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Tech Note
Technical Notes from the Technical Committee, NIBA – The Belting Association

#15 Splicing Tools for Hot/Cold Splice, Fabric Ply Belt or Steel Cable Belt

The procedure in splicing conveyor belts will vary slightly among manufacturers, but the steps and tools will remain relatively constant. The main difference is between fabric plied belt, versus steel cable belting.

These are the basic steps and descriptions of the tools used in vulcanizing conveyor belts: (Steel cable or fabric plied.)

1. Clamping
2. Measuring
3. Alignment
4. Marking
5. Cutting (skiving)
6. Stripping
7. Buffing (texturing)
8. Cleaning
9. Cementing
10. Stitching
11. Vulcanizing (curing)

The tools that are used in the above steps are made by various manufacturers and can be purchased from most NIBA members.

The following pages describe most of the tools required for the above steps in splicing conveyor belts.

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Step 1: CLAMPING

Before a belt is spliced or cut, the ends surrounding the work or splice area must be properly secured with clamps or special designed clamping bars. This step is most important. A belt that is not secured (clamped) to prevent movement can be very dangerous to workers, equipment, and property.

The size of the clamps used would depend on the size, length, and weight of the belt. The clamps must be able to hold the weight and pull of the entire belt that is on the system.

Clamp size can vary from C clamps to very large steel beams or wooden timbers bolted tightly together. These clamping devices are then blocked off in the system with come alongs or chain falls. This prevents belt movement, ensuring that both belt ends are securely in position when the belt is being cut or prepared for the splice.

Due to the size and construction of some belts, it may be necessary to have clamps or clamping bars custom made. A weld shop or machine shop can make special clamping devices to your specific needs.

Step 2: MEASURING

Measuring tools range from tapes of various lengths, straight edges, to tee and carpenters squares, as illustrated above. A folding tape is very good to get measurements, while a square or straight edge is used to guide lines and assure alignment, by connecting measurements.

Step 3: ALIGNMENT

The alignment of a belt prior to cutting or splicing ensures straight steps and proper match. When the stripping is completed, alignment and measurements should be checked and rechecked during the belt preparation before the belt is vulcanized. A crooked or misaligned splice can cause a belt to track improperly. This applies to hot or cold vulcanizing, steel cable, or fabric plied belting. Cold bond splicing is not recommended for steel cable belting. The above illustrations show examples of a center line. Procedure for establishing a center line is explained in the NIBA Engineering Hand Book, Technical Note number 14.

Step 4: MARKING

The most common marking tools used are silver ink pens, silver or white marking pens, crayons, and a chalk line. Marking tools are used to draw lines in conjunction with a straight edge or a square for reference, steps, or cuts in the belt.

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Step 5: CUTTING or SKIVING

Preparation of the belt requires the cutting of the top and bottom covers as well as the fabric plies or steel cable. The knives used are typically mill knives, utility knives, or hook knives. Other cutting tools include ply knives, V-knives, prodders, and razor knives. The choice of knife style is usually a personal preference of the technician doing the splice. All knives should be sharp and as clean as possible to insure a clean, exact cut to the belt.

Steel cable belts will require a hook knife or a wire garotte style stripper to filet cables. A knife with the cutting edge to the front of the handle is best suited for cutting covers from a steel cable belt.

Steel cables in the belt will require bolt cutters or a cable cutter. Either tool can be hydraulic or hand operated.

Step 6: STRIPPING

When hot or cold splicing, rubber covers and plies must be stripped or removed from the belt. Stripping fabric should be done in the step down method so that the same ply on one end does not overlap the step or ply on the other end.

Stripping can be done by hand with small strip cuts. Larger cuts can be expedited with a power winch or a come along. Stripping of fabric plys should be pulled in the direction of belt travel.

If a power tool is used for stripping, make sure it is properly hooked and secured before operating. Safety procedures should be observed any time tools are used.

Step 7: BUFFING

Buffing is usually done with a carbide cup, disc or cone, along with a wire brush or a sanding disc. The grit of the grinding attachment will determine the amount of rubber removed. Smooth grit will leave a lightly textured surface. A rough grit will be a course textured surface.

Electric or air buffing motors are the most widely acceptable drives. If air is used, be extremely careful that oil or water from the grinder does not drip on the buffed surface of the belt.

Grinder design is an angle head, or straight shaft design. The design is usually the choice of the operator.

When buffing or texturing, it is very important that you do not burn or revert the rubber with too much heat from excessive pressure or grinder r.p.m. Buff in smooth, even strokes. Rubber should not smoke when it is properly buffed. The optimum r.p.m. for a buffer is between 1500 to 2500 r.p.m.

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Step 8: CLEANING

Cleaning the buffed or textured surface is an important step in splicing. The prepared areas should be free of any rubber dust, or other contaminants, prior to cementing.

Cleaning can be done with clean, dry compressed air or a clean brush. A lint-free rag dampened with solvent will also work for cleaning. When using solvents for cleaning, make sure surfaces are dry before cementing. Use adequate ventilation when using solvents. If a solvent cleaner is flammable, follow normal safety procedures for flammable liquids.

Step 9: CEMENTING

Cementing is an easy task. It usually is a messy procedure. Applying cement should be accomplished with a brush or a roller. If a brush is used, the brush should have short, moderately stiff bristles, and a roller requires a short nap roll.

The cement must be worked into the surface areas very well. A smooth, uniform coat that does not puddle will achieve the best results.

Some cements have a pot life and require special brush lids that are airtight, such as the one above.

If flammable cements are used, observe precautions and use adequate ventilation when using solvent-based cements.

Step 10: STITCHING

Various stitchers and rollers are used to apply pressure to the belt when installing tie gum, fill strip, or the two ends together, before cooking or curing the splice.

In a cold vulcanized splice, the final pressure is exerted to the splice with a double acting clamp roller. This particular tool has a roller on top and a roller on the bottom that are clamped together over the splice to exert pressures.

Stitchers usually have a knurled surface, while rollers have a smooth surface. Both tools range from 1/16" wide to approximately four inches wide. There is also a porcupine or needle stitcher that is used to help eliminate air pockets in laminated surfaces on uncured rubber.

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Step 11: VULCANIZING HOT

A vulcanizer is a tool that exerts heat and pressure to a splice to cure the raw rubber used in a hot splice. The pressure is from air, oil, steam, or mechanically induced. A vulcanizer is heated by steam or electricity.

Vulcanizers range in size from 3" wide to 10 feet wide. Weight can range from several pounds to several tons. Usually a vulcanizer is designed to do a specific job. This is why heat, size, pressure, and designs vary among manufacturers.

VULCANIZING COLD

Cold vulcanizing does not require a vulcanizer to produce its cure. Vulcanization is achieved by the cross linking of the cement and activator to the rubber surfaces prepared in the splice area. A cold bond splice should be kept out of use until sufficient drying time is allowed. Low heat and pressure will expedite a cold bond cure, but never exceed the maximum allowable temperature that the cold bond adhesive manufacturer recommends.

When using any of the tools mentioned in this text, please use them properly and with caution. Misuse can cause serious personal injury.