AF2903 Road Construction and Maintenance

Compaction of Hot Mix Asphalt

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Compaction of Soils/Granular Materials

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Compaction of Asphalt Mixtures

To Minimize Additional Compaction

To Minimize Permeability

To Prevent Excessive Oxidation of the Asphalt Mixture

To Provide Adequate Shear Strength

Three Phases of Rolling

- Breakdown Rolling
- Intermediate Rolling
- Finish Rolling

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Breakdown Rolling

Generally induces the most density gain of any roller in the sequence. Breakdown rollers can be of any type but are most often vibratory steel wheel and sometimes pneumatic tire.

- Vibratory Steel Wheel Roller (Mostly)
- Rubber Tired Roller (Sometimes / Tender mixes)
- Static Steel Wheel Roller (Rarely)
- Three Wheel Roller (not desired)

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Intermediate Rolling

Provides additional compaction.

- Rubber Tired Roller (Kneading action)
- Vibratory Steel Wheel Roller

Finish Rolling

Offers a smooth mat surface.

- Static Steel Wheel Roller

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Breakdown Roller

Should Stay Immediately Behind the Paver

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Vibratory Steel Wheel Roller

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Rubber Tired Roller

Right after breakdown compaction

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Heaters for the Tires

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Skirts Around Rubber Tires

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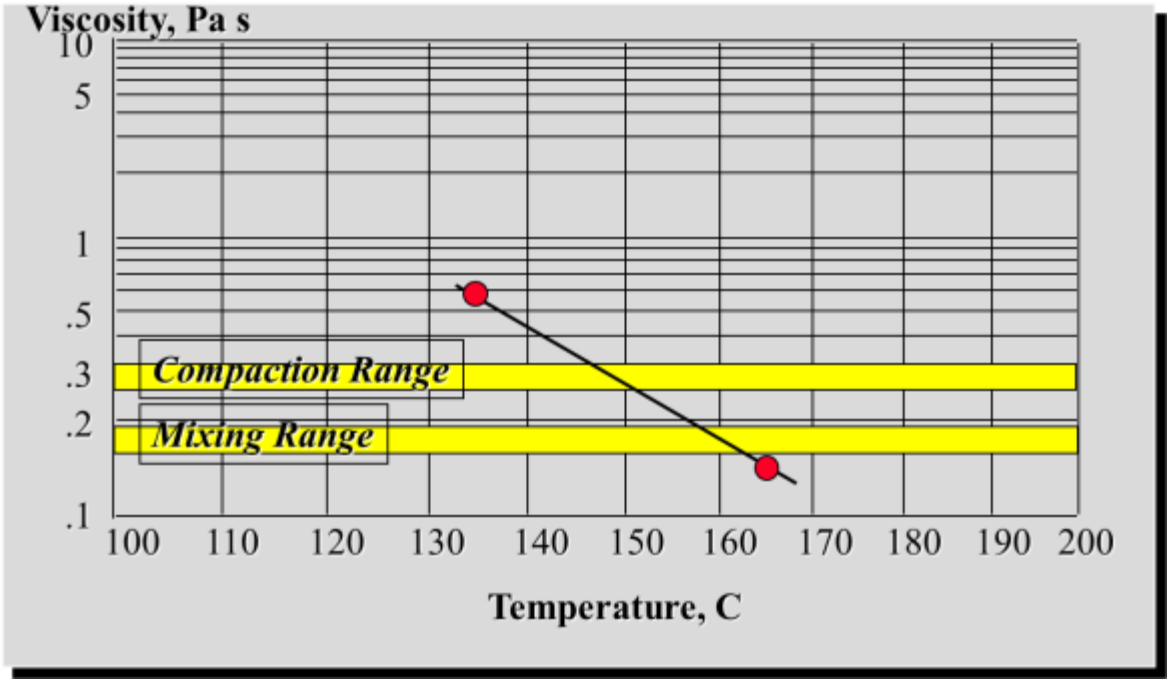
Planning the Compaction Sequence

- What is the time window for compaction? (depends on temperature of mix, air, ground, weather, wind, etc)
- How many rollers, how many passes?
- Rolling patterns



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Roller pattern depends on:

Type of compaction equipment

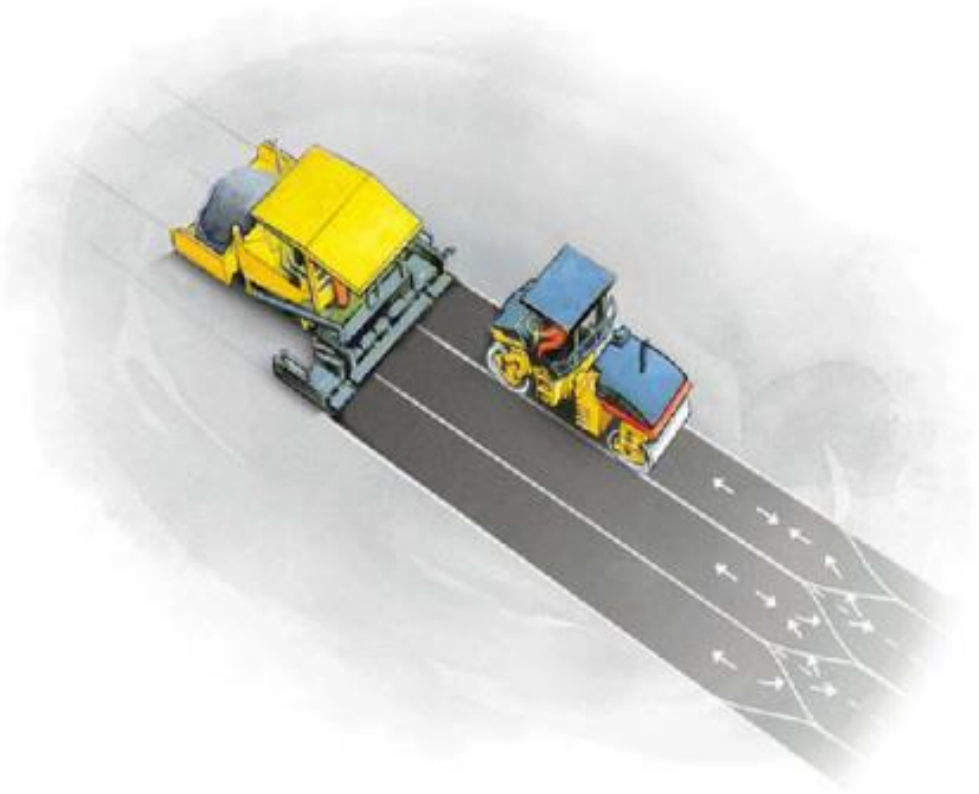
Paving width

Roller width

Number of passes

Roller speed

Number of rollers



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Roller Speed

Rollers Should Operate at a Slow Rate of Speed (about Walking Speed).

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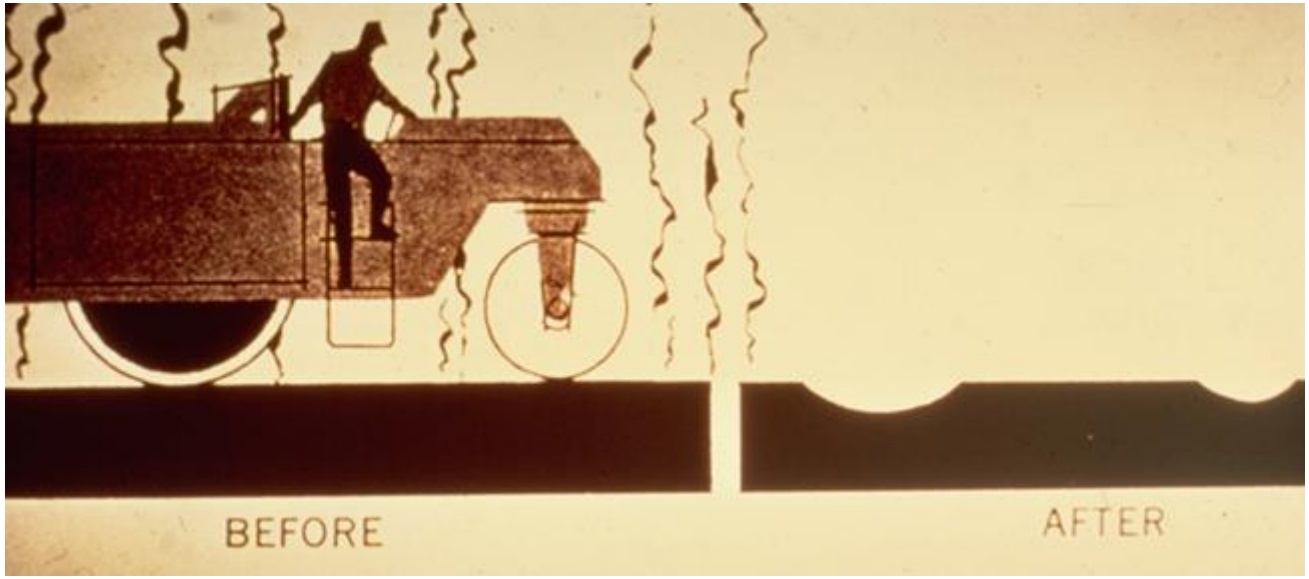
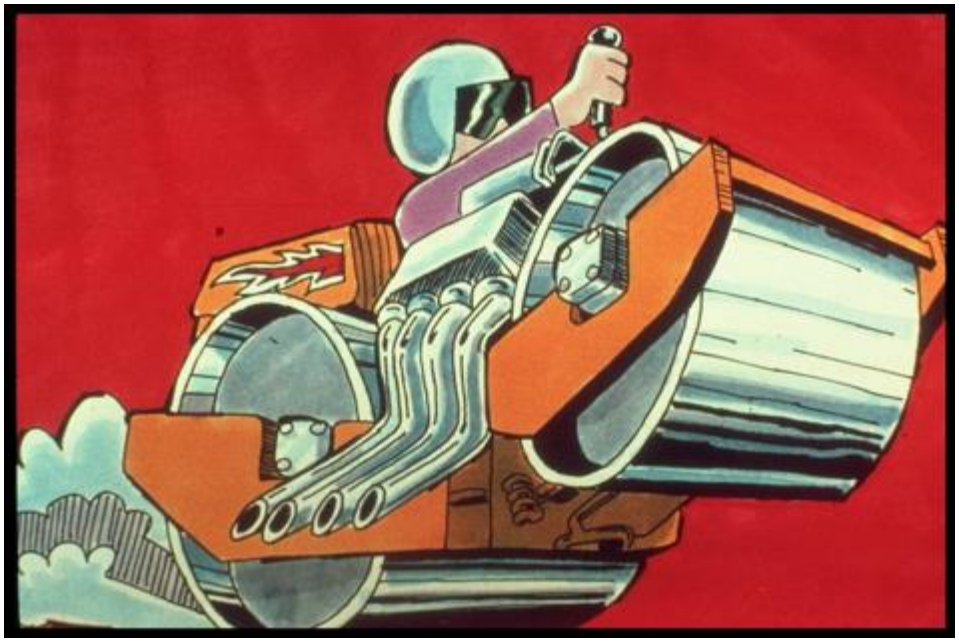
Roller Speed

Not too slow…



Not too fast…



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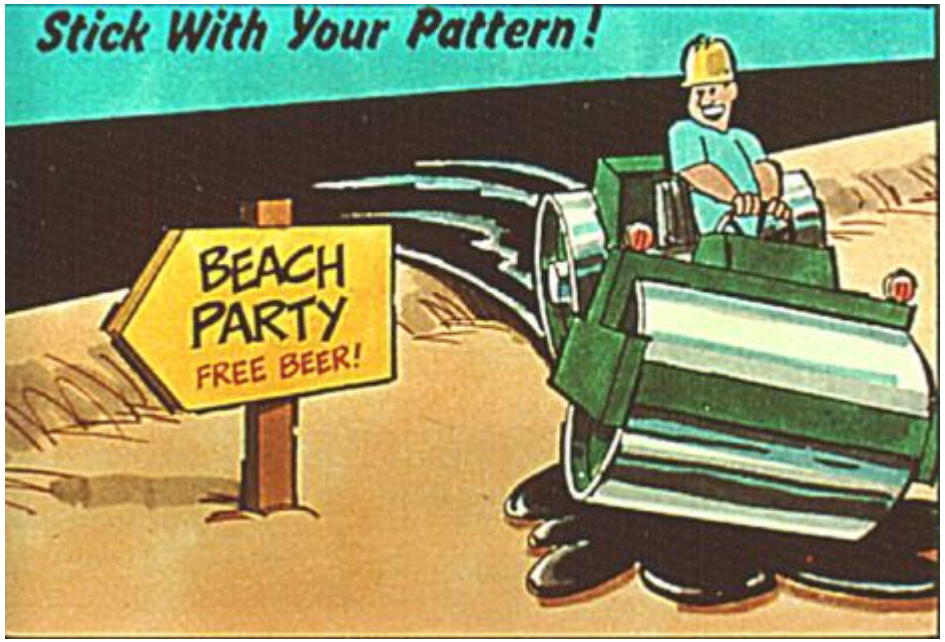
Roller Pattern

Rollers Should Avoid Sudden Stops, Starts, or Turns



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Intelligent Compaction

The precise location of the roller, its speed, and number of passes over a given location are mapped using the Global Positioning System (GPS) or a similar system.

To determine the effectiveness of the compaction process, compaction meters are mounted in or about the drum to monitor applied compaction effort, frequency, and response from the material being compacted.

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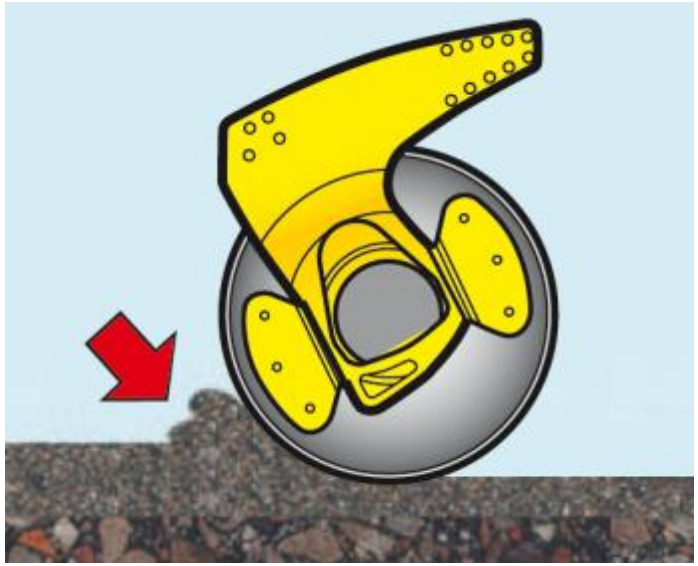
Rolling behavior of HMA

Instable mixture



Stiff mixture

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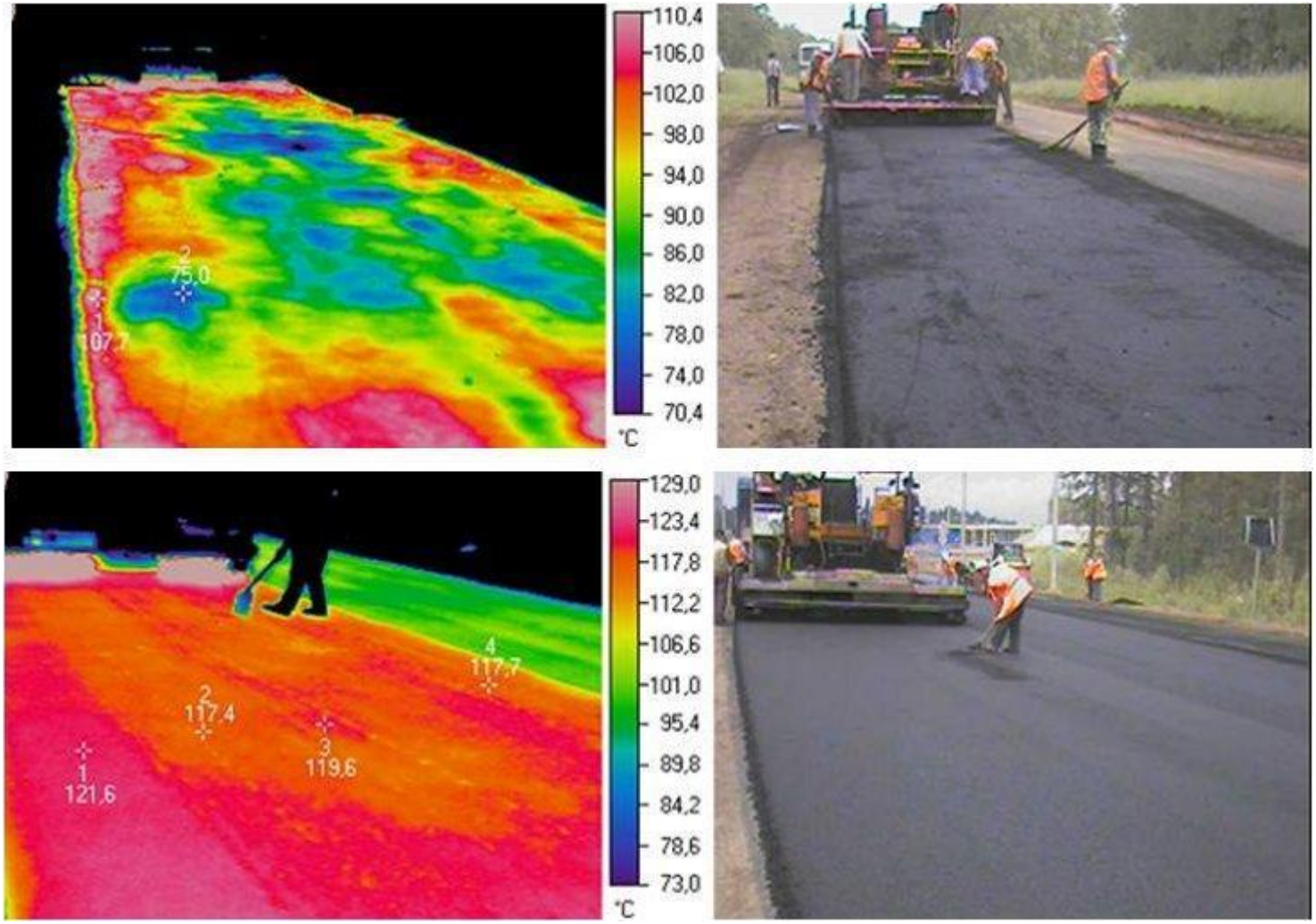
Compaction Temperature



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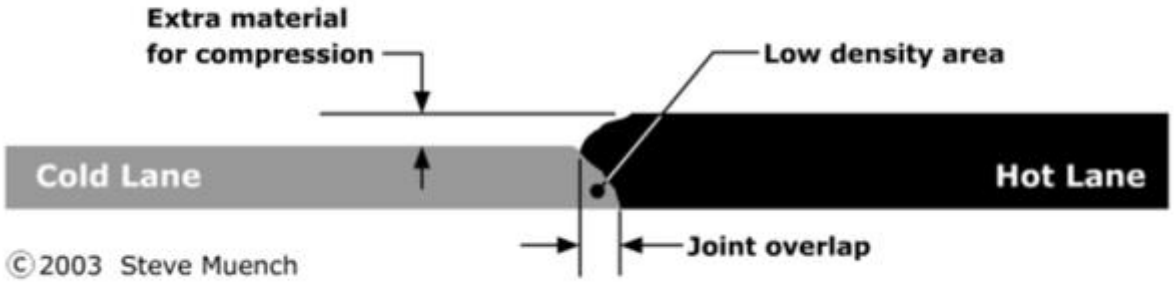
Longitudinal Joint

The Longitudinal Joint is Often the Biggest Problem Area



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Joint Construction Devices

- Notched wedge joint
- Cutting wheel
- Joint maker
- Edge restraining device

Cutting Wheel has Been a Very Effective Method to Obtain Density at Longitudinal Joint

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Notched Wedge Joint

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Cutting wheel

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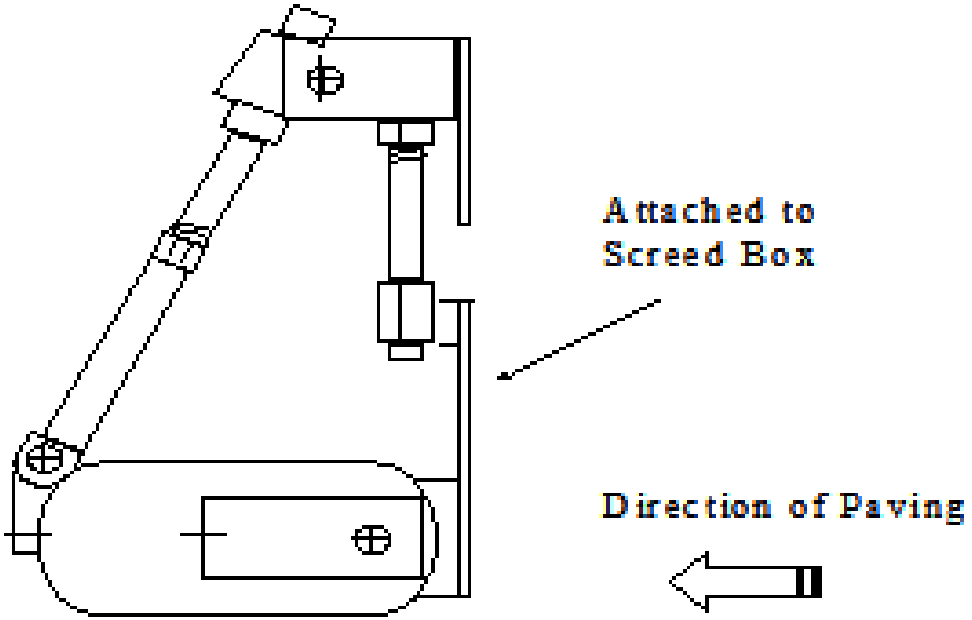
Joint maker



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Edge restraining device

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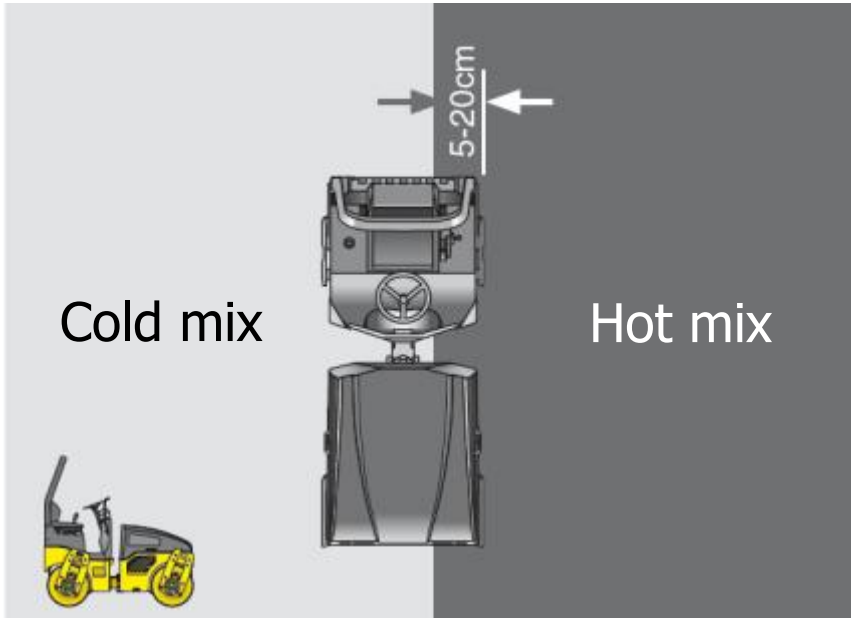
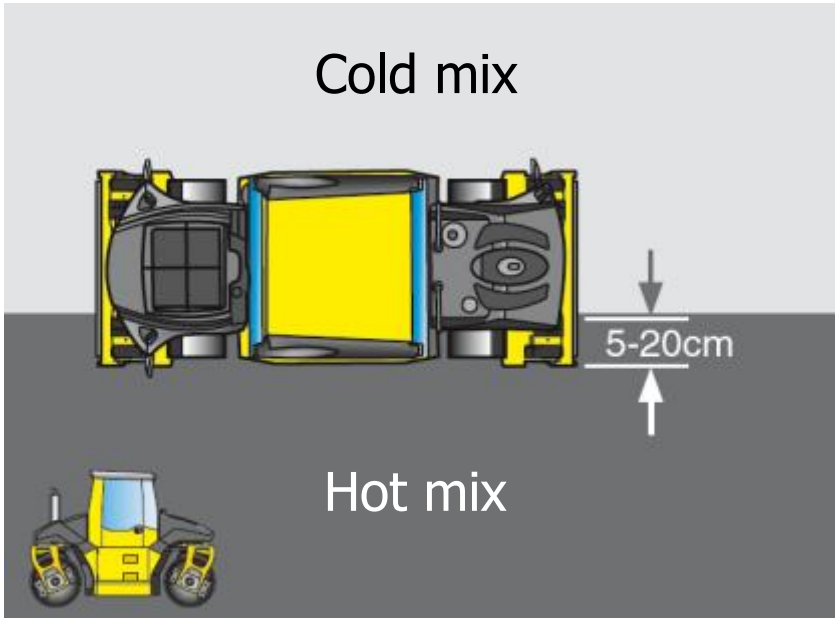
Rolling joints

Longitudinal joints



Transverse joints



Joint Adhesion:

- Heat the cold side before placing the hot side.
- Coat the cold side with an adhesive material.

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Eliminate Longitudinal Joint

Use paver extension

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Echelon Paving

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Two Ways to Check Density

Cores

Insitu Measurements

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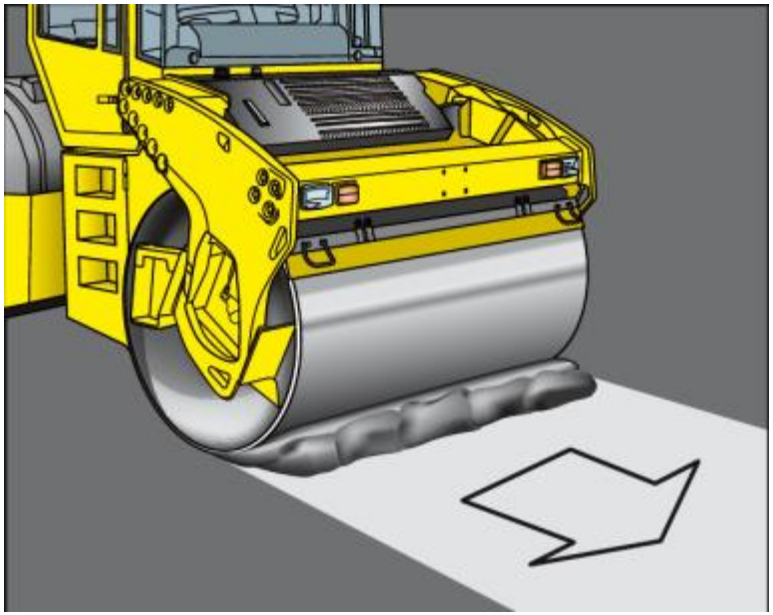
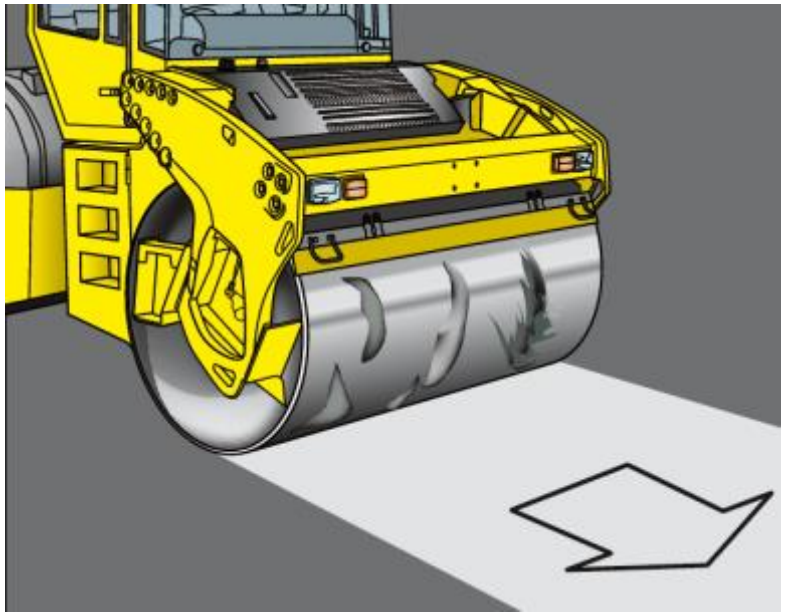
Asphalt Compaction Problems



Scuffing of mix in front of the drum

Mix sticking to the drums



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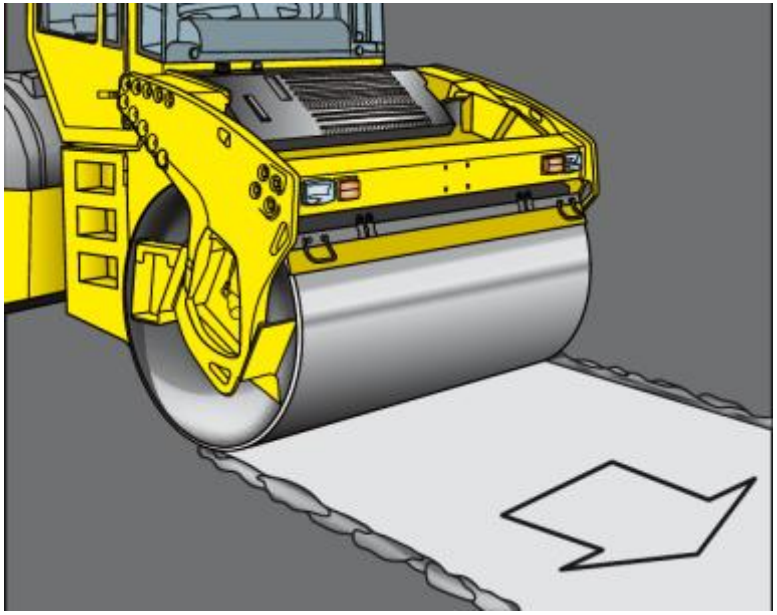
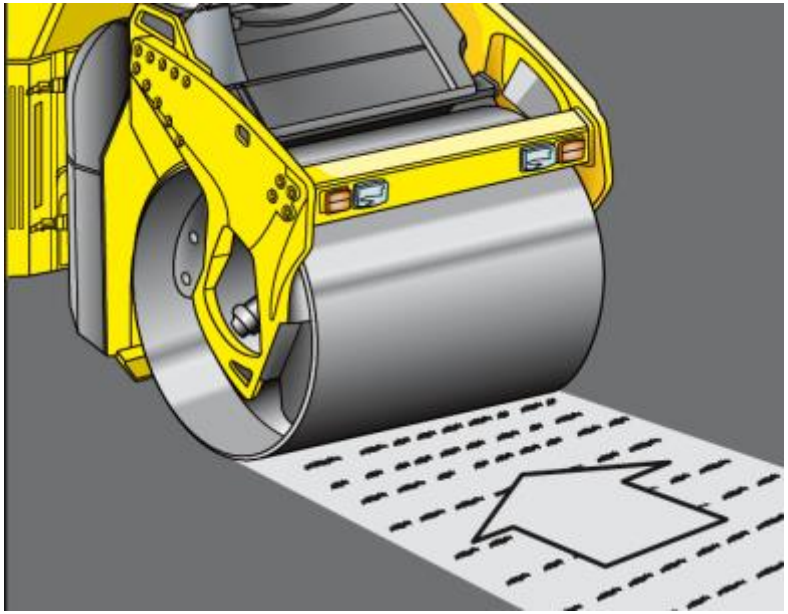
Asphalt Compaction Problems



Cambering along the side of the drum

Transverse cracks behind drum



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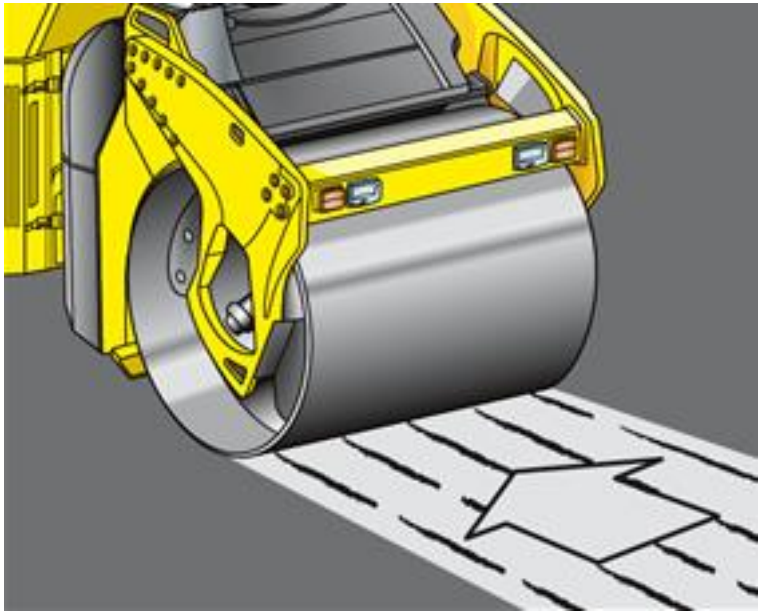
Asphalt Compaction Problems



Longitudinal cracks

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Questions?

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