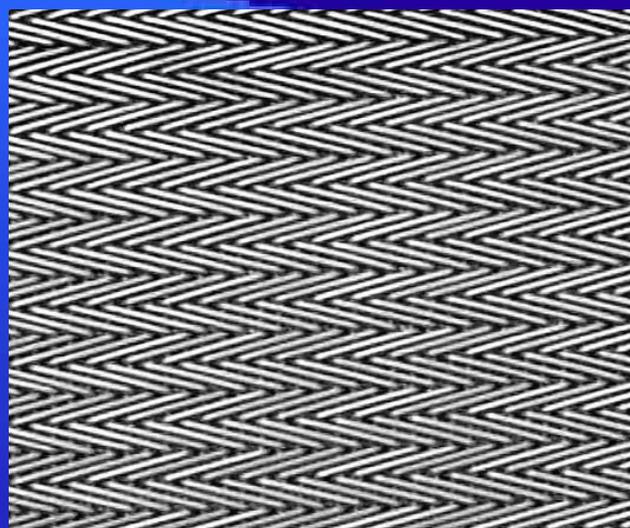


Baking Bands



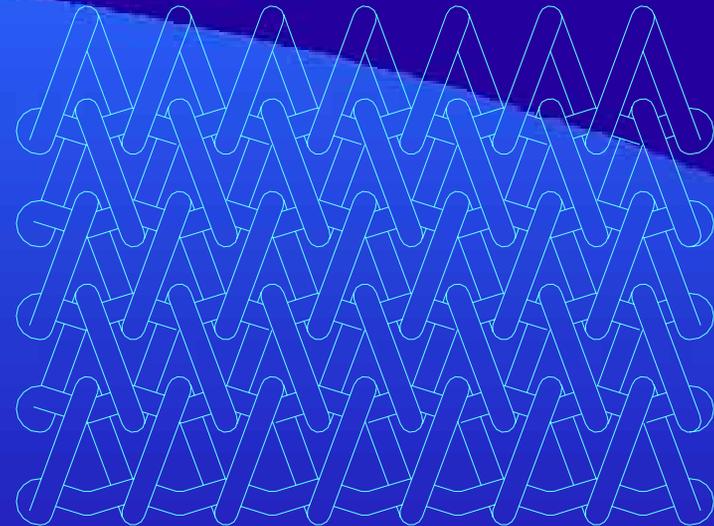
AIB Cookie & Cracker Production Seminar
June 28, 2006
Presented by Ashworth Bros., Inc.

Types of Baking Bands

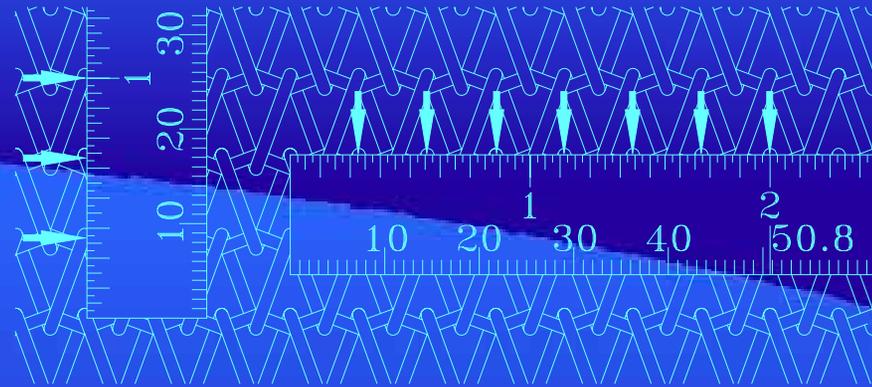
- **Solid Bands**
 - Ideal for soft dough products
 - May prevent the escape of gases from the dough leaving unsightly cavities in the product bottom
- **Perforated Solid Bands**
 - Allows gases to escape from the dough producing a more even bottom surface on the product

Types of Baking Bands

- **Balanced Weave**
 - Alternating right and left hand spirals joined with a crimped connector



Typical nomenclature for Balanced Weave mesh designations:



BXX-YY-ZZ

B indicates a Balanced Weave mesh

XX number of loops in 12 inches of belt width

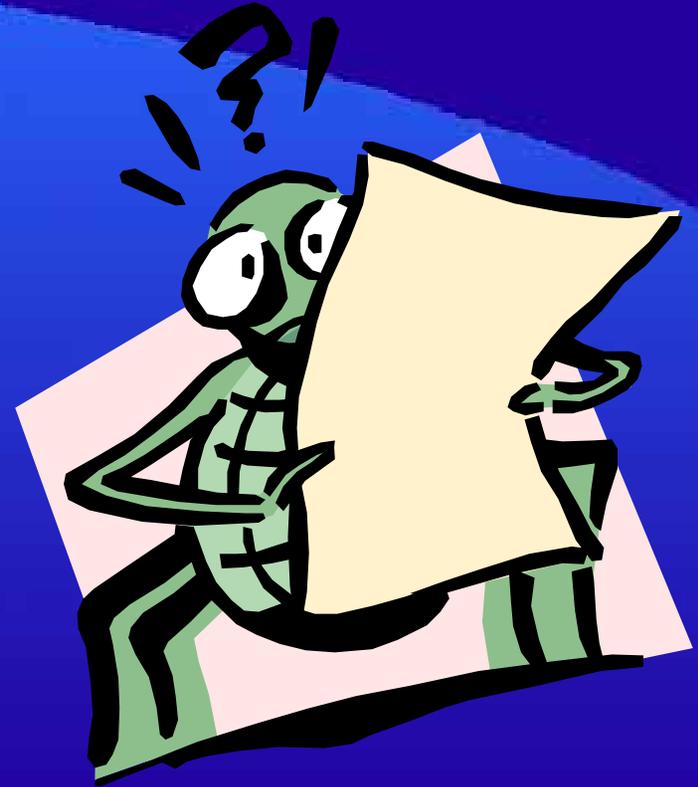
YY number of connectors in 12 inches of belt length

ZZ wire gages used to produce belt

If two different sizes of wire are used, the gage of the connector appears first followed by the gage of the spiral

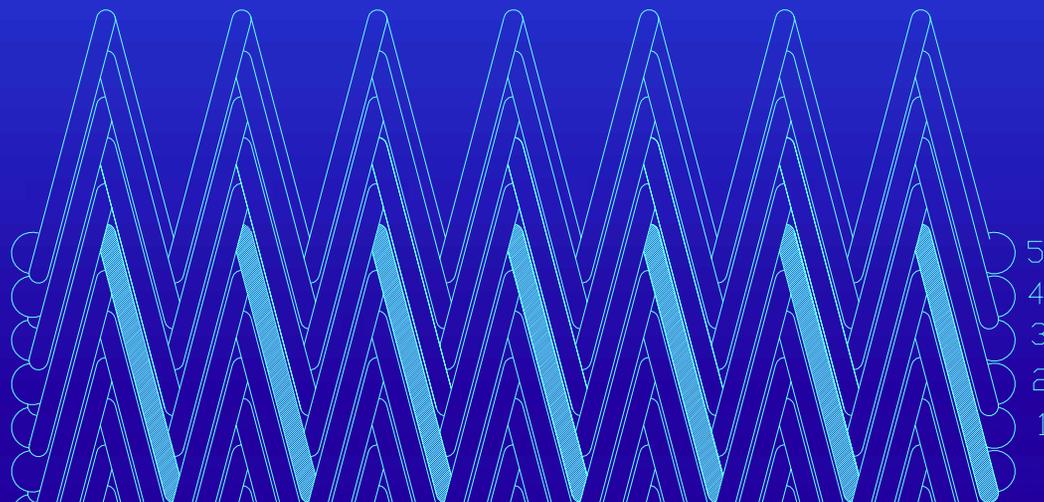
Choosing a Baking Band

- **Balanced Weave**
 - Mesh choice is nearly unlimited. Selection should consider:
 - product support
 - heat exposure
 - belt strength required for the oven design



Compound Balanced Weave - CB5 27-84-1416F

- 1963 - Introduced by Ashworth Bros., Inc.
- Today this specification is the standard dense mesh band in the western hemisphere



Compound Balanced Weave - CB5 27-84-1416F

- Adequate support for all but the more fluid dough's
- Prevents entrapment of cooking gases
- Crimped connector assures positive positioning of the spirals



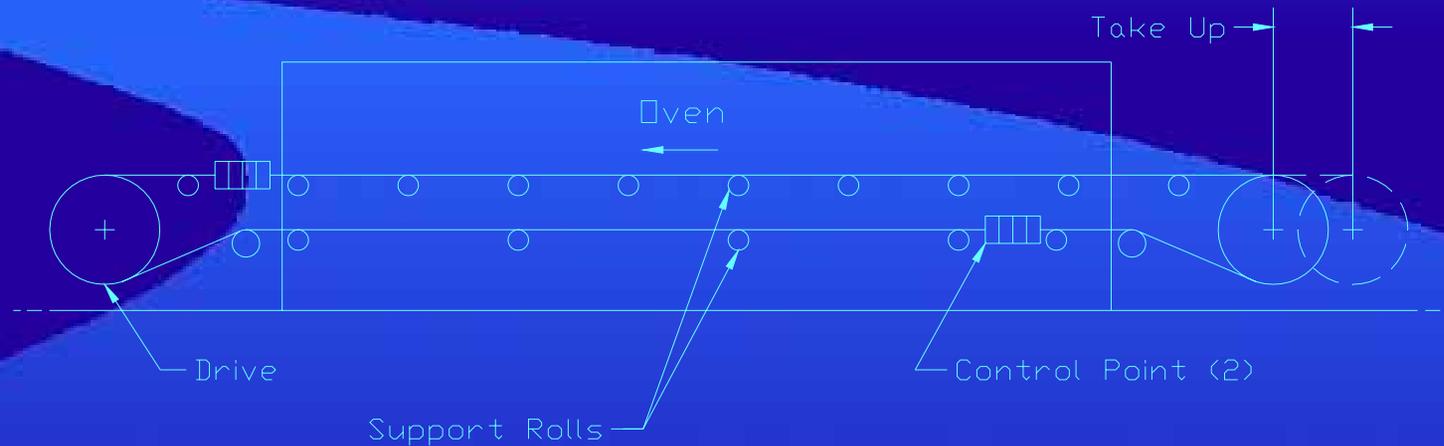
Band Options

- **Material**
 - Typically annealed high carbon steel round wire
- **Flattened Wire**
 - If a more flat conveying surface is required the spirals can be made from a flattened wire
 - The letter "F" as a suffix is added to the mesh designation to specify *flattened wire*

Band Options

- **PGLW (Precision Ground Light Weight)**
 - Flatten the surface of an open mesh band by precision grinding the surface after manufacture. This feature is currently limited to band widths of 54" [1370 mm] or less

Layout of Baking Conveyors



- Terminal Drums
- Major & Minor Rolls
- Band Support
- Take Up
- Control Systems

Terminal Drums

- Located at the terminal ends of the conveyor
- One serves as drive and the other an idle
- Flat Faced – never crowned!!
- Must be large enough to insure good contact and maximum flexibility as the band travels around the drum

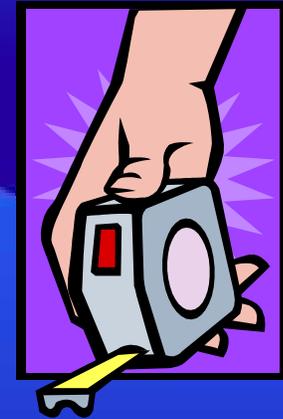
Terminal Drums

- Minimum Drum Diameter =
 - $180 / (\text{mesh second count})$ for BW and U
 - $180 / (\text{mesh second count}/3)$ for CB3
 - $180 / (\text{mesh second count}/5)$ for CB5



Terminal Drums

- Drums are several inches wider than the band
- Must be level, parallel to each other, and square to the centerline of the conveyor
- Must be clean, no product build-up on surface



Major & Minor Rolls

- Snub rolls and bend rolls
- Insure adequate belt wrap around terminal drums
- Align with the terminals
- Do not move out of parallel



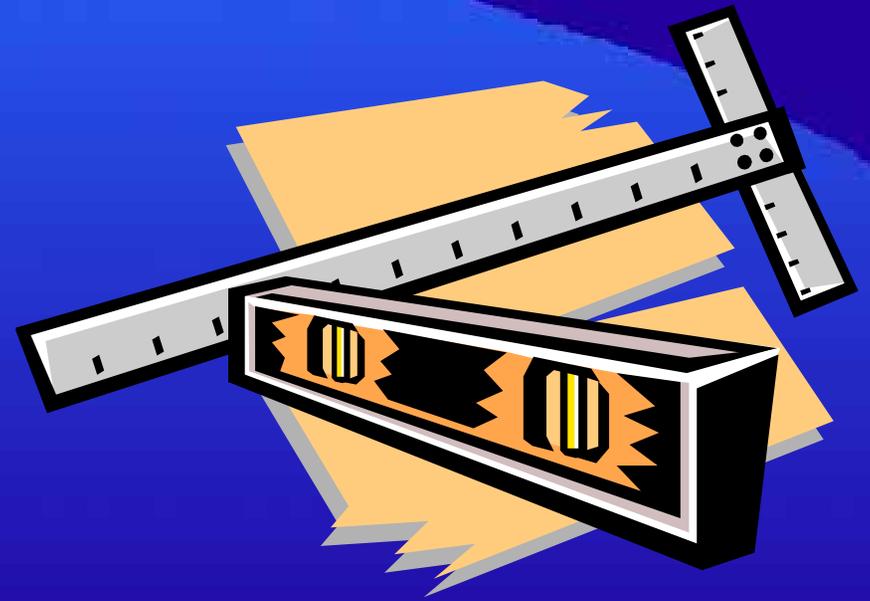
Band Supports

- **Free Turning Rollers - Recommended**
 - Free turning, horizontally adjustable
 - Externally mounted bearings
 - Minimize wear on the band
 - Account for lower tension to overcome friction in the system
 - Aid in band tracking



Band Supports

- **Skid Rails**
 - Cut costs
 - Must be level and have a uniform surface
 - Adjustments can be made only when the oven is cold



Take - Up

- Apply tension necessary to cause the band to move
- Must be automatic to maintain uniform tension as the band expands and contracts with temperature
- Most oven systems today use an air cylinder take-up



Control Systems

- Restrain the belt until all alignment and tracking adjustments are complete
- Act as a sensing device to indicate tracking problems

Band Performance

- Select a band suitable for the product and baking environment
- Consider:
 - *Material* suitable for baking environment
 - *Baking surface* compatible with dough
 - *Opening size* with consideration of product size, air flow, and band temperature
 - *Markings* on the product
 - *Band strength* required for oven design

Band Performance

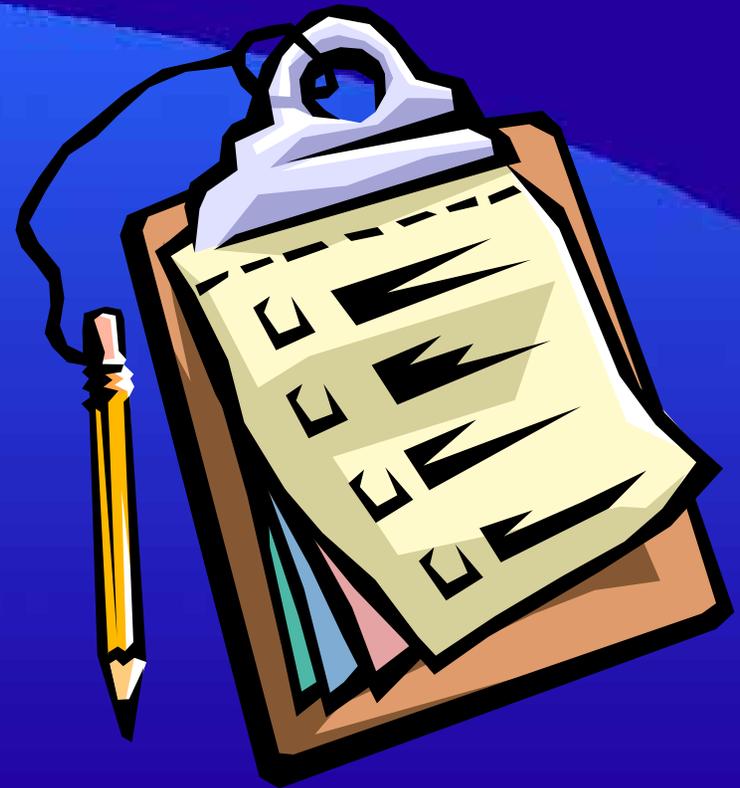
- Purchase a band that will run straight
- Insure all components of the conveying system are in good condition and aligned properly
- Install the band without damage and in the proper direction of travel

Band Performance

- Adjust the conveyor components to create a straight path with uniform tension across the band width
- Exert zero or minimal forces to maintain this path
- Maintain this condition and alignment of band and the conveying system

Installation of Baking Bands

- **Inspection**
 - Belt path for obstructions
 - Conveyor and oven components are in good working condition



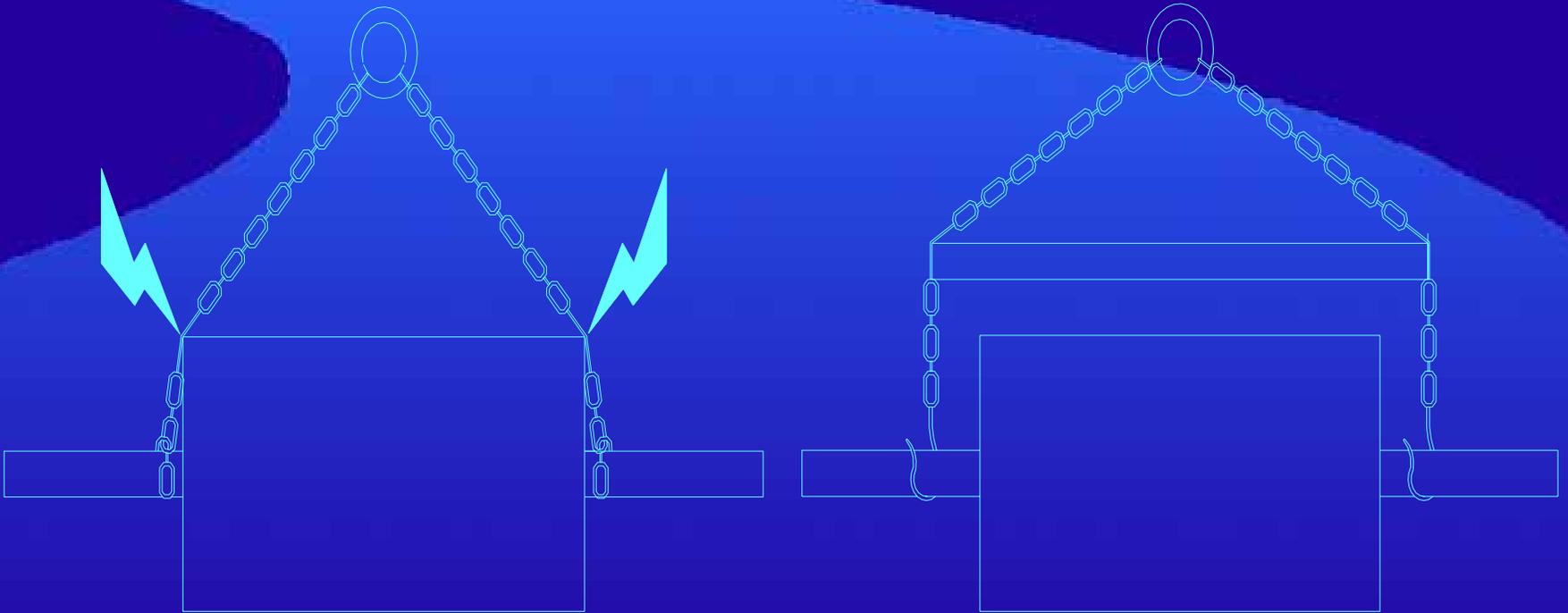
Installation of Baking Bands

- Conveyor Alignment
 - Terminal rollers must be level, parallel to each other, and perpendicular to the oven centerline
 - Most common methods used to align terminals are:
 - "Diagonal-Parallel" method
 - "Centerline" method
 - Transit alignment
 - All measurements should be within $\pm 1/32$ inch [1 mm].



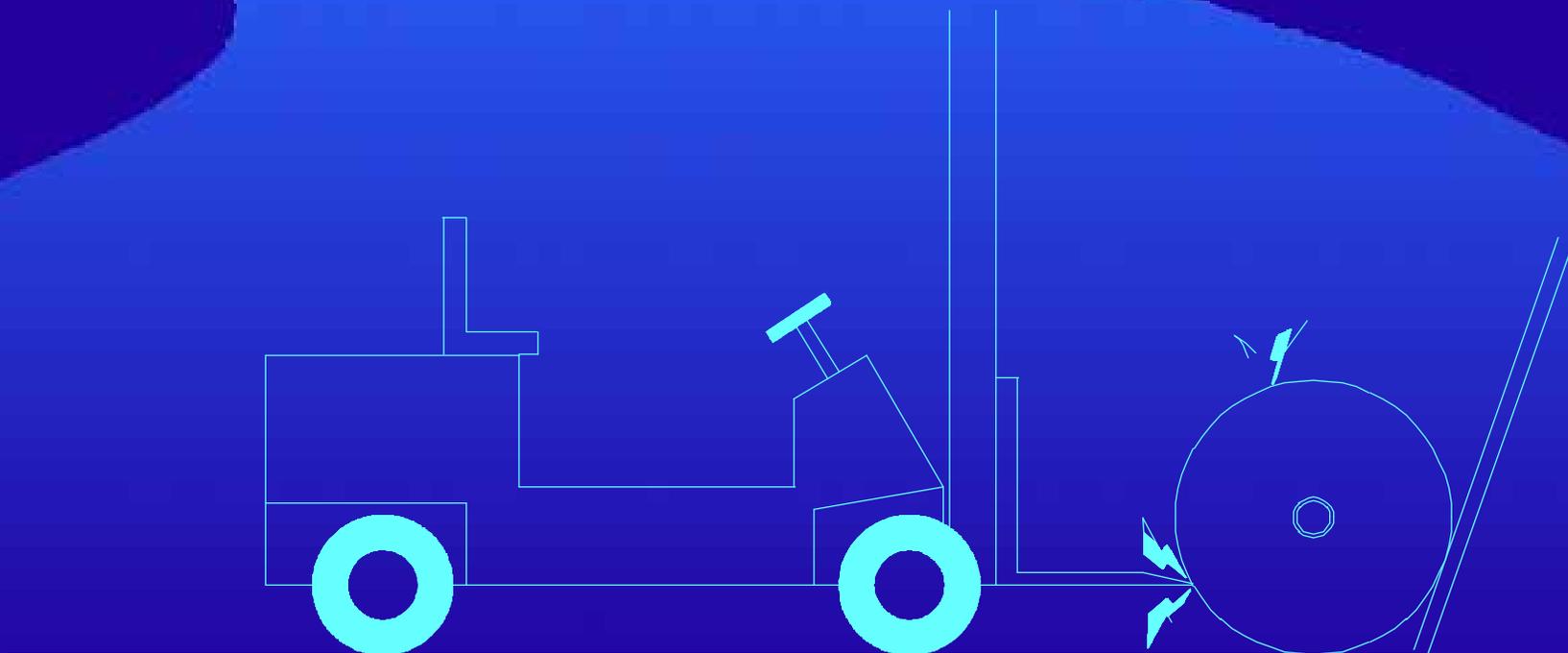
Band Installation

Slings should use a spreader bar design.



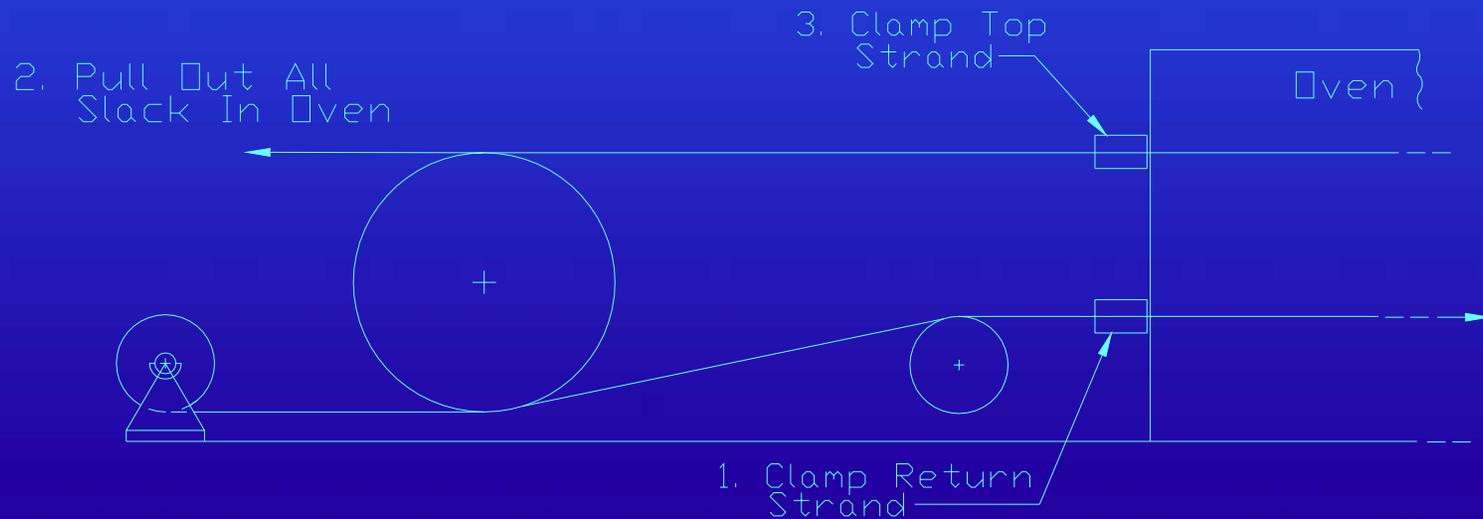
Band Installation

Uncrate the band with care. Avoid blows or concentrated pressure on the roll circumference



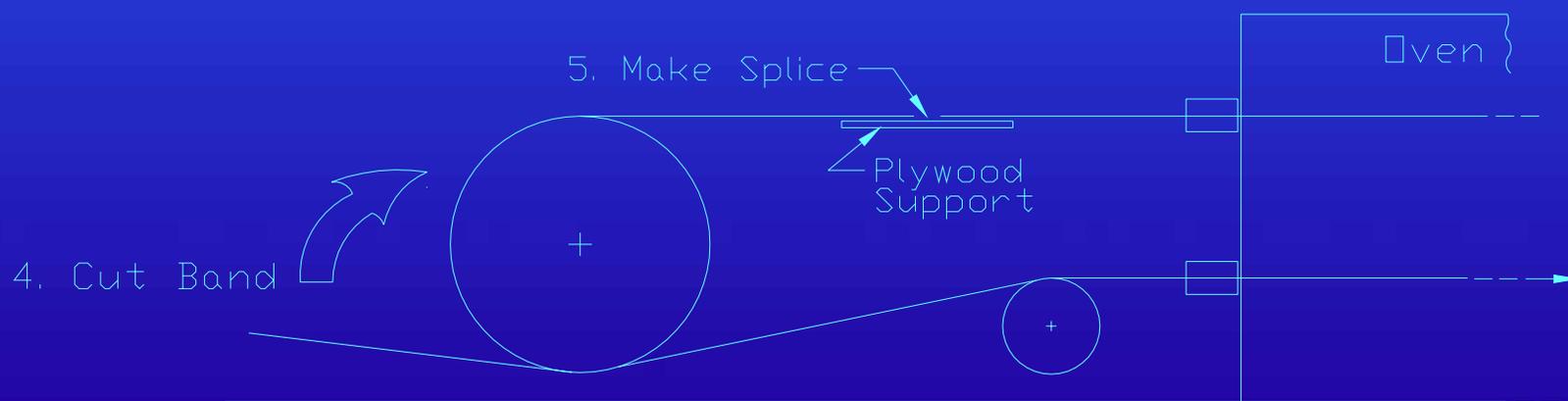
Band Installation

- To make the final splice:
 1. Clamp the band where it first enters the oven
 2. Pull until the band is tight throughout the oven
 3. Clamp the band at the oven exit



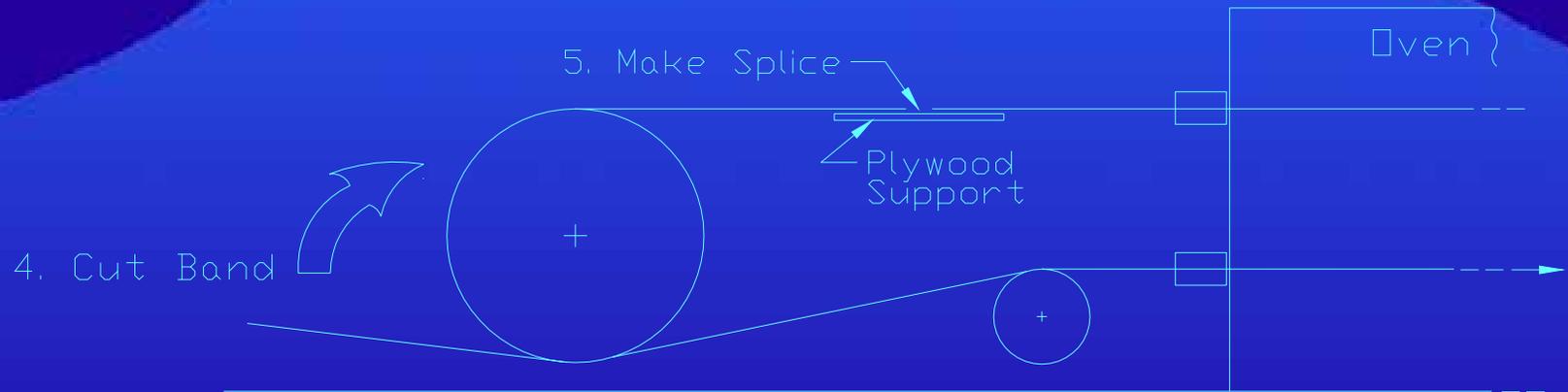
Band Installation

4. Disconnect the rope or cable and remove any excess band so that the final splice will fall on top between the oven and the drum. Make the final cut so that a right hand spiral is mating with a left hand spiral (Exception: Unilateral weaves have all the same hand spiral)



Band Installation

5. Insert the connectors and remove all clamps



Band Installation

Splice together each succeeding roll of band using the correct number of connectors

Balanced Weave

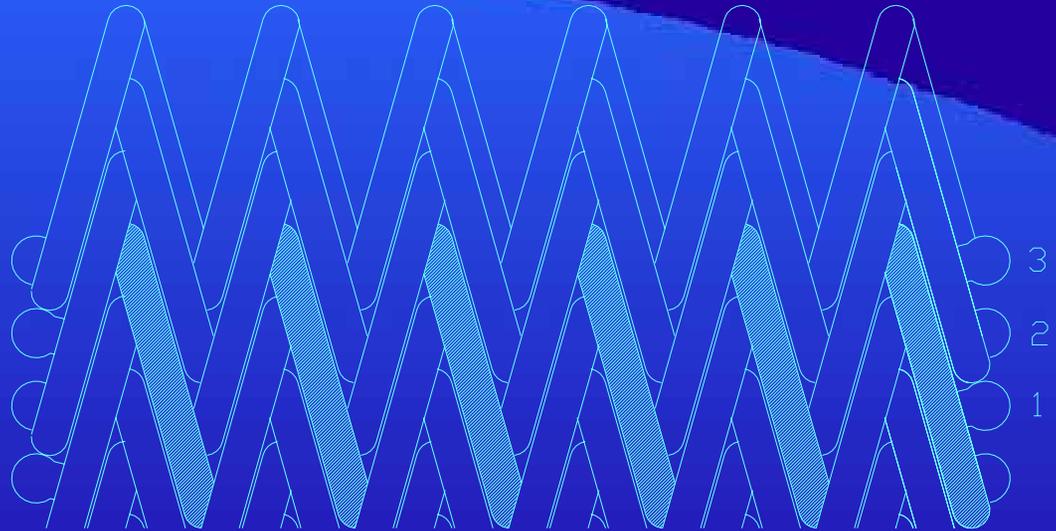
1 connector



Band Installation

CB3

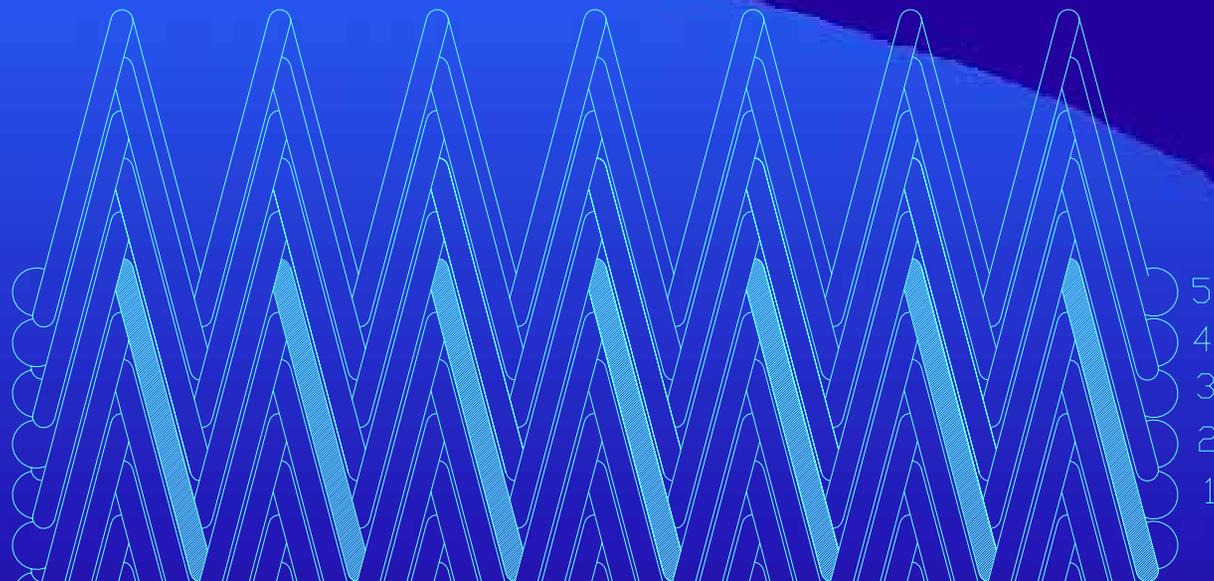
3 connectors



Band Installation

CB5

5 connectors



Band Installation



- Trim the connectors about 1/16 inch [2 mm] from the belt edge
- Use a small tip acetylene torch with reduced pressure and a neutral flame
- With sharp nosed pliers holding the spiral and connector in contact, apply the torch to the end of the connector until it forms a molten ball

Band Installation

- Then flow it back to the spiral where the two will visibly flow together
- For the CB5, the spiral wire is small and will not tolerate a lot of heat before it disappears
- Remove the torch quickly when the flow takes place



WELDS MUST NOT
BRIDGE FROM ONE
PITCH TO THE NEXT

Band Installation

- **Band Take-Up**
 - Shortest position at the time of the final splice
 - For a CB5 27-84-1416F baking band, the take-up pressure should apply 100 lb. per inch of belt width [17.5 N/mm] to move the band



Band Installation

- To determine the pressure setting:

Pressure = Force/Area

Force = (100 lb./in)(belt width in inches), or
(17.5 N/mm)(belt width in mm)

Area = cross sectional area of each cylinder in
in² or mm²

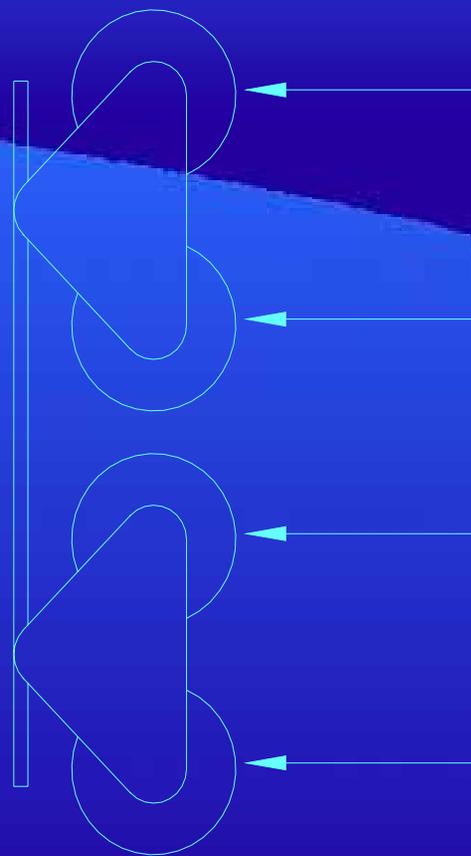


Control Systems

- Ashworth control systems are simple mechanical devices that have been successfully used for over 20 years
- No electrical or air power is required
- Designed in double tandem configuration (three pivot points) that divide any lateral forces among four contact points to avoid stressing the band edges

Control Systems

- Locate controls three (3) band widths prior to the terminal drums
- If the system utilizes a snub roll with a significant arc of band contact, locate control system three bands width prior to that roll.



Control Systems

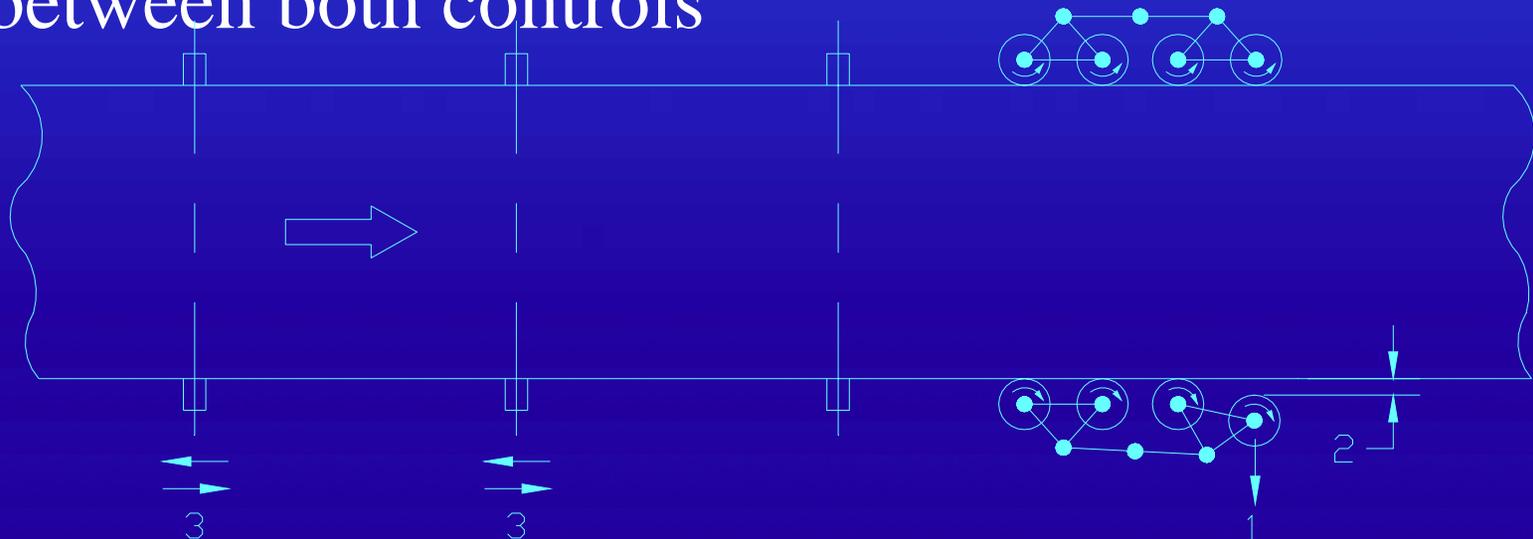
Control Clearances

A well tracked band will have only light contact with the controls, alternating in a slow cycle from one side to the other

Proper operation requires correct set-up

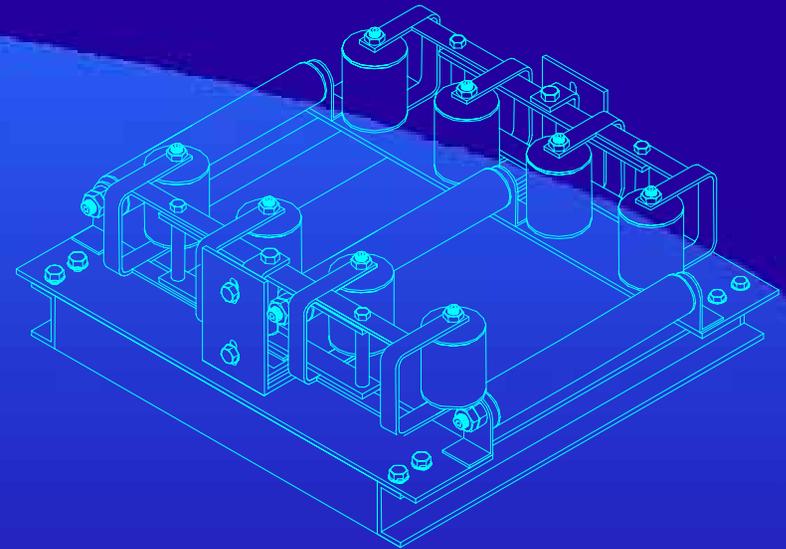
Setting the Controls

1. Gently pull on one end of the frame containing four vertical rolls so that one roll is pulled away from the belt edge and the belt is in contact with the remaining seven rolls
2. Adjust the controls so that the gap between the belt edge and the roll is $\frac{3}{8}$ to $\frac{1}{2}$ inch [10 to 13 mm]
3. Skew upstream support rolls to balance contact between both controls



Control Systems

- Model No. 1 Controls - Recommended
 - System includes base frame and three horizontal rolls
 - Four vertical rolls contacting 18 inches [457 mm] of band edge
 - Band width limited to 60 inches [1525 mm] or less



Control Systems

- Suitable for all spiral meshes.
- Guide rolls adjust vertically to move roll to new wear point
- Available with either ball bearings or ZW (zero wear) carbide bearings
- Two control units required per system

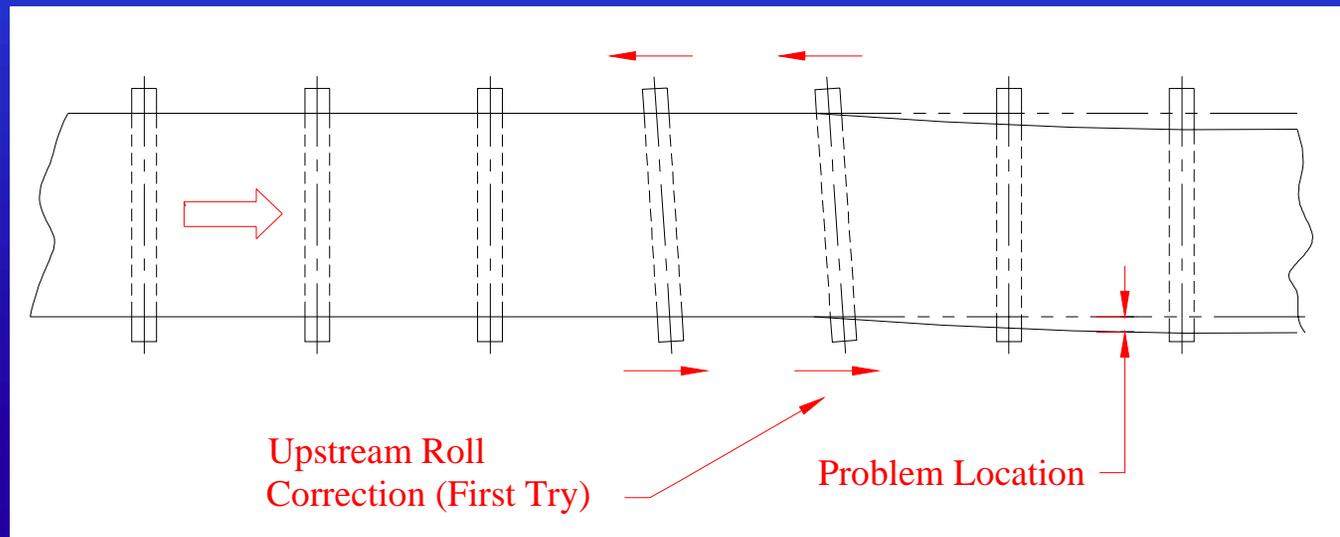
Tracking Your Band

- Track belt path using support rollers
- NEVER adjust terminal drums or snub rolls



Tracking Your Band

- The band will attempt to leave a free turning roller at 90° to its axis
- Adjust rollers prior to trouble area
- Move several rollers a small amount



Tracking Your Band



- Rollers with frozen bearings affect the band oppositely
- Behave like skid bars

Maintenance

- Inspection and Prevention
 - Band
 - Path
 - Oven
 - Drums and Major Rolls



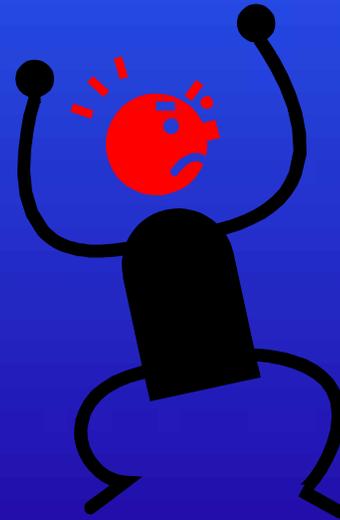
Maintenance



- Inspection and Prevention
 - Control System
 - Take-up
 - Roller Supports
 - Slider Supports

When Things Go Wrong

- **Belt Sag**
 - Tension
 - Alignment
 - Temperature variation



When Things Go Wrong

- **Band mis-tracking**
 - Product loading
 - Temperature Variations
 - Frozen/broken bearings



When Things Go Wrong

- **Vibration**
 - Tension
 - Eccentric rollers
 - Loose framework
 - Band speed
 - Support roll spacing



Cleaning Your Band

- **Key is prevention**
 - Prevention through inspection
 - Monitor daily
 - Maintain a routine



Cleaning Cracker Bands

- Debris build-up is seldom a problem
- Band brush usually sufficient



Cleaning Sweet Goods Bands

- Product build-up can be a real problem
- Least messy method is a burn off
 - 800-900° F on moving band
 - May require added burners
 - Keep the band moving



Cleaning Sweet Goods Bands

- Soft accumulations can be steam cleaned
- Hard on systems – corrosion
- Must have adequate drainage for water
- Do not steam clean a hot band
- Season the band after cleaning



Product Accumulation

- Result of product accumulations
 - Inability to flex around drums
 - Change in bake properties
 - Discolored product
- Prevention is key to avoiding future problems



Thank-you

