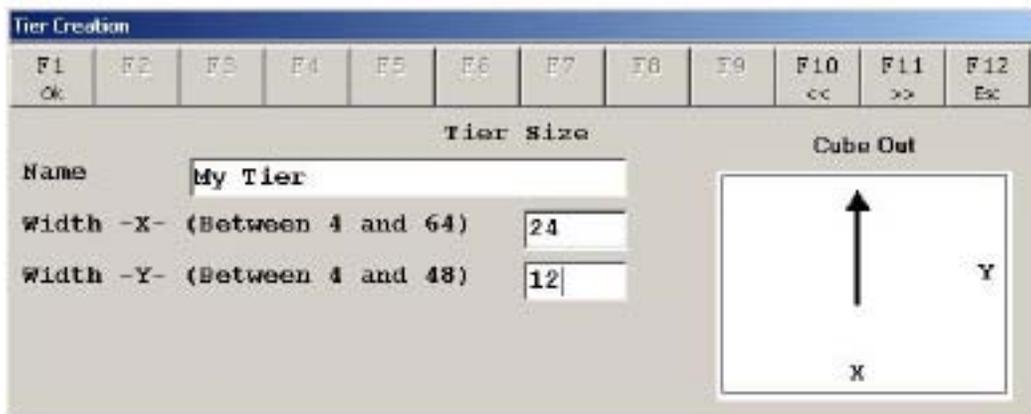
Figure 3.23 - Tier Creation dialog box

Enter the desired name for the tier in the Name section.
Enter the desired width, according to the X axis, in the Width -X- section
Enter the desired width, according to the Y axis, in the Width -Y- section
The Cube Out section represents the tier's orientation according to the Cuber's X and Y axis.
Use the << (F10) and >> (F11) buttons to switch between the fields in the dialog window
Press Esc (F12) to quit the Tier Creation dialog window.

☐ Press OK (F1) when you're done. You will return to the Tier Selection screen. Press OK (F1) to go to the Block Selection screen.

3.4.2 Creating a new block

☐ After creating a new tier, from the Tier Selection window press OK (F1) to go to the Block Creation window.
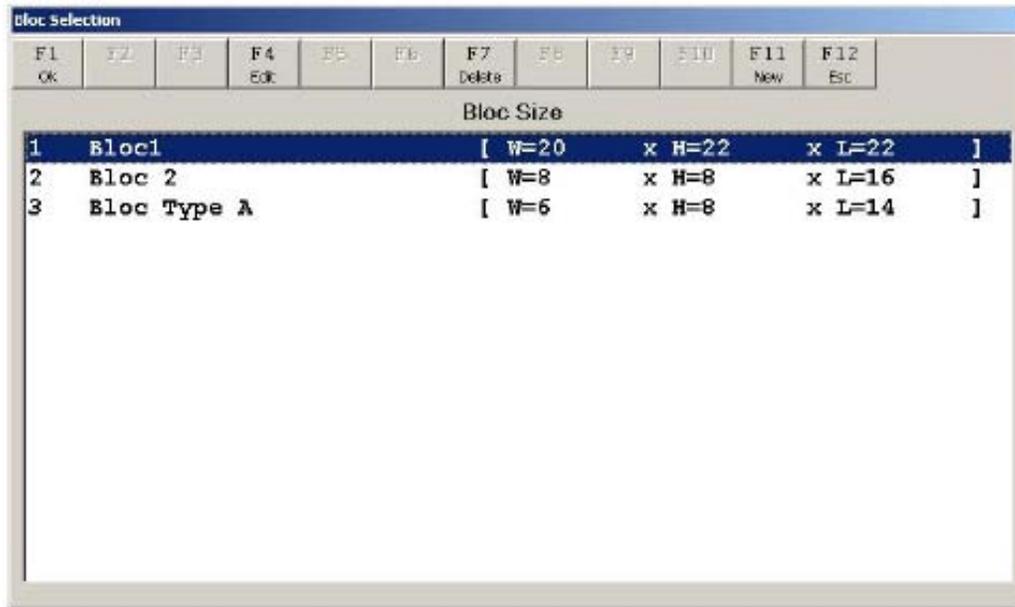
Figure 3.24 - Block Selection window

☐ Press New (F11). The Block Creation dialog window will be shown.
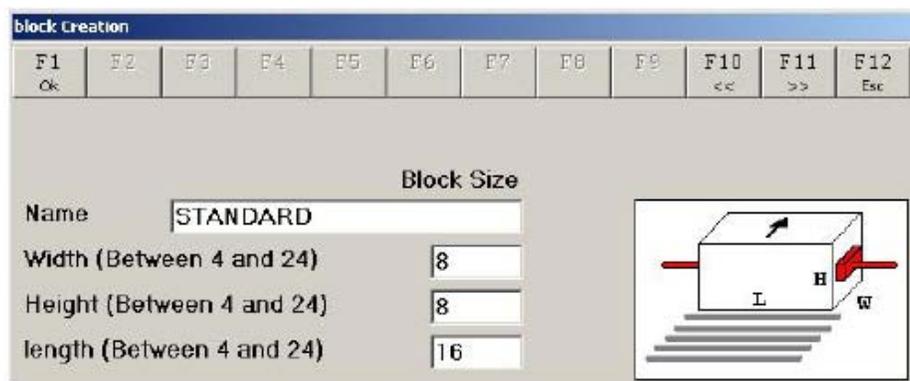
Figure 3.25 - Block Creation dialog box

Enter the desired name for the block in the Name section.
Enter the desired width, according to the X axis, in the Width section
Enter the cube's desired height in the Height section
Enter the cube's desired length in the Length section
A 3D representation of the block is shown on the right
Use the << (F10) and >> (F11) buttons to switch between the fields in the dialog window
Press Esc (F12) to quit the Block Creation dialog window.

☐ Press OK (F1) to complete the block creation and to go to the layer editor. See Section 5.2 for complete details on layer creation.

3.5   Using the Pre-Pattern Maker

3.5.1   Enabling the Pre-Pattern Maker option
The Pre-Pattern maker allows creation of particular patterns that could not be created otherwise. When this option is enabled, certain block structures will be recognized as patterns and the Cuber will perform specific tasks to place the blocks corresponding to the desired pattern in order to save time in the loading process.

Possible patterns are shown here:
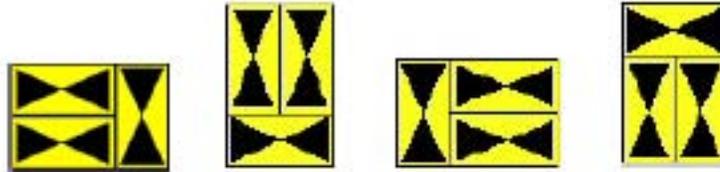
☐   When creating a new cube pattern and after pressing OK (F1) from the Block Selection window, a prompt window appears.

Note: This windows will appears only if the Pre-Pattern Maker option is set to Yes in the cuber.ini file. See Section 4.1 for more details.
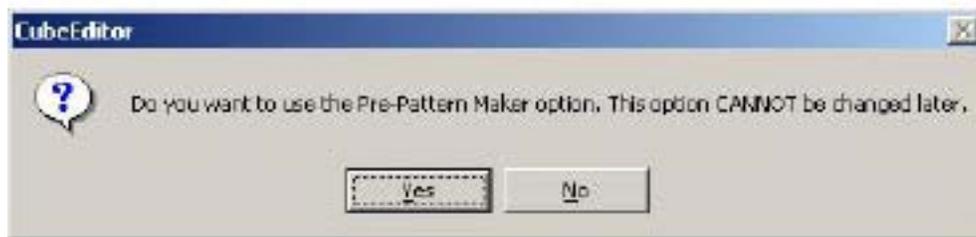
Figure 3.26 - Pre-Pattern Maker prompt window

☐   Select Yes in order for the Pre-Pattern Maker option to be enabled.

The following screens will be used to show how the Pre-Pattern maker can be useful.

    ☐   Shown below is an example of a layer created without the Pre-Pattern Maker. Here, the horizontal and vertical blocks are not represented in the same column. Thus, patterns are not recognized.
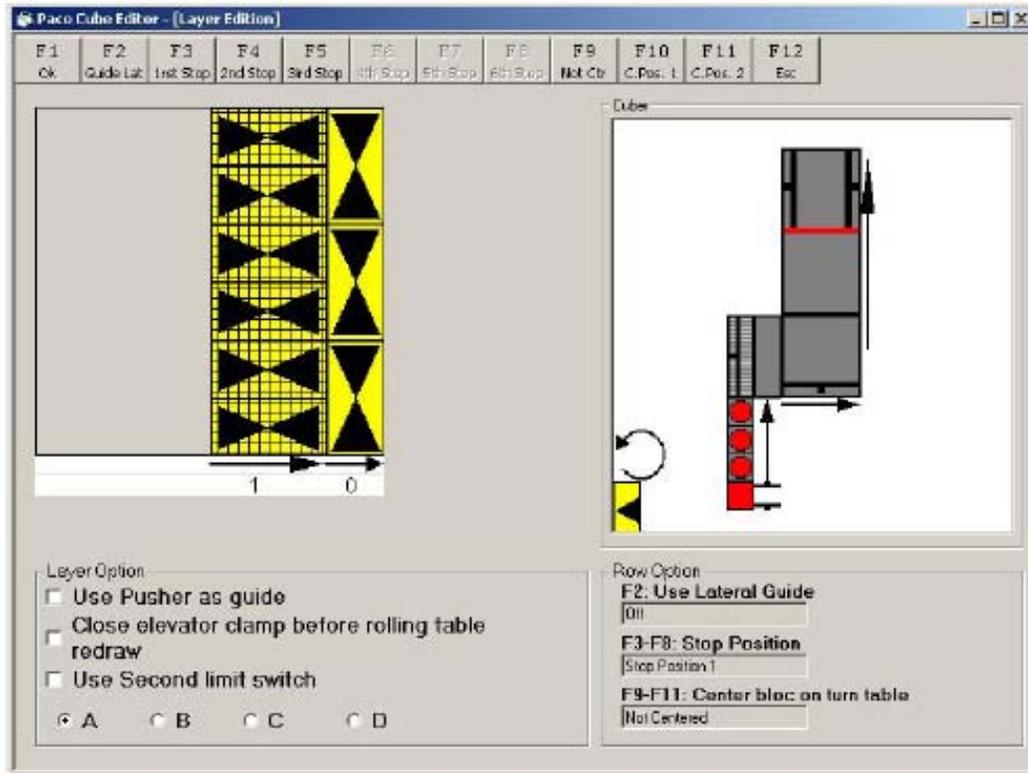
Figure 3.27 - Layer edition without the Pre-Pattern Maker

☐ The following example shows how to add blocks so that they will be part of a pattern when the Pre-Pattern Maker option is enabled. In this example, a vertical block is first inserted, using the || (F6) button.
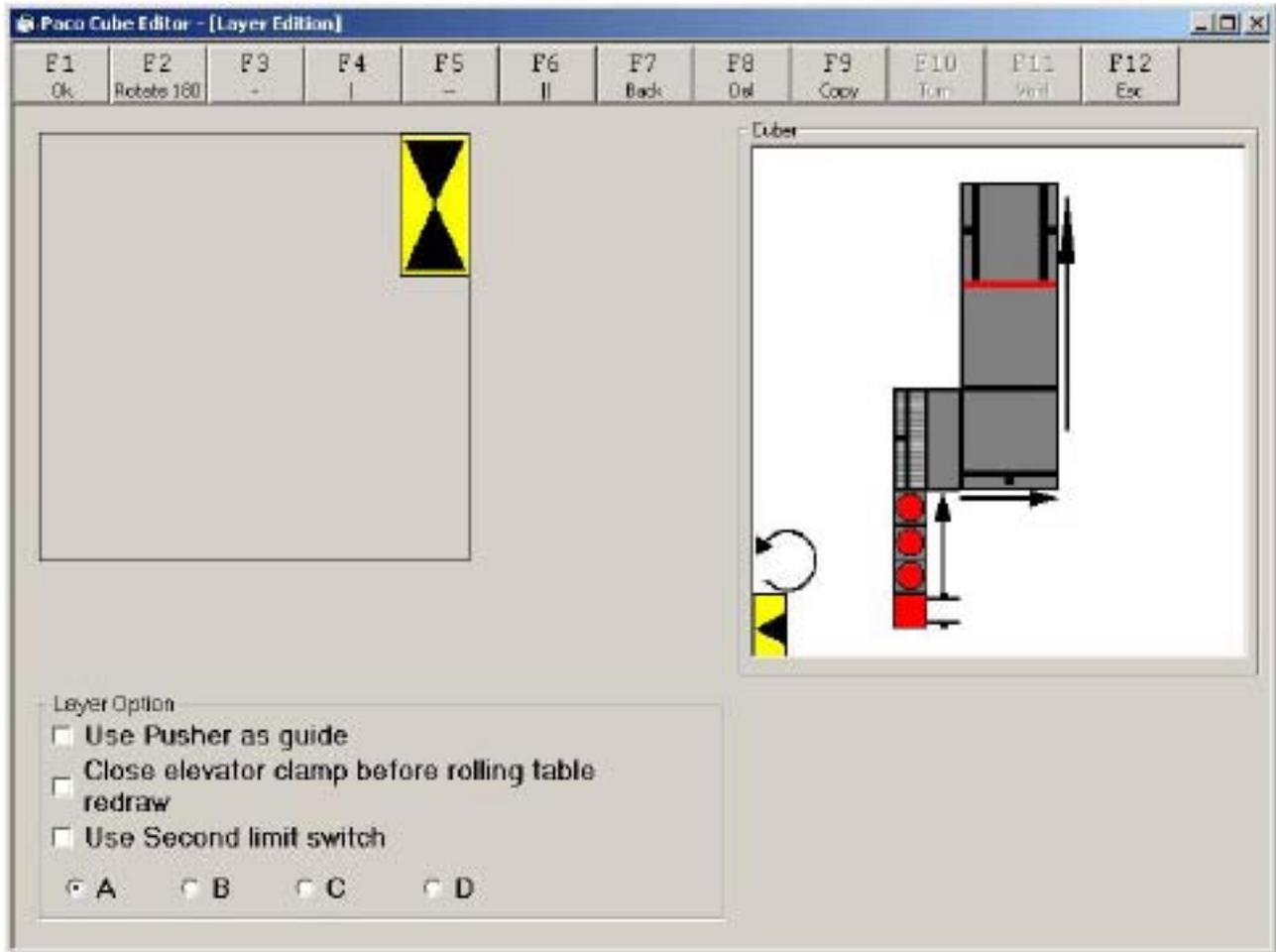
Figure 3.28 - Layer edition with the Pre-Pattern Maker

☐ To add two horizontal blocks next to the vertical block already inserted, press the - (F3) button. The pattern is now created and will be recognized by the application and the Cuber.
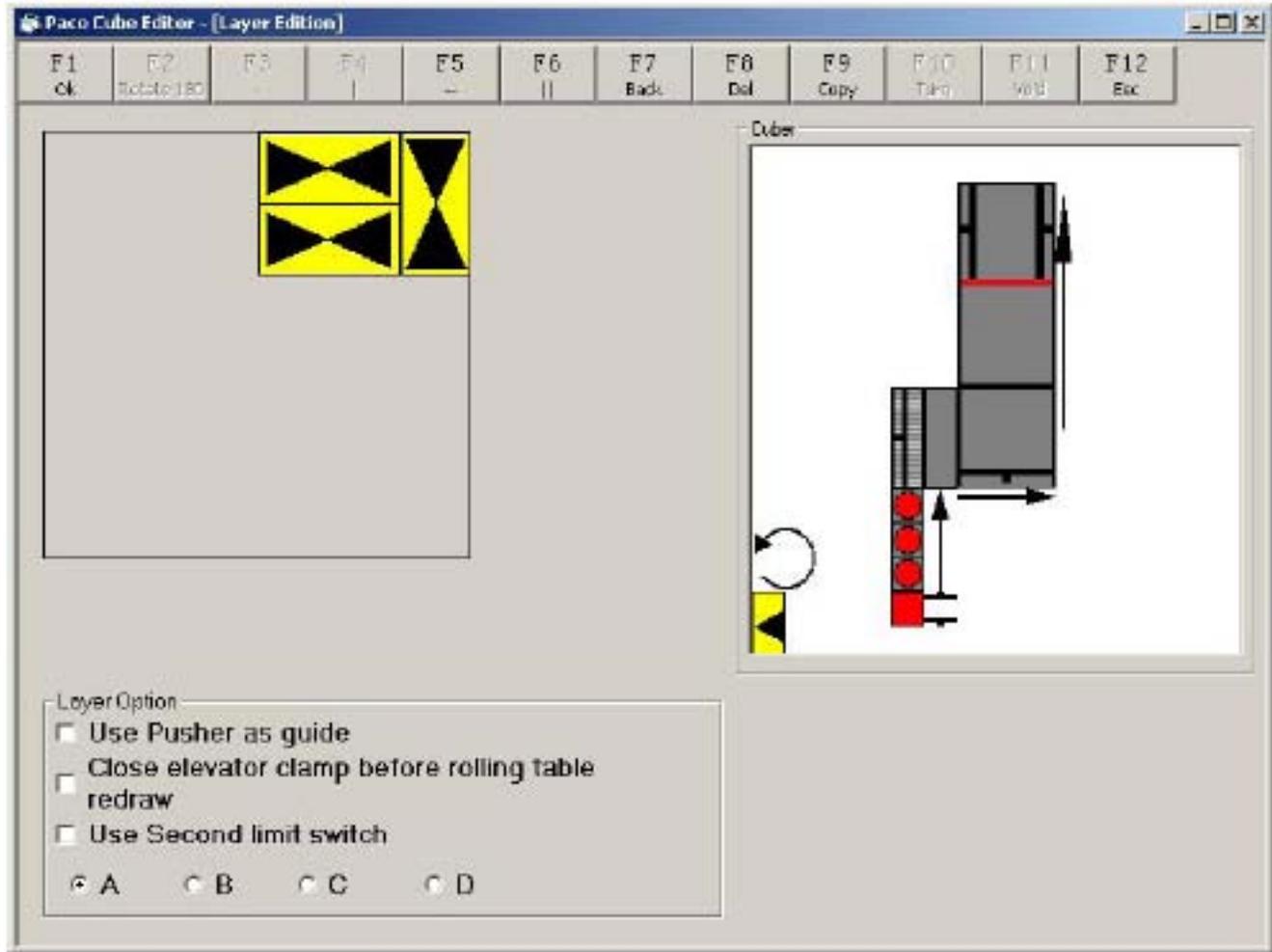
Figure 3.29 - Pattern creation

☐   In the layer editor, what was previously considered as two columns will now be considered as only one, because of the Pre-Pattern Maker.
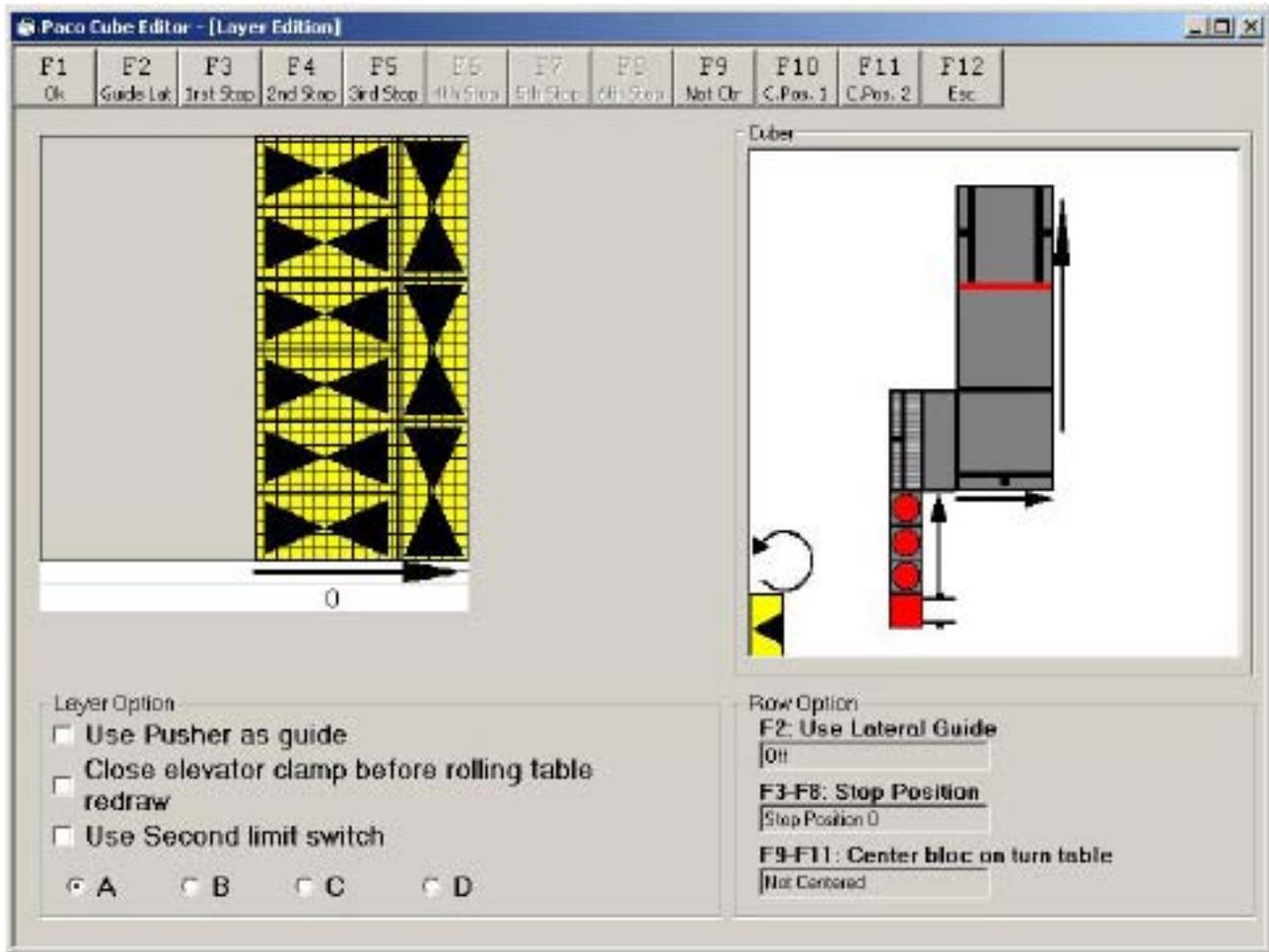
Figure 3.30 - Column created with the Pre-Pattern Maker

☐ Also, the Pre-Pattern Maker allows creation of pattern fittings that would not be possible otherwise. The following image is an example.
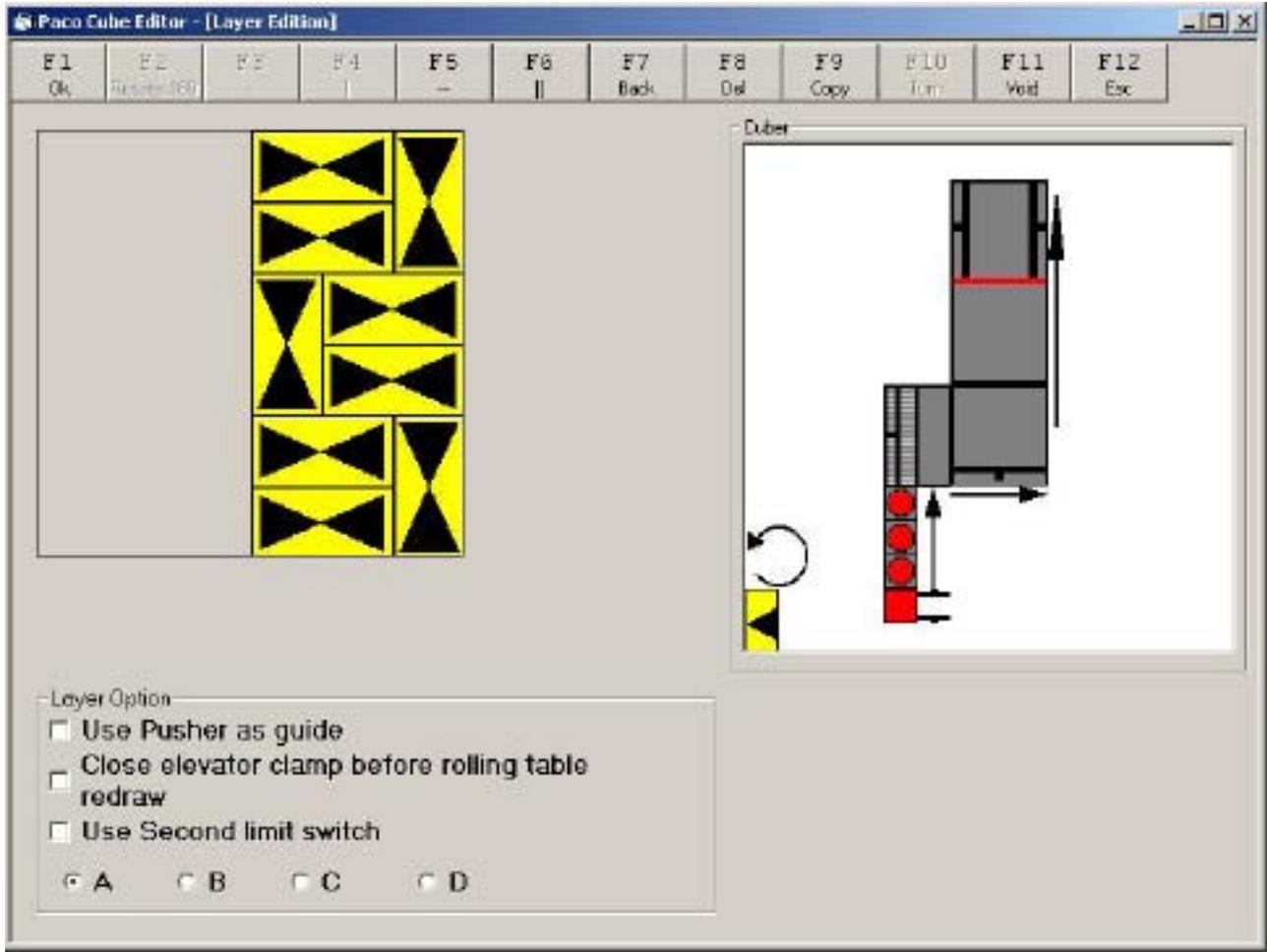
Figure 3.31 - Special pattern fitting created with the Pre-Pattern Maker

3.6   Connecting to the PLC

For the cube patterns to be correctly sent to the PLC:

      ☐   The InGear software must be installed

      ☐   A connexion using a RS-232 serial port must be established with the PLC

      ☐   Ethernet cable must be plugged from the Computer to the Controller.

Shown here is the pattern flow diagram:
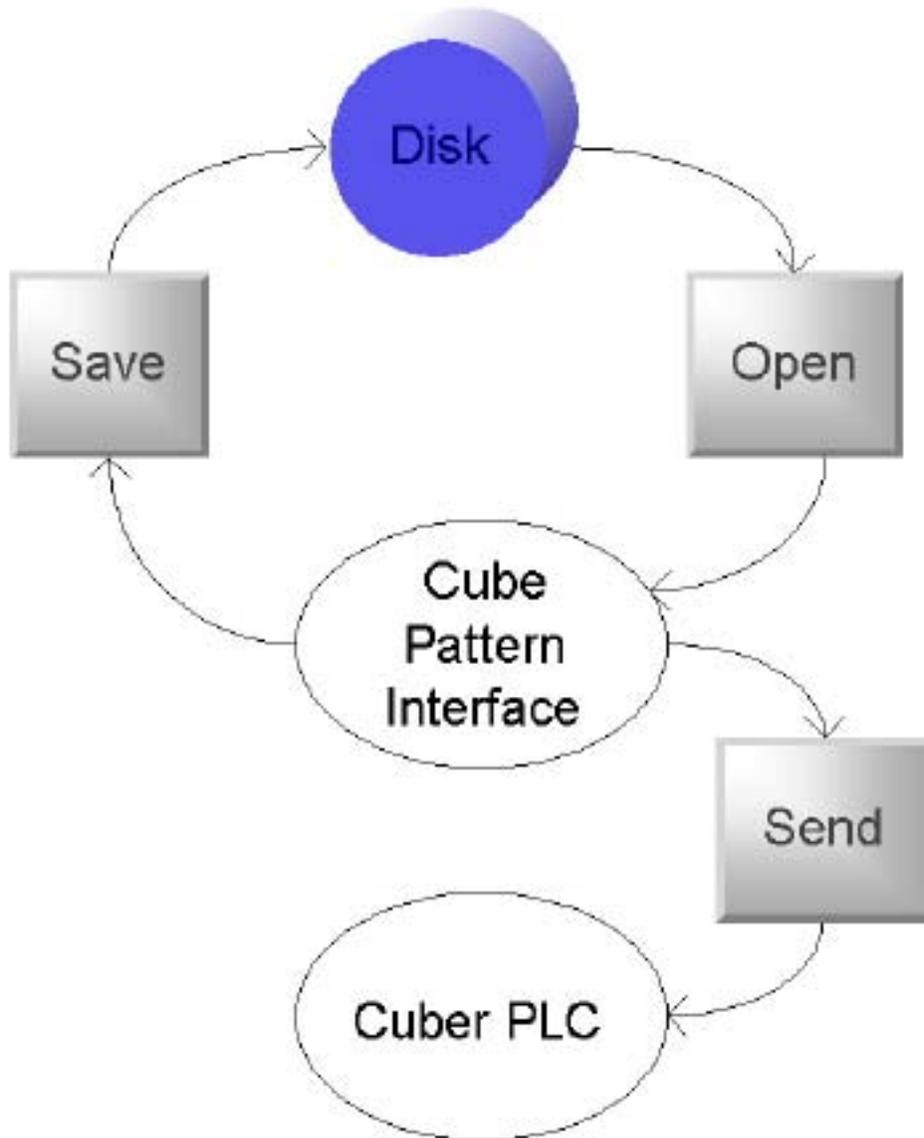
Figure 3.32 - Pattern Flow Diagram

4   Troubleshooting Guide

4.1   Known Problems, Limitations and Workarounds

No known problems at the moment