ACADEMY / TECHNICAL TRAINING SERIES

HOT VULCANISED OVERLAP / STEP SPLICING

MODULE 07 / ASSESSOR GUIDE & ANSWER KEY

LEARNER NAME _____

DATE _____ TRAINER / ASSESSOR _____

ONLINE TRAINING / VIDEO LINK _____

TRAINING SCOPE Theory only. Hot vulcanising requires a competent authorised team, site-specific risk controls, approved splice specification, verified press settings and supervised practical assessment.

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Module Overview

This module introduces the principles of hot vulcanised overlap and stepped splicing for fabric conveyor belts.

Hot vulcanising is a permanent belt joining method that uses heat, pressure and uncured rubber materials to bond the belt ends together. When carried out correctly, a hot vulcanised splice can provide a strong, smooth and long-lasting joint.

A good vulcanised splice depends on correct planning, accurate marking, careful preparation, clean working conditions, correct materials, correct press setup, controlled curing and proper cooling.

A poor splice may fail because of incorrect preparation, contamination, poor alignment, wrong splice length, incorrect pressure, uneven temperature, trapped air, poor material selection or opening the press too early.

This module is designed for engineers, fitters, belt technicians, maintenance teams, apprentices, supervisors and companies wanting to improve in-house conveyor belt splicing knowledge.

This module can be used as a classroom training guide, toolbox talk, apprentice handout or self-training document.

Important Safety and Training Notice

This module is for general training and awareness only.

Hot vulcanised splicing should only be carried out by competent and trained people using the correct equipment, materials and method for the belt being joined.

Always follow:

- Site safety rules
- Risk assessments
- Method statements
- Permit-to-work systems
- Lock-off and isolation procedures
- Belt manufacturer instructions
- Splice material supplier instructions
- Vulcanising press manufacturer instructions
- Temperature, pressure and cure-time guidance for the specific belt and material system
- Electrical safety requirements
- Manual handling and lifting procedures
- Company procedures
- Local health and safety requirements

Do not use a generic training guide as the only instruction for a live splice.

If you are unsure, stop and ask a competent supervisor.

Learning Objectives

By the end of this module, the learner should be able to:

1. 1. Understand what hot vulcanised splicing is.
2. 2. Understand where overlap and stepped splices may be used.
3. 3. Identify the main parts of a fabric belt splice.
4. 4. Understand why splice planning is important.
5. 5. Explain the purpose of bias angle, splice length and step length.
6. 6. Understand the importance of accurate marking and belt alignment.
7. 7. Understand the basic preparation sequence for a stepped splice.

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8. 8. Understand why clean, dry and contamination-free preparation is essential.
9. 9. Understand the purpose of tie gum, skim rubber, cover rubber and edge rubber.
10. 10. Understand the basic press setup, cure, cooling and inspection stages.
11. 11. Recognise common causes of vulcanised splice failure.
12. 12. Complete a basic hot vulcanised splice checklist.

1. What Is Hot Vulcanised Splicing?

Hot vulcanised splicing is a method of joining two conveyor belt ends together using heat, pressure and uncured rubber materials.

The splice area is prepared, built with the correct rubber materials, placed inside a vulcanising press and cured under controlled heat and pressure.

The aim is to create a strong joint that becomes part of the belt structure.

Hot vulcanised splices are often used where a smooth, permanent and strong joint is required.

They may be used on:

- Quarry conveyors
- Recycling conveyors
- Mining conveyors
- Bulk handling conveyors
- Aggregate conveyors
- Sand and gravel conveyors
- Fixed plant conveyors
- Longer conveyor systems
- Higher-duty belt applications

Model answer

Hot vulcanised splicing joins two conveyor belt ends using heat, pressure and uncured rubber materials. The aim is to create a strong, smooth and permanent joint.

2. What Is an Overlap / Step Splice?

An overlap or stepped splice is commonly used on multi-ply fabric conveyor belts.

The belt ends are prepared so that the plies overlap each other in steps. Each ply is stepped back by a set distance, allowing the strength layers of both belt ends to overlap and bond together.

This creates a longer bonding area than a simple butt joint.

A stepped splice may include:

- Top cover removal
- Bottom cover removal
- Ply stepping
- Bias angle
- Tie gum or skim rubber
- Cover rubber
- Edge rubber
- Press curing

The exact splice design depends on the belt type, belt rating, number of plies and manufacturer guidance.

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Model answer

A stepped splice joins the belt ends by overlapping the fabric plies in steps. This creates a larger bonding area and helps transfer belt tension through the splice.

3. When Hot Vulcanising May Be Used

Hot vulcanising may be suitable when:

- A permanent splice is required.
- A smooth joint is needed.
- Mechanical fasteners are not suitable.
- The conveyor has belt cleaners or scrapers.
- Material leakage through a mechanical joint would be a problem.
- The conveyor duty is medium or heavy.
- The belt is suitable for vulcanising.
- The correct press is available.
- The correct materials are available.
- There is enough time and access to complete the splice properly.
- Conditions can be controlled.

Hot vulcanising may not be suitable if the site conditions, belt condition, access, time, weather or available equipment cannot support a proper splice.

Model answer

Hot vulcanising may be used when a strong, smooth and permanent joint is required and the correct belt, materials, equipment, time and working conditions are available.

4. Limits of Hot Vulcanising

Hot vulcanising is not automatically the right answer for every belt.

It may not be suitable if:

- The belt is badly contaminated.
- The belt carcass is damaged beyond repair.
- The belt is too worn.
- The belt type is unknown.
- The correct materials are not available.
- The press is too small.
- The power supply is unsuitable.
- The work area cannot be kept clean and dry.
- The weather cannot be controlled.
- The splice length cannot be achieved.
- The belt is not suitable for hot vulcanising.
- The team is not competent.
- The site cannot allow enough downtime.

A rushed vulcanised splice can be worse than a correctly fitted temporary mechanical repair.

Model answer

Hot vulcanising has limits. It needs the correct belt condition, materials, equipment, access, time, temperature, pressure and trained people.

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5. Main Parts of a Fabric Belt Splice

A fabric belt splice may include several parts.

Belt Covers

The top cover protects the belt from material wear.

The bottom cover protects the belt as it runs over pulleys and rollers.

Fabric Plies

The fabric plies provide the tensile strength of the belt.

Ply Steps

The ply steps are the prepared overlapping fabric layers.

Tie Gum or Skim Rubber

Tie gum or skim rubber helps bond the prepared fabric plies together.

Cover Rubber

Cover rubber replaces the removed top and bottom covers over the splice.

Edge Rubber

Edge rubber seals and protects the splice edges.

Bias Cut

The bias cut is the angled splice line across the belt.

Model answer

The main parts of a fabric belt splice include the belt covers, fabric plies, ply steps, tie gum or skim rubber, cover rubber, edge rubber and bias cut.

6. Splice Planning

Before starting the splice, plan the job properly.

Check:

- Belt width
- Belt rating
- Number of plies
- Belt thickness
- Top cover thickness
- Bottom cover thickness
- Belt condition
- Splice method
- Splice length
- Step length
- Bias angle
- Press size

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- Press pressure capability
- Temperature capability
- Power supply
- Cables and connectors
- Water cooling if required
- Correct uncured rubber materials
- Material shelf life
- Work area protection
- Weather conditions
- Isolation and lock-off
- Belt tension control
- Clamping and support
- Time required
- Competence of the team

Do not start cutting until the splice has been planned and checked.

Model answer

Splice planning makes sure the correct belt information, splice design, materials, press, power supply, working area and safety controls are ready before cutting begins.

7. Splice Length

Splice length is the total length of belt required to prepare and build the joint.

Splice length depends on:

- Belt type
- Belt rating
- Number of plies
- Belt width
- Belt thickness
- Splice design
- Pulley diameter
- Conveyor duty
- Manufacturer recommendations
- Site requirements

A higher-rated belt or belt with more plies usually needs a longer splice.

Do not guess the splice length. Use the approved splice specification for the belt and material system.

Model answer

Splice length is the total prepared length of the joint. It depends on belt construction, rating, number of plies and splice design. It should follow approved guidance, not guesswork.

8. Step Length

Step length is the distance each fabric ply is stepped back during preparation.

The purpose of step length is to spread belt tension through the splice.

If the steps are too short, the splice may be weak.

If the steps are uneven, the splice may load unevenly.

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If the steps are badly cut, the splice may not bond correctly.

Each step should be measured, marked and prepared accurately.

Model answer

Step length is the distance between each ply step. Correct step length helps spread the load through the splice and improves splice strength.

9. Bias Angle

The bias angle is the angle of the splice across the belt.

A bias angle helps the splice pass over pulleys and rollers more smoothly instead of the full splice edge hitting the pulley at once.

Common bias angles may include:

- 17 degrees
- 19 degrees
- 22 degrees

The correct angle should follow the approved splice procedure or belt supplier guidance.

The same bias angle must be used consistently across the splice.

Model answer

The bias angle is the angled cut across the belt. It helps the splice run more smoothly over pulleys and rollers.

10. Belt Centre Line and Alignment

The belt centre line is used to align both belt ends before and during the splice.

Do not rely only on worn or damaged belt edges.

Basic method:

13. 1. Measure the belt width.
14. 2. Mark the centre point at several positions.
15. 3. Draw a straight centre line.
16. 4. Repeat on the other belt end.
17. 5. Align both centre lines before building the splice.
18. 6. Check that the belt ends are not twisted or offset.

Poor alignment can cause tracking problems and uneven splice loading.

Model answer

The belt centre line helps align both belt ends correctly. Poor alignment can cause tracking problems and uneven stress in the splice.

11. Work Area Setup

A hot vulcanised splice needs a clean, safe and controlled working area.

Check:

- Conveyor is isolated and locked off.
- Stored energy is controlled.

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- Belt is clamped and supported.
- Take-up is secure.
- Work area is clean.
- Lighting is suitable.
- Weather protection is in place.
- Dust and falling material are controlled.
- Tools are organised.
- Press parts can be lifted safely.
- Power supply is suitable.
- Cables are routed safely.
- Splice materials are kept clean and dry.
- Fire risks are controlled.
- People are clear of the line of tension.

A dirty or wet splice area can cause failure even if the rest of the method is correct.

Model answer

The work area must be clean, dry, safe and controlled. The belt must be clamped and isolated, and splice materials must be protected from contamination.

12. Tools and Equipment Required

A hot vulcanised fabric belt splice may require:

- Tape measure
- Steel rule
- Straight edge
- Belt square
- Chalk line
- Marker or chalk
- Belt knives
- Skiving knives
- Hook knives
- Spare blades
- Blade disposal container
- Belt clamps
- Pulling clamps
- Hand rollers
- Stitcher rollers
- Buffing tools
- Cleaning brushes
- Approved solvent and cloths
- Uncured tie gum or skim rubber
- Uncured cover rubber
- Edge rubber
- Release paper or silicone cloth
- Packing materials
- Vulcanising press platens
- Press beams
- Airbag or pressure system
- Control box

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- Temperature probes
- Power cables
- Cooling hoses if required
- PPE
- Fire extinguisher where required

The exact tools depend on the belt, splice system and press type.

Model answer

Hot vulcanised splicing requires measuring tools, cutting tools, buffing tools, cleaning materials, splice rubber materials, belt clamps, hand rollers, a vulcanising press and suitable PPE.

13. Inspecting the Belt Before Splicing

Before preparing the splice, inspect the belt.

Check:

- Belt type
- Belt rating
- Number of plies
- Cover condition
- Edge condition
- Ply condition
- Previous splice condition
- Oil contamination
- Grease contamination
- Moisture
- Heat damage
- Chemical damage
- Ply separation
- Belt wear
- Cracking
- Holes or tears

If the belt is badly damaged or contaminated, the splice may not be reliable.

Model answer

The belt must be inspected to make sure it is suitable for hot vulcanising. Damage, contamination, wear or ply separation may affect the splice quality.

14. Marking the Splice

Marking must be accurate.

Mark:

- Belt centre line
- Cut line
- Bias angle
- Splice length
- Step lengths
- Cover removal area
- Ply steps

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- Edge trim lines
- Alignment marks

Check all measurements before cutting.

Good practice is to have another competent person check the marking before preparation begins.

Model answer

Accurate marking makes sure the splice length, bias angle, steps and alignment are correct. Poor marking can lead to poor tracking or splice failure.

15. Cutting the Belt Ends

The belt ends should be cut cleanly and accurately according to the marked splice design.

Before cutting:

- Confirm isolation and lock-off.
- Confirm belt tension is controlled.
- Confirm belt clamps are secure.
- Confirm cut line is correct.
- Keep hands away from the cutting line.
- Use sharp blades.
- Cut with controlled pressure.
- Do not rush.
- Keep the cut clean and accurate.

If the cut is wrong, stop and assess before continuing.

Model answer

The belt ends must be cut safely and accurately. The belt must be isolated, clamped and marked correctly before cutting starts.

16. Removing Covers

For a stepped splice, the top and bottom covers may need to be removed in controlled areas.

Cover removal must be done carefully to avoid damaging the fabric plies.

Good practice includes:

- Follow the marked lines.
- Use the correct knife angle.
- Remove only the required cover material.
- Avoid cutting into the fabric.
- Keep step edges clean.
- Remove loose rubber.
- Keep the prepared area clean.

Cover removal quality affects the final splice thickness and bond.

Model answer

Covers are removed to expose and prepare the splice area. The cover should be removed carefully without damaging the fabric plies.

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17. Ply Separation and Stepping

Ply separation is the process of separating the belt plies so each layer can be stepped.

This is a skilled part of splicing.

During ply separation:

- Follow the marked step lengths.
- Use controlled knife work.
- Avoid tearing the fabric.
- Avoid cutting through the wrong ply.
- Keep the ply surface clean.
- Keep step edges even.
- Do not pull plies aggressively.
- Stop if the fabric starts to tear incorrectly.

Both belt ends must be prepared so the steps match correctly.

Model answer

Ply separation and stepping prepare the fabric layers so they can overlap and bond. The plies must not be cut, torn or contaminated.

18. Buffing the Prepared Area

Buffing prepares rubber and fabric surfaces for bonding.

Buffing should:

- Remove surface contamination
- Remove gloss
- Create a suitable bonding texture
- Avoid burning the rubber
- Avoid damaging fabric plies
- Avoid deep grooves
- Avoid polishing the surface
- Leave an even prepared surface

After buffing, remove dust using the approved method.

Do not touch prepared surfaces with dirty gloves or oily hands.

Model answer

Buffing prepares the splice surfaces for bonding. It must be controlled so the surface is clean and textured without damaging the belt.

19. Cleaning the Splice Area

The splice area must be clean and dry before materials are applied.

Check for:

- Dust
- Moisture
- Oil
- Grease

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- Loose rubber
- Dirty tools
- Dirty gloves
- Old adhesive
- Mud
- Contaminated cloths

Use only approved cleaning products and methods.

Allow cleaned surfaces to dry properly before applying splice materials.

Model answer

The splice area must be clean and dry because contamination can stop the rubber materials bonding properly.

20. Applying Tie Gum or Skim Rubber

Tie gum or skim rubber is used between prepared surfaces to help bond the splice together.

Before applying:

- Confirm the correct material.
- Check shelf life.
- Keep material clean.
- Cut to the correct size.
- Avoid touching bonding surfaces.
- Apply smoothly.
- Avoid wrinkles.
- Avoid trapped air.
- Roll firmly with a hand roller.

The material should match the splice system and belt type.

Model answer

Tie gum or skim rubber helps bond the prepared fabric and rubber surfaces together. It must be clean, correct and applied without trapped air or wrinkles.

21. Building the Splice

Building the splice means placing and assembling the prepared belt ends and rubber materials in the correct order.

Good splice building requires:

- Accurate alignment
- Correct overlap
- Correct step matching
- Clean materials
- Firm rolling
- No trapped air
- No wrinkles
- Correct edge build-up
- Correct cover rubber placement
- Correct final thickness

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- Correct press packing

Work carefully and check each layer before moving to the next.

Model answer

Building the splice means assembling the belt ends and rubber materials correctly. Alignment, cleanliness, rolling and removal of trapped air are critical.

22. Removing Trapped Air

Trapped air can weaken a splice.

Air may become trapped between:

- Fabric plies
- Tie gum layers
- Cover rubber
- Edge rubber
- Repair materials
- Belt surfaces

Use hand rollers or stitcher rollers to press materials together.

Roll from the centre outwards where suitable.

Do not trap folds, wrinkles or pockets of air.

Model answer

Trapped air must be removed because it can create weak areas or voids in the splice. Rolling helps improve contact between layers.

23. Edge Build-Up and Edge Rubber

The splice edges should be properly built and sealed.

Edge rubber helps protect the splice edges from:

- Moisture
- Dirt
- Edge damage
- Material ingress
- Ply exposure
- Early separation

Poor edge build-up can allow the splice to open at the sides.

Model answer

Edge rubber helps seal and protect the splice edges. Poor edge preparation can allow moisture and dirt to enter the splice.

24. Cover Rubber

Cover rubber is used to replace the removed belt covers over the splice.

It should be:

- Correct grade

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- Correct thickness
- Clean
- Within shelf life
- Cut to the correct size
- Rolled firmly
- Free from trapped air
- Correctly positioned

The final splice should not have excessive high spots or low spots.

Model answer

Cover rubber replaces the belt cover over the splice. It protects the splice and helps restore the belt surface.

25. Release Materials and Packing

Before the press is closed, release materials and packing may be used.

These can include:

- Release paper
- Silicone cloth
- Edge bars
- Packing plates
- Pressure pads
- Fill strips
- Caul plates where required

Their purpose may include:

- Preventing sticking to platens
- Controlling splice thickness
- Supporting belt edges
- Improving pressure distribution
- Keeping the splice surface smooth

Use only materials suitable for vulcanising temperature and pressure.

Model answer

Release materials and packing help control the splice during pressing, prevent sticking and support correct thickness and pressure.

26. Vulcanising Press Setup

The vulcanising press must be suitable for the splice.

Check:

- Platen length covers the full splice.
- Platen width covers the full belt width.
- There is suitable overlap beyond belt edges.
- Beams are suitable and correctly positioned.
- Pressure system is working.
- Temperature controls are working.
- Temperature probes are placed correctly.
- Cables and plugs are safe.

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- Power supply is correct.
- Cooling system is available if required.
- Press parts are clean and undamaged.
- Hands are clear during tightening.
- The press is stable and evenly assembled.

Do not use damaged or unsuitable press equipment.

Model answer

The vulcanising press must cover the full splice and be capable of applying the correct heat and pressure safely and evenly.

27. Pressure, Temperature and Cure Time

Pressure, temperature and cure time must follow the belt and splice material specification.

There is no single universal setting for all belts.

Typical hot vulcanising settings may often involve controlled heat and pressure, but the exact values depend on:

- Belt type
- Belt thickness
- Rubber compound
- Splice material
- Press type
- Manufacturer guidance
- Ambient conditions
- Splice design

As a general example only, some fabric belt systems may cure around the 140°C to 150°C range, and some press systems may work around 7 bar / 100 psi pressure, but these are not universal values.

Always use the approved specification for the belt and material system being used.

Model answer

Pressure, temperature and cure time must match the belt and splice material specification. Generic values should not be used as the only instruction for a live splice.

28. Heating the Press

When heating the press, check:

- Temperature is rising evenly.
- Control box is operating correctly.
- Probes are reading properly.
- Cables are not overheating.
- The press remains stable.
- No smoke, burning smell or abnormal issue is present.
- The cure timer is started according to the approved procedure.

Temperature must be controlled across the splice area.

Uneven heat can cause poor curing and splice weakness.

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Model answer

The press should heat evenly and safely. Uneven or incorrect temperature can cause poor curing and weak splice performance.

29. Cure Stage

The cure stage is where the splice materials are vulcanised under heat and pressure.

During curing:

- Maintain the required pressure.
- Maintain the required temperature.
- Follow the correct cure time.
- Monitor the control box.
- Do not disturb the press.
- Keep the area controlled.
- Keep unauthorised people away.
- Watch for abnormal smells, smoke or equipment faults.

Do not shorten the cure time to reduce downtime.

Model answer

The cure stage bonds the splice materials under heat and pressure. The correct time, temperature and pressure must be maintained.

30. Cooling the Splice

Cooling is part of the vulcanising process.

The press should not be opened too early.

Opening too early may cause:

- Distortion
- Weak bonding
- Blisters
- Surface damage
- Edge separation
- Poor splice finish

Some presses use water cooling. Others may cool naturally or according to the press procedure.

Follow the approved cooling instructions before dismantling the press.

Model answer

The splice must be cooled correctly before the press is opened. Opening too early can damage the splice or weaken the bond.

31. Dismantling the Press

Before dismantling:

- Confirm the splice has cooled as required.
- Confirm pressure has been safely released.
- Check parts are safe to handle.
- Use heat-resistant gloves if needed.

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- Keep hands clear of pinch points.
- Lift platens and beams safely.
- Keep cables and hoses controlled.
- Do not drag dirty parts across the splice.
- Store press equipment safely.

Press parts can be heavy, hot and awkward to handle.

Model answer

The press should be dismantled only after safe cooling and pressure release. Press parts may be hot, heavy and create pinch-point risks.

32. Trimming and Finishing the Splice

After the press is removed, the splice should be inspected and finished.

This may include:

- Removing release material
- Checking surface finish
- Checking edges
- Trimming flash
- Removing loose rubber
- Checking splice thickness
- Checking alignment marks
- Checking for blisters
- Checking for voids
- Checking for poor edge fill
- Checking for contamination
- Cleaning the area

Do not cut into the belt or splice when trimming.

Model answer

Finishing the splice includes inspecting, trimming and checking the cured joint. The splice should be smooth, sound and free from obvious defects.

33. Final Splice Inspection

Before returning the conveyor to service, inspect the splice.

Check:

- Splice is fully cured.
- Surface is smooth.
- No blisters.
- No soft areas.
- No open edges.
- No visible voids.
- No major high spots.
- No deep low spots.
- No exposed fabric.
- No misalignment.
- No trapped materials.

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- Belt edges are sound.
- Tools and press parts are removed.
- Guards are refitted.
- Area is safe.

If there is a serious defect, do not restart until it has been assessed.

Model answer

The final inspection checks that the splice is cured, aligned, smooth and free from defects before the conveyor is restarted.

34. Restarting the Conveyor

Restart must be controlled.

Before restart:

- Remove tools and materials.
- Refit guards.
- Remove waste and offcuts.
- Confirm everyone is clear.
- Remove locks only by authorised persons.
- Follow the site restart procedure.
- Run slowly or jog where possible.
- Watch the splice pass over pulleys and rollers.
- Check belt tracking.
- Check scraper contact.
- Check for abnormal noise.
- Recheck after running under load.

Do not leave a new splice unchecked after restart.

Model answer

The conveyor should be restarted carefully, with people clear, guards refitted and the splice monitored over pulleys, rollers and scrapers.

35. Common Causes of Vulcanised Splice Failure

Common causes include:

- Incorrect splice length
- Incorrect step length
- Poor alignment
- Wrong bias angle
- Contamination
- Moisture
- Dust
- Oil or grease
- Damaged plies
- Over-buffing
- Under-buffing
- Wrong materials
- Expired materials

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- Trapped air
- Poor rolling
- Incorrect pressure
- Incorrect temperature
- Incorrect cure time
- Opening the press too early
- Poor cooling
- Bad edge build-up
- Poor belt condition
- Conveyor tracking problems
- Incorrect belt tension
- Pulley diameter too small
- Material impact near the splice

Model answer

Vulcanised splice failure is often caused by poor preparation, contamination, wrong materials, poor alignment, incorrect curing or conveyor problems after installation.

36. Splice Record

A splice should be recorded.

Record:

- Date
- Customer or site
- Conveyor number
- Technician name
- Belt width
- Belt rating
- Number of plies
- Belt thickness
- Splice type
- Splice length
- Step length
- Bias angle
- Materials used
- Material batch numbers if available
- Press used
- Temperature setting
- Pressure setting
- Cure time
- Cooling method
- Final inspection result
- Photos before and after
- Any follow-up action required

A splice record helps with quality control, warranty review, future maintenance and training.

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Model answer

A splice record provides evidence of the method, materials, settings and inspection result. It helps with quality control and future fault finding.

Practical Exercise

Use a belt sample, splice drawing, workshop demonstration or training photograph and complete the following exercise.

1. Identify the Belt Type

Suggested learner response

Check the belt marking, construction, number of plies and cover thickness. Example: EP400/3 fabric belt.

2. Identify the Splice Method

Suggested learner response

For a multi-ply fabric belt, the splice may be a hot vulcanised stepped splice if the belt and site conditions are suitable.

3. Mark the Centre Line

Suggested learner response

Measure the belt width, mark the centre at several points and draw a straight centre line for alignment.

4. Mark the Bias Angle

Suggested learner response

Mark the approved bias angle across the belt, such as 17°, 19° or 22°, depending on the splice specification.

5. Mark the Splice Length

Suggested learner response

Mark the total splice length according to the approved splice design for the belt rating and number of plies.

6. Identify the Ply Steps

Suggested learner response

Mark each ply step according to the required step length so the plies can overlap correctly.

7. Inspect the Prepared Surface

Suggested learner response

Check that the prepared surface is clean, dry, correctly buffed, free from dust, free from oil and not over-buffed.

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8. Identify the Splice Materials

Suggested learner response

Materials may include tie gum, skim rubber, cover rubber, edge rubber, release paper and cleaning materials.

9. Check the Press Setup

Suggested learner response

Check platen size, beam position, pressure system, temperature controls, probes, cables, power supply and cooling method.

10. Complete a Final Inspection

Suggested learner response

Check that the splice is cured, cooled, trimmed, aligned, sealed at the edges and free from blisters, voids or loose material.

Knowledge Check

Question 1

What is hot vulcanised splicing?

Model answer

Hot vulcanised splicing is a method of joining belt ends using heat, pressure and uncured rubber materials.

Question 2

What is a stepped splice?

Model answer

A stepped splice overlaps the fabric plies of each belt end in steps to create a larger bonding area and transfer belt tension through the joint.

Question 3

Why is splice length important?

Model answer

Splice length provides the bonding area needed for the belt rating and construction. If it is too short, the splice may be weak.

Question 4

What is step length?

Model answer

Step length is the distance each fabric ply is stepped back during splice preparation.

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Question 5

What is the purpose of the bias angle?

Model answer

The bias angle helps the splice pass over pulleys and rollers more smoothly.

Question 6

Why is the belt centre line important?

Model answer

The centre line helps align both belt ends correctly and prevents tracking problems caused by misalignment.

Question 7

Why must the splice area be clean and dry?

Model answer

Dust, moisture, oil and contamination can prevent the splice materials from bonding properly.

Question 8

What is tie gum or skim rubber used for?

Model answer

Tie gum or skim rubber helps bond the prepared fabric and rubber surfaces together.

Question 9

Why must trapped air be removed?

Model answer

Trapped air can create voids or weak areas in the splice.

Question 10

Why must the press be the correct size?

Model answer

The press must cover the full splice area and apply even heat and pressure across the joint.

Question 11

Can the same temperature, pressure and cure time be used for every belt?

Model answer

No. Temperature, pressure and cure time must follow the belt and splice material specification.

Question 12

Why is cooling important before opening the press?

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Model answer

Cooling helps stabilise the splice. Opening the press too early can cause distortion, blisters, weak bonding or surface damage.

Question 13

What should be checked during final splice inspection?

Model answer

Check for proper cure, smooth surface, sound edges, no blisters, no voids, no exposed fabric, good alignment and no obvious defects.

Question 14

Why should the splice be monitored during restart?

Model answer

The splice should be checked as it passes over pulleys, rollers and scrapers to confirm tracking, clearance and joint condition.

Question 15

Name three causes of vulcanised splice failure.

Model answer

Common causes include contamination, moisture, poor alignment, wrong materials, trapped air, incorrect pressure, incorrect temperature, short cure time, poor cooling or damaged plies.

Self-Assessment

Tick each statement once you understand it.

- I understand what hot vulcanised splicing is.
- I understand what an overlap or stepped splice is.
- I understand why splice planning matters.
- I understand why splice length must follow approved guidance.
- I understand what step length means.
- I understand what a bias angle is.
- I understand why belt centre lines are used.
- I understand why the splice area must be clean and dry.
- I understand the basic purpose of tie gum, skim rubber and cover rubber.
- I understand why trapped air must be removed.
- I understand why the press must be suitable for the splice.
- I understand that cure settings must follow the belt and material specification.
- I understand why cooling is part of the process.
- I understand the importance of final inspection.
- I understand why splice records should be kept.

Model answer

A learner should be confident with the following before moving to Module 8:

19. 1. Hot vulcanising uses heat, pressure and uncured rubber materials to join belt ends.

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20. 2. A stepped splice overlaps fabric plies in steps.
21. 3. Splice planning confirms the belt, method, materials, tools, press and site conditions.
22. 4. Splice length depends on belt type, rating, number of plies and approved splice design.
23. 5. Step length is the distance between each ply step.
24. 6. A bias angle helps the splice run smoothly over pulleys and rollers.
25. 7. Centre lines help align both belt ends correctly.
26. 8. Dirt, dust, oil, grease and moisture can cause poor bonding.
27. 9. Tie gum and skim rubber help bond prepared layers together.
28. 10. Cover rubber protects and restores the belt surface over the splice.
29. 11. Trapped air can create weak areas and must be rolled out.
30. 12. The vulcanising press must cover the full splice and apply even heat and pressure.
31. 13. Cure time, temperature and pressure must follow the belt and material system.
32. 14. Cooling must be completed before the press is opened.
33. 15. Final inspection and restart monitoring help confirm the splice is safe to return to service.

Safety

- Conveyor isolated and locked off
- Stored energy controlled
- Belt clamped and supported
- Take-up secured
- Work area safe
- Correct PPE worn
- Press lifting handled safely
- Electrical supply checked
- Fire risks controlled

Belt and Splice Planning

- Belt type confirmed
- Belt rating confirmed
- Number of plies confirmed
- Belt width measured
- Belt thickness checked
- Splice method confirmed
- Splice length confirmed
- Step length confirmed
- Bias angle confirmed
- Press size confirmed
- Materials confirmed

Preparation

- Belt inspected
- Centre line marked
- Cut line marked
- Bias marked
- Step lines marked
- Belt cut safely
- Covers removed correctly
- Plies separated carefully
- Prepared areas buffed correctly

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- Dust removed
- Surfaces clean and dry
- No oil or grease
- No damaged plies

Build

- Correct tie gum or skim rubber used
- Correct cover rubber used
- Edge rubber used where required
- Materials clean and within shelf life
- Layers aligned
- Air rolled out
- Edges built correctly
- Release material fitted
- Packing fitted correctly

Press

- Press clean and undamaged
- Platens cover splice area
- Beams positioned correctly
- Pressure system checked
- Temperature controls checked
- Probes positioned correctly
- Power supply correct
- Cooling system ready if required

Cure and Cooling

- Pressure set to approved requirement
- Temperature set to approved requirement
- Cure time followed
- Press monitored during cure
- Cooling completed correctly
- Press opened only when safe

Final Inspection

- Surface smooth
- Edges sealed
- No blisters
- No voids
- No exposed fabric
- No soft areas
- Splice aligned
- Flash trimmed safely
- Tools removed
- Guards refitted
- Conveyor restarted carefully
- Splice monitored under load
- Splice record completed

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Trainer Notes

This module should be delivered only as awareness unless the learner is being supervised by a competent belt splicer.

Where possible, use:

- Belt sample
- Prepared splice sample
- Failed splice sample
- Tie gum sample
- Cover rubber sample
- Edge rubber sample
- Release paper or silicone cloth
- Hand roller
- Buffing tool
- Belt knife
- Press platen example
- Temperature probe
- Control box
- Photos of good and poor splices

The trainer should show the difference between:

- Correct and poor alignment
- Clean and contaminated surfaces
- Correct and damaged ply preparation
- Correct and poor edge build-up
- A good cured splice and a blistered or contaminated splice
- A splice ready to run and a splice needing further inspection

The key message in this module is:

A vulcanised splice is built in layers, but it succeeds or fails in the preparation.

For self-training, the learner should read each section, review the self-study answers, complete the practical exercise and check their understanding using the knowledge check.

Module Summary

Hot vulcanised overlap and stepped splicing is a permanent joining method for suitable conveyor belts.

The process requires careful planning, accurate marking, clean preparation, correct ply stepping, suitable materials, correct splice build-up, even press pressure, controlled temperature, correct cure time and proper cooling.

The most common failures come from poor preparation, contamination, poor alignment, wrong materials, trapped air or incorrect cure conditions.

A hot vulcanised splice should always be inspected, recorded and monitored when the conveyor is returned to service.

This module provides the foundation for understanding fabric belt vulcanised splicing before moving into finger splicing in Module 8.

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