

# Warm Mix Asphalt

**2013 OHMPA Fall Seminar**  
**December 11, 2013**

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# Overview

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# WMA Definition

## MTO adopted NAPA's Definition of WMA

- A group of technologies which allow a reduction in the temperatures at which asphalt mixtures are produced and placed. WMA can be separated into 3 categories:
  - Chemical Processes
  - Organic Additives
  - Foaming Processes
- WMA allows compaction temperature to be reduced by 20-50°C while still achieving adequate compaction.

# Benefits of WMA

**When compared to Hot Mix Asphalt (HMA), WMA benefits include:**

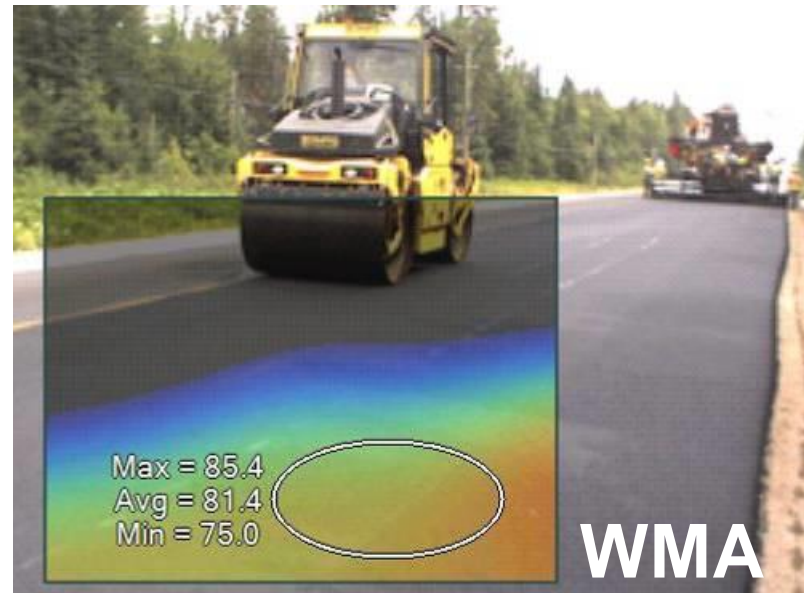
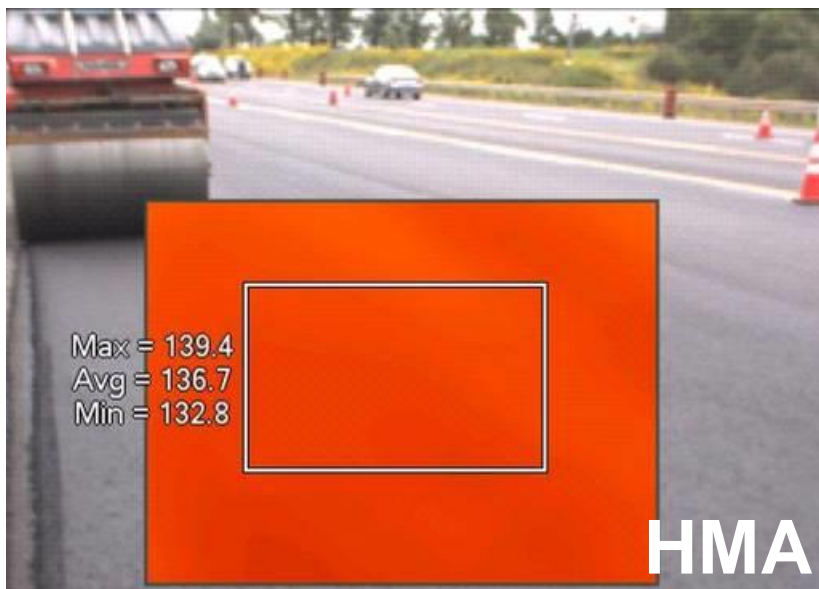
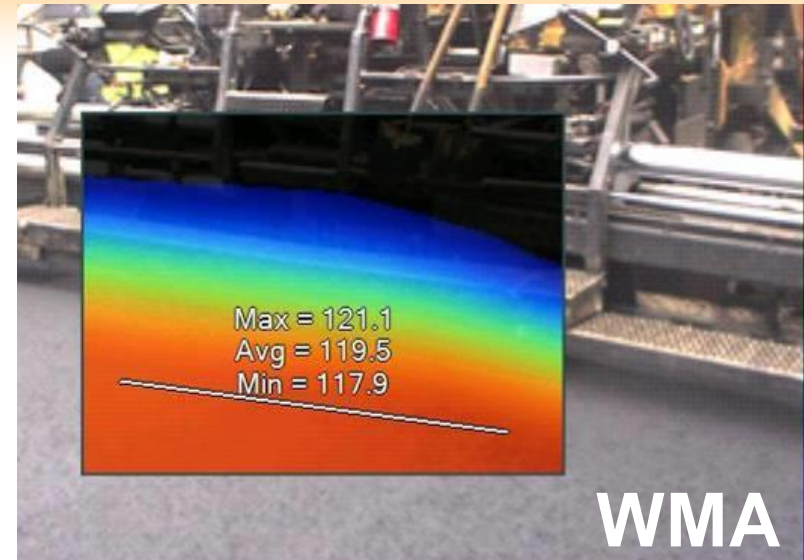
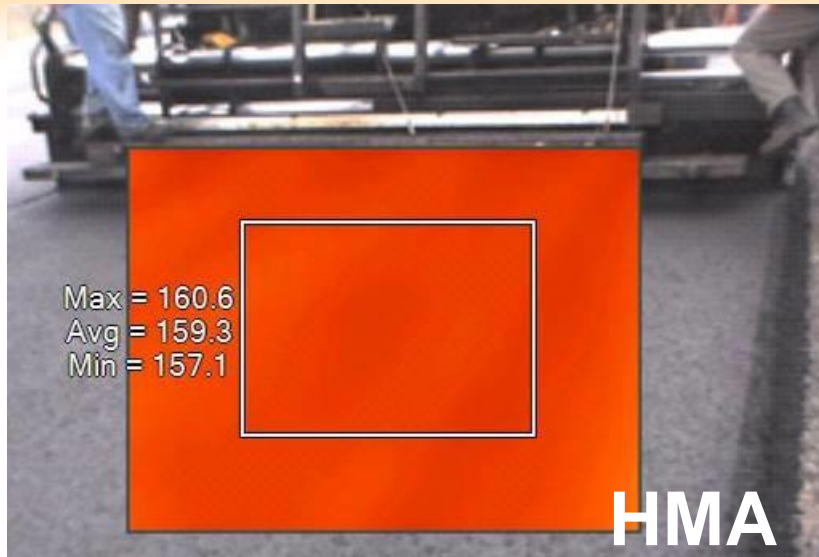
- Reduced asphalt plant emissions
- Reduced paving crew exposure to fumes
- Reduced fuel consumption
- Improved compaction and better joints
- Facilitates higher recycled asphalt pavement (RAP) content in the mix
- Less asphalt aging and the potential for reduced cracking
- Facilitates longer hauling distances
- Facilitates late season paving

# Challenges of WMA

- Costs?
- Effectiveness of different technologies – not all are the same
- Ensuring long term performance including moisture susceptibility
- Mix design procedure
- Recyclability
- Restrictions/adjustments at the asphalt plant

## MTO WMA Contracts

- MTO has paved about 500,000 tonnes of WMA since 2008.
- WMA technologies included Chemical and Organic; no Foaming technology has been used on MTO jobs
- In 2011, WMA accounted for 10% of total asphalt paved on provincial highways.
- MTO set a 15% target for 2013 and 2014.
- Pavement performance of WMA has been comparable to HMA with slightly better joint quality.



## QA Results

- In general, the lot mean compaction for WMA was either equal to or higher than HMA.
- WMA was paved at temperatures 10-30°C lower than HMA without any adverse effect on mix properties or compaction.
- TSR results on production WMA samples were significantly variable with values ranging from 44 to 117 percent.
- Hamburg rut depths were comparable between WMA and HMA.



# Energy Savings on MTO WMA Contracts

- Replacing HMA with WMA on our contracts has saved an estimated 31,200 Giga Joules of energy.
- This energy saving is equal to 900,000 litres of diesel fuel, the equivalent of taking 126,000 vehicles off the roads for one day.

## WMA Task Group

- An MTO/Industry WMA Task Group was formed in late 2010 to further investigate WMA and improve MTO's specification. Issues under discussion included:
  - Mix design, PGAC (Performance Graded Asphalt Cement) selection, moisture sensitivity, rutting resistance, performance testing, RAP content, field performance, and emissions.
- Other objectives of the WMA Task Group would include:
  - Compiling a WMA state of the practice guide
  - Developing mix design procedures for WMA
  - Developing a WMA guideline for contractors
  - Developing educational material to promote WMA use

# WMA Specification Requirements

- Superpave mix design according to LS-318
  - Flow Number (for info only)
  - Coating test
  - Compactability test
  - Minimum TSR of 80% is required
- TSR on the production samples performed by QA lab (for info only)
- Provide WMA supplier's recommendations
- Contractors are encouraged to record the fuel usage at the asphalt plant during WMA/HMA production.

## Closing Remarks

- WMA is an innovative green technology that reduces greenhouse gas and fuel consumption while improving compaction.
- MTO experience with WMA has been positive.
- MTO will continue to work with WMA Task Group to improve our WMA specification.
- Given the environmental benefits and potential performance improvements, the life cycle cost of WMA is expected to be similar to HMA.
- In addition to the permissive specification, MTO is specifying WMA in up to 15% of total asphalt quantity for 2013 and 2014.
- This 2-year program will allow the asphalt industry to invest in WMA technology and increase WMA use.

# Thank You



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