

## Paving with HMA in Cold Weather

We generally recognize that effective compaction is the single most critical variable in placing quality asphalt pavement with an extended pavement life. In cold weather, proper compaction requires the perfect balance of temperature and time.

### Temperature

Above all else, the temperature of hot mix asphalt (HMA) during the rolling operation determines the success of the compaction operation. The time available for compaction (TAC) defines the total amount of time that roller operators must compact the mix before it loses too much heat and becomes too stiff to compact.

These are the primary factors influencing the rate of heat loss in HMA:

- Lift thickness
- Base temperature
- Mix delivery temperature
- Ambient air temperature
- Wind speed
- Solar-radiant flux

### Tips for Maintaining Temperature

**Tarp loads when necessary.** For short hauls, the crust that develops maintains internal heat and is readily re-mixed with hot asphalt upon unloading and transfer to and through the paver.

**Unload the third and fourth trucks first, then the first and second trucks.** The first couple of truckloads are generally cooler from plant startup or the cooler cone of silos. A hotter mix heats the paver screed faster and avoids tearing the mat at the start of paving.

**Avoid using a pickup machine.** HMA loses approximately 10° to 20°F of its delivery temperature during transfer to the paver hopper. End dumping into the paver results in



only about 5°F heat loss. HMA loses another 10° to 20°F when going from the paver hopper to behind the screed. Avoid long windrows when using a pickup machine. Do not string out windrows until they are ready to be picked up.

**Keep the paver hopper near full when waiting 15 minutes or less for trucks.** The mix retains heat better in a large mass and keeps the hopper hot. Communicate with the plant to ensure proper truck spacing and minimal waiting periods.

**Keep handwork and raking to a minimum.** Every time the mix is “fluffed,” it loses considerable heat.

**Roll from the hot side of the mat.** When constructing longitudinal joints in cold weather, roll from the hot side as soon as possible.

**Utilize the MultiCool App.** MultiCool is an asphalt pavement cooling prediction program for use during construction. MultiCool is meant to estimate how rapidly a freshly-placed mat will cool as a function of the initial mat temperature, ambient conditions, mat thickness, and other properties. The cooling rate prediction can help

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contractors better plan their rolling operations to more efficiently achieve target mat density. Access MultiCool here: <http://www.eng.auburn.edu/users/timmdav/MultiCool/FinalRelease/Mobile.html>

## Timing

When paving with Hot Mix Asphalt in cold weather, the goal is to finish compacting the mix while it is still in the compaction temperature range of 275° to 175°F. To allow adequate time for compaction, take steps to alter dependent variables and to minimize the time of exposure of the mix between mixing and compaction. Specific actions may include any or all the following as necessary:

- Increase the mix temperature
- Increase the layer thickness
- Minimize the time/length of haul
- Work the rollers as close to the paver as possible
- Use more or higher capacity rollers
- Use WMA (Warm Mix Asphalt)

## Tips for Optimal Timing

**Avoid handwork and feathering in cold weather.** Consider the results of such operations to be temporary and plan to replace when conditions become more suitable.

**Avoid placing a thin HMA course in cold weather.** Placing a relatively thick intermediate course, that can be used as the temporary wearing surface until proper conditions return for placing a thin surface course, involves little change to construction procedures and minimal additional risk

## The Benefits of WMA in Cold Weather Paving

Using WMA (warm mix asphalt) processes at HMA production temperatures:

1. Increases the temperature gap between production and cessation, e.g. increased haul distances.
2. Facilitates compaction, which is beneficial for stiff mixes and RAP, paving during extreme weather conditions, and reduction in compaction effort.
3. Acts as a compaction aid for mixes produced at, or close to, regular HMA production temperatures, used to increase haul distances or pave during cold and challenging weather conditions.