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## SMD Operations Procedures Manual

### 8.1.1.25 OPERATION OF NORTHROP/GRUMMAN WRAPPING MACHINE

Text Pages 1 through 8  
Attachment 1-2

#### Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
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## **1. Purpose and Scope**

1.1. The purpose of this document is to provide instructions for:

- Operating the Northrop/Grumman Wrapping Machine located in Building 902
- Testing the safety interlocks of the Wrapping Machine.

## **2. Responsibilities**

2.1. The Cognizant Technical Supervisor shall ensure that operators have been instructed before operating the Machine.

2.2. Before operating the machine, the Authorized Operator shall ensure that the safety interlocks have been tested within an interval not to exceed 6 months.

## **3. Prerequisites**

4.2. The Operator shall receive instruction from the Cognizant Technical Supervisor, or designee.

## **4. Precautions**

4.1. Test the safety interlocks within the required interval, and promptly repair any failed interlocks.

4.2. Keep cover panels, chain drive guards, and plexiglass shields in place during operations.

4.3. The links at the ends of the feed cables will not fit through the Teflon inserts at the ends of the support tubes. The motion limit switches should protect against damage. Nevertheless, the Operator should use caution when the links are near the Teflon inserts.

4.4. To prevent damage to the feed rate mechanism, do not attempt to turn the PIV crank unless the motor is running and the feed line is moving.

4.5. Safety glasses are required when operating safety switches and circuit breakers.

4.6. Control panel controls shall be set to their "initial" settings (See Section 5.1) before activating the control console.

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## **5. Procedure**

### 5.1. Section I: Initial Settings

- 5.1.1. Main disconnect switch, located under the wrapping head assembly and labeled "Main Disconnect", in the "OFF" position.

**NOTE:**

**The machine is powered by circuit breaker #18 in panel RP P2-2 located on the Southwest wall of building 902.**

- 5.1.2. Motor speed dial set to zero.
- 5.1.3. Motor "ON/OFF" toggle switch set to "OFF".
- 5.1.4. Motor "START/STOP" toggle switch set to "STOP".
- 5.1.5. "HEAD CLUTCH" switch set to "OFF".
- 5.1.6. All indicator lights should be extinguished.
- 5.1.7. Oven Control Potentiometer to "Zero"
- 5.1.8. Oven Power to "Off"
- 5.2. Section II: Curing Oven

**NOTE:**

**This section ("CURING OVEN") is to be followed if heating of the wrapped product is required. Otherwise skip to section 5.3.**

- 5.2.1. Overview: For some insulated magnet parts, the Kapton tape must be heated to a temperature high enough to activate the adhesive, fixing it in place. This is accomplished by transporting the insulated part through a quartz oven. By adjusting transport speed and oven power, and observing the Tube Temperature using the (2) Infrared Sensors located at the oven outlet, the operator must insure that the temperature the magnet part must reach for proper curing of the tape adhesive is maintained during the entire curing process. This temperature is specified in the

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traveler. The oven power shall be controlled manually (by adjusting a potentiometer) while reading tube temperature using the sensors.

### **CAUTION**

**Equipment Damage: Cooling water must be on when the oven is on. Failure to do this may cause severe burn hazard or equipment damage. Do not admit cold water into a hot oven.**

- 5.2.2. Open the water valve located against the south wall near the Wrapper. A second valve, which normally is left open at all times, is located inside the control assembly
- 5.2.3. Verify that water is flowing to the oven jacket.
- 5.2.4. Verify that the infrared sensors are located approximately .25" from the surface of the wrapped tube. Attach the sensors to a laptop using the USB connectors. Initialize the monitoring software and verify that the emissivity setting is correct for the material being measured.

### **CAUTION**

**To avoid equipment damage, verify that the sensor leads are properly dressed to avoid contact with the hot oven and to ensure they do not become entangled with the rotating tube.**

- 5.3. Section III: Activating Power
  - 5.3.1. Place the main input disconnect switch in the "ON" position.
  - 5.3.2. Depress the green push button labeled "POWER ON".
- 5.4. Section IV: Setting the Amount of Overlap
  - 5.4.1. Perform the steps in Sections I and II (Section II only if required).
  - 5.4.2. Set the motor "ON/OFF" toggle switch to "ON".
  - 5.4.3. Set the motor "FORWARD/REV" toggle switch to "FORWARD".
  - 5.4.4. Set the motor "START/STOP" toggle switch to "START" (the switch is a momentary contact switch and will snap back to a neutral position.)

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- 5.4.5. Set the "HEAD CLUTCH" switch to "ON".
- 5.4.6. Slowly turn the "MOTOR SPEED" dial until the wrapping heads begin rotating and the line begins moving.
- 5.4.7. Adjust the "MOTOR SPEED" dial until the digital display labeled "HEAD RPM" indicates 100 RPM.
- 5.4.8. Adjust the feed rate by turning the PIV crank.

**NOTE:**

**The wrapping pitch is calculated by dividing the feed rate by the rate of revolution:**

$$\text{pitch (In. Per Rev.)} = \frac{\text{feed rate (IPM)}}{\text{head revolution rate (RPM)}}$$

**For instance, a desired pitch of 0.5 inches will be obtained by setting the feed rate to 50 IPM and the head rate to 100 RPM.**

**Once the ratio is set, the PIV crank should not be touched except for minor adjustments as necessary.**

**The motor speed may be adjusted without changing the ratio.**

- 5.4.9. When the desired ratio is set, turn the "MOTOR SPEED" dial to zero and place the motor "ON/OFF" toggle switch in the "OFF" position.
- 5.5. Section V: Setting Up Material to be Wrapped
  - 5.5.1. Refer to the applicable PICS Traveler for detailed instructions on setting up material to be wrapped.
  - 5.5.2. To facilitate mounting the spools, a red push button located next to the wrapping heads, inside the Plexiglas shield, may be depressed to release the head clutch. This will allow the head to be manually spun. Before depressing this push button, the steps in Section I and III should be performed. Otherwise, the push button will not be operable.

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5.6. Section VI: Running the Wrapping Machine

5.6.1. Setting the Oven

5.6.1.1. Section 5.6.1 is only required if the curing oven will be used

**WARNING**

**To prevent equipment damage and personnel injury, ensure that all steps in Section 5.2 have been accomplished prior to proceeding.**

5.6.1.2. Start the exhaust fan for the wrapper. Ensure the appropriate dampers are open and lined up as needed to draw fumes out of the building.

5.6.1.3. Set the OVEN CONTROL potentiometer as specified in the traveler.

**CAUTION**

**Personnel Injury – Burns: Always use the handle to open and close the curing oven.**

**CAUTION**

**Personnel Injury – Burns: The insulated magnet part is hot as it exits the oven. Do not touch. After the insulated part travels past the shielded area, it may still be too hot to touch without protective gloves.**

5.6.1.4. Place the OVEN POWER selector switch in the ON position. Verify that the OVEN ON yellow indicator light is illuminated to indicate that the oven is activated.

5.6.2. Set the motor "ON/OFF" toggle switch to "ON".

5.6.3. Set the motor "FORWARD/REV" toggle switch to the desired direction.

5.6.4. Set the motor "START/STOP" toggle switch to "START" momentarily.

5.6.5. Set the "HEAD CLUTCH" switch to "ON".

5.6.6. Slowly turn the "MOTOR SPEED" dial until the wrapping heads begin rotating and the material to be wrapped begins feeding into the Machine, and continue turning the dial until the desired speed is reached.

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- 5.6.7. If the motor is stopped during wrapping (for instance, to reverse the feed direction), then it will be necessary to push the motor "START/STOP" toggle switch to the "START" position to restart the motor.
- 5.7. Section VII: Shutting off the Wrapping Machine
  - 5.7.1. For An Emergency Shutdown:
    - 5.7.1.1. Depress the large red push button on the control panel labeled "Emergency Stop".
  - 5.7.2. For A Normal Shutdown:
    - 5.7.2.1. In the section of the control panel labeled "MOTOR", set the "MOTOR SPEED" dial to zero, the "ON/OFF" toggle switch to "OFF", the "START/STOP" toggle switch to "STOP".
    - 5.7.2.2. Set the "HEAD CLUTCH" switch to "OFF".
    - 5.7.2.3. Set oven power to "OFF"
  - 5.7.3. Place the main input disconnect switch in the "OFF" position.
  - 5.7.4. Turn cooling water "OFF"
- 5.8. Section VIII: Testing the Safety Interlocks

**NOTE:**

**The interlocks shall be tested every six months during operations.**

- 5.8.1. Door Interlock and Emergency Stop Switch
  - a) Perform the steps in Sections I and III.
  - b) Set the motor "ON/OFF" toggle switch to "ON".
  - c) Set the motor "FORWARD/REV" toggle switch to "FORWARD".
  - d) Set the motor "START/STOP" toggle switch to "START".
  - e) Set the "HEAD CLUTCH" switch to "ON".

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- f) Slowly turn the motor "MOTOR SPEED" dial until the wrapping heads begin rotating and the line begins moving.
- g) Trip the interlock by opening the Plexiglas shield door. Verify that machine motion stops and the amber light, located above the green "POWER ON" push button, extinguishes.
- h) Close the door and repeat steps a) to g) except trip the interlock by depressing the emergency stop switch.

#### 5.8.2. Limit Switches

- a) Repeat steps 5.8.1 Items a) through f)
- b) Increase the feed rate so that the drive is moving at a typical operational speed.
- c) When the forward limit is reached, verify that machine motion stops and the "FWD LIMIT" red indicator light turns on.
- d) Repeat steps 5.8.1 Items a) through f), except set the drive to move in the reverse direction.
- e) Increase the feed rate so that the drive is moving at a typical operational speed.
- f) When the reverse limit is reached, verify that machine motion stops and the "REV LIMIT" red indicator light turns on.
- g) Complete the checklist (see Attachment 1) and post the checklist on the Machine.

## 6. **Documentation**

6.1 Safety Interlock Test Checklist

6.2 Traveler

## 7. **References**

None

## 8. **Attachments**

- 1. Northrop/Grumman Wrapping Machine: Safety Interlock Test Checklist
- 2. Machine Diagram

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**Attachment 1**

**Northrop/Grumman Wrapping Machine: Safety Interlock Test Checklist**

Door interlock located on Plexiglas shield	Pass · · Fail · ·					
Emergency stop switch	Pass · · Fail · ·					
Forward limit switch	Pass · · Fail · ·					
Reverse limit switch	Pass · · Fail · ·					
Date Tested						
Initials of Tester						
Expiration Date						

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Attachment 2

Machine Diagram

