

FORMATIONS M210

THERMOFOIL MANUFACTURING STANDARD OPERATING PROCEDURES

SOP-002 CNC OPERATIONS

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Department Overview

KPI

150 DOORS (400 SQ FT) PER ROUTER PER 8-HOUR SHIFT (SHAKER DOORS)

OR

400 DOORS (1080 SQ FT) PER ROUTER PER 8-HOUR SHIFT (SLAB DOORS)

Performance Measurement

Department performance shall be evaluated using both:

Door Count

- 150 completed doors per router per shift

Material Throughput

- 400 square feet processed per router per shift

Square footage is used to better reflect actual workload when processing slab doors, raised panel doors, large components, and varying order configurations.

Primary Responsibilities

- Material machining
 - Insert cutting
 - Labeling
 - Quality verification
 - Material flow
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Downstream Customers

- Insert Assembly
 - Sanding
 - Sittex Glue Line
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Quality Ownership

The CNC Department owns:

- Rail sizing
 - Stile sizing
 - Profile quality
 - Edge quality
 - Tool chatter
 - Tool marks
 - Chip-out
 - Machining defects
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Critical Daily Checks

- Tool sharpness

- Tool carousel verification
- First-off inspection
- Backside inspection
- Melamine inspection
- Label orientation verification
- Dust collection monitoring

Revision Control

Revision	Date	Description	Approved By
Rev 0		Initial Release	Phil Land

1. Purpose

To ensure all machined components are produced accurately, consistently, safely, and in accordance with Formations quality standards and customer requirements.

The CNC Department is responsible for producing components that are ready for downstream operations while minimizing rework and manufacturing defects.

2. Scope

This SOP applies to all CNC Operators responsible for:

- Machine operation
- Material loading and unloading
- Tooling management
- Program execution
- Labeling

- Product quality
 - Documentation
 - Production reporting
 - Material handling
 - Traceability requirements
-

3. PPE Requirements

Required PPE:

- CSA Approved Safety-Toe Footwear
- Hearing Protection
- Dust Mask

Additional PPE may be required during maintenance activities.

4. Department KPI

Production Target

- 150 Doors per Router per 8-Hour Shift
 - 400 Square Feet per Router per 8-Hour Shift
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Production Expectations

Production output may vary based on:

- Slab vs shaker ratio
- Raised panel volume
- Tool changes
- Remakes

- Material handling requirements
- Maintenance requirements
- Custom machining requirements

Quality shall never be sacrificed to achieve production targets.

Performance Measurement

Department performance shall be evaluated using both:

Door Count

- 150 completed doors per router per shift

Material Throughput

- 400 square feet processed per router per shift

Square footage is used to better reflect actual workload when processing large formats, raised panel components, slab doors, and varying order configurations.

5. Responsibilities

The CNC Department is responsible for:

- Producing dimensionally accurate components
- Producing production-ready parts
- Maintaining tooling condition
- Completing required inspections
- Completing documentation
- Reporting quality concerns

CNC Quality Ownership

The CNC Department owns:

- Rail sizing
- Stile sizing
- Profile quality
- Edge quality
- Tooling chatter
- Tool marks
- Chip-out
- Machining defects

Machining issues shall not be corrected downstream except where specifically identified in departmental SOPs.

6. Daily Startup Procedure

At the beginning of every shift:

Machine Inspection

Verify:

- Air pressure is functioning normally
- Vacuum system is operating correctly
- Vacuum zones are functioning correctly
- Dust collection is operating correctly
- Emergency stops are functional
- Router table is clean
- Machine is safe to operate

Report abnormalities immediately.

Tooling Inspection

Inspect all active tooling.

Verify:

- Tools are sharp
- No broken tooling
- No chipped tooling
- Holders are secure
- Collets are secure

Daily Requirement

All active tooling shall be checked for sharpness at the beginning of every shift.

Production Schedule Review

Review Smartsheet.

Verify:

- Production priorities
 - Due dates
 - Rush orders
 - Remakes
 - Special instructions
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7. Weekly Tooling Audit

Every Friday:

Inspect:

- Active tooling

- Spare tooling
- Tool holders
- Collets

Verify:

- Tool condition
- Inventory levels
- Replacement requirements

Remove damaged tooling from service.

Report replacement requirements to the Production Supervisor.

8. Production Scheduling – Smartsheet

Purpose

Smartsheet is the production scheduling system used throughout Formations to manage daily production priorities and track order completion.

Smartsheet is not used for traceability.

Traceability is maintained through Business Central scanning.

Daily Schedule Review

At the beginning of every shift:

Review:

- Daily production schedule
- Rush orders
- Customer priorities
- Remakes

- Due dates
- Special instructions

Report scheduling concerns immediately.

Production Priorities

Orders shall be processed according to the Smartsheet schedule unless otherwise directed by management.

Special attention shall be given to:

- Rush orders
- Remakes
- Backorders
- Customer deadlines

Order Completion

When the CNC portion of an order is complete:

Verify:

- Machining complete
- Labels applied
- Quality inspections completed
- Product transferred to correct department
- Production Report completed
- All material thicknesses included in the order have been cut
- No components remain outstanding
- Order quantities match production paperwork

Once complete:

- Mark order complete in Smartsheet
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9. Business Central Scanning

Scan Into Department

When beginning work on an order:

Scan:

1. Assembly Order
 2. CNC Department
 3. Employee Barcode
-

Scan Out Of Department

When work is completed:

Scan:

1. Assembly Order
 2. CNC Department
 3. Employee Barcode
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10. First-Off Inspection

A first-off inspection is required whenever:

- A new machining program is loaded
- A profile change occurs
- Tooling is changed
- Machine setup is modified

Verify:

- Dimensions
- Profile
- Rail size
- Stile width
- Insert fit
- Chip-out

No separate paperwork is required.

By initialing the Production Report, the operator confirms the first-off inspection was completed.

11. Tool Change Procedure

Whenever a tool is changed:

Verify:

- Correct tool number
- Correct tool length
- Correct tool diameter
- Correct offsets

Mandatory Verification

Before machining:

- ☐ Tool Number Verified
- ☐ Tool Length Verified
- ☐ Tool Diameter Verified
- ☐ Tool Offset Verified

12. Program Verification

Before machining:

Verify:

- TFO Number
- Program loaded
- Profile requirements
- Rail requirements
- Special instructions
- All required tools are present in the tool carousel
- Tool locations match program requirements

Ensure the correct program is loaded before machining begins.

Tool Carousel Verification

Prior to starting production, verify:

- Required tooling is installed
- Tool numbers match the program
- Tool positions match the tool list
- No tools are missing from the carousel
- No incorrect tools are loaded in active positions

If tooling does not match the program requirements:

1. Stop setup
2. Correct tooling configuration
3. Verify tool numbers and positions

4. Reconfirm program requirements before machining

No production shall begin until tooling and program requirements match.

13. Material Verification

Before loading material:

Verify:

- Correct material
 - Material free from damage
 - Material sits flat
 - Vacuum hold-down is effective
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14. Product Flow and Material Handling

Completed product shall:

- Be organized by order
- Remain clearly identified
- Have labels attached
- Have paperwork attached

Completed product shall be stacked on production sleds.

15. Slab Door Workflow

Quality Requirements

Inspect:

- Dimensions
- Profile

- Rail size (where applicable)
- Tool marks
- Chatter
- Chip-out

Touch up minor machining imperfections as required.

Material Flow

Stack product on a sled.

Transfer sled directly to:

Glue Conveyor

Doors shall leave CNC ready for glue application.

16. Shaker Door Workflow

Insert Processing

Insert panels shall be cut first.

Verify:

- Insert size
- Insert quantity
- Order matching

Maintain inserts with matching doors throughout production.

Runtime Efficiency

While the CNC is machining door components:

- Sand insert panel edges
- Inspect insert panels for damage

- Organize inserts by order
- Prepare inserts for assembly

This work shall be completed during machine runtime whenever practical to maximize machine utilization and reduce downstream handling.

Damaged Insert Procedure

If an insert panel is identified as:

- Chipped
- Cracked
- Delaminated
- Incorrectly sized
- Damaged during handling
- Damaged during machining

The operator shall:

1. Verify insert dimensions from the production paperwork
2. Manually cut a replacement insert
3. Verify replacement dimensions
4. Sand insert edges as required
5. Match the replacement insert with the corresponding door

Damaged inserts shall not be sent to the Insert Assembly Department.

All required replacement inserts shall be completed before the order is transferred to the Insert Assembly Conveyor.

Quality Requirements

Inspect:

- Dimensions
- Rail size
- Insert fit
- Chip-out
- Tool marks
- Chatter

Doors shall leave CNC ready for Insert Assembly except for insert installation and sanding requirements.

Material Flow

Stack completed doors and inserts on a sled.

Transfer sled to:

Insert Assembly Conveyor

17. Raised Panel Door Workflow

Inspect:

- Dimensions
- Profile
- Rail size
- Tool marks
- Chatter
- Chip-out

Material Flow

Stack completed product on sled.

Transfer sled to:

Sanding Conveyor

18. Material Flow Summary

Door Type	Destination
Slab Doors	Glue Conveyor
Shaker Doors	Insert Assembly Conveyor
Raised Panel Doors	Sanding Conveyor

19. Labeling Procedure

To maximize machine utilization:

1. Complete machining cycle
 2. Offload completed product
 3. Load next job
 4. Start next program
 5. Label previous order while machine runs
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Label Verification

Verify:

- Correct TFO Number
- Correct Profile
- Correct Size
- Correct Quantity

Labels shall remain attached and legible.

Label Orientation Standard

Labels shall be applied using:

Width × Height Orientation

The label shall be oriented so the information is readable when viewing the height of the door vertically.

Objective

Maintain consistent label orientation throughout production to:

- Improve readability
- Reduce handling
- Improve department-to-department identification
- Improve QC and Packaging efficiency

All doors within an order shall be labeled consistently.

20. Quality Control Requirements

Dimension Verification

Verify:

- Length
- Width
- Thickness

Production Tolerance

Characteristic	Tolerance
Length	±0.5 mm
Width	±0.5 mm
Thickness	±0.1 mm

Profile Verification

Verify:

- Outside Profile
- Inside Profile
- Panel Profile
- Rail Size
- Stile Width
- Center Panel Dimensions
- Panel Depth

Special Attention

Verify:

- Reduced rail requirements
- Custom rail requirements
- Insert dimensions
- Custom panel depths
- Special machining instructions
- Customer-specific profile requirements

Rail sizes shall match production paperwork.

Panel depths shall match production paperwork and programmed specifications.

Any door containing a custom panel depth shall be inspected during first-off inspection and monitored throughout production.

Pass Criteria

- Profile matches production paperwork
- Rail size matches production paperwork
- Stile width matches production paperwork
- Panel dimensions are correct
- Panel depth is correct
- Insert fit is acceptable where applicable

Fail Criteria

- Incorrect profile
- Incorrect rail size
- Incorrect stile width
- Incorrect panel dimensions
- Incorrect panel depth
- Incorrect insert dimensions
- Product does not match production paperwork

Defective parts shall not proceed.

21. Backside Inspection

Every door shall be inspected for:

- Chip-out

- Blow-out
- Breakout
- Tear-out
- Melamine defects
- Melamine scratches
- Surface spots
- Surface contamination
- Handling damage

Melamine Inspection

Particular attention shall be given to the backside melamine surface.

Inspect for:

- Scratches
- Surface spots
- Manufacturing defects
- Chips
- Surface contamination
- Handling damage
- Press marks
- Discoloration

Pass Criteria

- Clean machining
- No visible chip-out
- No breakout
- Acceptable edge quality

- Clean melamine surface
- No visible scratches
- No visible surface defects
- No visible contamination

Fail Criteria

- Visible chip-out
- Corner damage
- Blow-out
- Breakout
- Visible melamine scratches
- Surface spots
- Melamine defects
- Surface contamination
- Handling damage affecting appearance

Defective parts shall not proceed to the next operation.

22. Chip-Out Escalation

Immediately notify the Production Supervisor if:

- Excessive chip-out occurs
- Multiple parts are affected
- Tool wear is suspected
- Quality degradation is observed

23. Spoilboard Maintenance

Monitor spoilboard condition throughout production.

Run Flycut Program When:

- Vacuum performance decreases
- Material no longer sits flat
- Cutting depth becomes inconsistent
- Visible spoilboard wear exists
- Backs of doors begin chipping
- Chip-out increases on exit cuts
- Cut quality deteriorates due to spoilboard condition

Indicators of Spoilboard Wear

Operators shall monitor for:

- Increased backside chip-out
- Poor vacuum hold-down
- Inconsistent cutter breakthrough
- Uneven cutting depths
- Material movement during machining
- Increased sanding requirements

Flycut Procedure

1. Verify setup
2. Remove all material from the CNC table
3. Verify vacuum zones are clear
4. Run flycut program
5. Remove debris and dust
6. Verify spoilboard surface condition

7. Verify vacuum performance before resuming production

Post-Flycut Verification

Verify:

- Material sits flat
 - Vacuum hold-down is effective
 - Backside chip-out is reduced
 - Cutting depth is consistent
 - Product quality meets requirements
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24. Deficiency Reports

Complete a Pink Deficiency Report whenever:

- Parts are missing
- Quantities are incomplete
- Components will follow later
- Remakes are outstanding

Attach report to the front of the production package.

25. Remake Procedure

If a remake is required:

1. Complete Yellow Remake Form
2. Record remake code
3. Attach labels
4. Submit to Programming Office

Remake Codes

- BD – Board Defect
- 3D – Vinyl Defect
- ME – Machine Error
- HE – Human Error

Remakes receive production priority.

26. Production Reporting

Before releasing an order:

Record:

- Date
- Initials

By initialing the Production Report, the operator confirms:

- First-off inspection completed
 - Quality inspection completed
 - Product ready for next department
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27. Daily Housekeeping

Housekeeping shall be maintained continuously throughout the shift.

Dust Collection Bins

Dust collection bins shall be monitored throughout the day.

Operators shall:

- Check dust bin levels regularly
- Empty bins when full
- Prevent dust overflow

- Maintain proper dust collection performance

End of Shift Housekeeping

Final 15–20 minutes of the shift shall be dedicated to departmental housekeeping.

Complete the following:

- Clean router table
- Clean machine surfaces
- Remove scrap material
- Organize tooling
- Sweep work area as required
- Empty dust collection bins if required
- Remove accumulated dust and debris
- Report maintenance concerns
- Prepare department for next shift

28. Friday Deep Clean

A dedicated 45-minute cleanup period shall be scheduled at the end of the shift each Friday.

Equipment Cleaning

- Clean router table surfaces
- Remove accumulated dust and debris
- Clean machine exterior surfaces
- Clean surrounding work areas
- Clean conveyor and transfer areas
- Clean vacuum zone surfaces as accessible

Tooling Organization

Inspect and organize:

- Active tooling
- Spare tooling
- Tool holders
- Collets
- Tool storage locations

Dust Collection Maintenance

Verify:

- Dust collection bins have been emptied
- Dust accumulation has been removed
- Dust collection performance is acceptable

Department Organization

Organize:

- Production sleds
- Materials
- Tooling
- Documentation
- Workstations

Maintenance Review

Inspect for:

- Equipment damage
- Vacuum issues
- Dust collection concerns

- Spoilboard concerns
- Tooling concerns
- Safety concerns

29. Release Checklist

- ☐ Smartsheet reviewed
- ☐ Business Central Scan-In completed
- ☐ First-off inspection completed
- ☐ Tool verification completed
- ☐ Dimensions verified
- ☐ Profiles verified
- ☐ Rail size verified
- ☐ Backside chip-out inspected
- ☐ Labels applied
- ☐ Product stacked on sled
- ☐ Correct destination verified
- ☐ Production Report completed
- ☐ Date recorded
- ☐ Initials recorded
- ☐ Deficiency Report attached if required
- ☐ Remake Form completed if required
- ☐ Business Central Scan-Out completed
- ☐ Dust bins monitored and emptied as required
- ☐ Daily housekeeping completed
- ☐ Friday Deep Clean completed (Fridays only)

Appendix A – CNC Training Record

Employee Name: _____

Trainer: _____

Date: _____

Competencies Verified

- ☐ Machine Startup
- ☐ Business Central Scanning
- ☐ Tool Changes
- ☐ Program Selection
- ☐ Quality Inspection
- ☐ Chip-Out Inspection
- ☐ Labeling
- ☐ Documentation
- ☐ Housekeeping

Employee Signature: _____

Trainer Signature: _____

Appendix B – Monthly CNC Audit

Documentation Compliance: ☐ Pass ☐ Fail

Business Central Compliance: ☐ Pass ☐ Fail

Quality Compliance: ☐ Pass ☐ Fail

Tooling Compliance: ☐ Pass ☐ Fail

Housekeeping Compliance: ☐ Pass ☐ Fail

KPI Review Completed: ☐ Yes ☐ No

Auditor: _____

Date: _____

Appendix C – Warranty Reference

All CNC-produced components shall support final warranty requirements, dimensional tolerances, and quality expectations established by Formations.