

FANN CONTRACTING'S EXPERIENCE WITH WARM MIX ASPHALT



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WHAT IS WARM MIX ASPHALT?

Warm Mix Asphalt

- * Warm Mix Asphalt (WMA) is an Asphaltic Concrete that is produced within the temperature range of 215 degrees F to 275 degrees F.
- * WMA is produced by one of several technologies including plant water foaming process, mineral additives, or chemical additives.



BENEFITS OF WARM MIX ASPHALT



- * Engineering benefits include better compaction on the road, the ability to haul paving mix for longer distances, and extending the paving season by being able to pave at lower temperatures.
- * Cutting fuel consumption and decreasing the production of greenhouse gases.

HOW IT ALL STARTED...

FLAGSTAFF - HOLBROOK
HIGHWAY (I-40) - BUFFALO
RANGE

SPECS FROM BUFFALO
RANGE

WARM MIX ASPHALT
GENERAL
REQUIREMENTS

WMA General Requirements

- * The work under this section will consist of constructing Warm Mix Asphalt (WMA) test sections. WMA will be required in three different test sections during asphaltic concrete production.
- * Each of the Three WMA test sections shall consist of a different WMA technology and each test shall be two lots of WMA production.
- * The two lots in each test section shall consist of a total of at least 2000 tons.
- * A maximum of one of the three test sections may use a WMA foaming process, while the other two test sections will require a mineral or chemical WMA additive in the production.

- * A control lot without WMA technology must be placed immediately before or after each WMA test section.
- * The WMA test sections, shall be placed on the mainline pavement placed as the top lift excluding the AR-ACFC.
- * The three WMA technologies used in asphaltic concrete production shall be approved by ADOT Materials Group prior to the start of production and shall meet the requirements of Appendix A - ADOT Material Group Approved WMA Products/Process List.

Mix Design & WMA

- * With exception of Immersion Compression testing and Tensile Strength Ratio (TSR) testing, the mix design may be developed without the WMA technology.
- * If the WMA technology manufacturer recommends the full mix design be performed to include the WMA technology, the mix design shall be performed in accordance with the manufacturers recommended process.

SUMMARY OF TEST RESULTS

I-40 Warm Mix Asphalt - Summary of Test Results and Field Data			
	Lot 14 AquaBlack	Lot 15 AquaBlack	Lot 16 Control
Station	1201+09-1249+00	1249+00-1297+00	1297+00-1372+00
Milepost	219.6 to 220.5	220.5 to 221.4	221.4 to 222.9
Direction	EB	EB	EB
Lane	#2 (Travel)	#2 (Travel)	#2 (Travel)
Tons in Lot	1559.98	1572.28	2454.01
Fuel Consumption	1930	1568	3663
Fuel (gal/ton)	1.24	1.00	1.49
Avg Temperature			
Hot Plant	270	272	314
Windrow	250	248	290
Behind Screed	239	235	271
Breakdown	193	183	220
Intermediate	182	173	191
Finish	179	166	172
Rolling Pattern			
Breakdown	6V	6V	7V
Intermediate	5P	5P	5P
Finish	4S	5S	6S





I-40 Warm Mix Asphalt - Summary of Test Results and Field Data			
	Lot 17 Advera	Lot 18 Advera	Lot 19 Control
Station	1371+85-1420+00	1420+00-1467+10	1467+10-1429+00
Milepost	222.9 to 223.8	223.8 to 224.5	224.5 to 223.9
Direction	EB	EB	EB
Lane	#2 (Travel)	#2 (Travel)	#2 (Travel)
Tons in Lot	1592.23	1557.09	1278.78
Fuel Consumption	1448	1550	2304
Fuel (gal/ton)	0.91	1.00	1.80
Avg Temperature			
Hot Plant	270	265	304
Windrow	250	242	291
Behind Screed	239	230	262
Breakdown	194	178	234
Intermediate	181	166	194
Finish	158	158	153
Rolling Pattern			
Breakdown	6V	6/7(V)	6V
Intermediate	6/8(P)	6/8(P)	6/8(P)
Finish	6/7(S)	6/7(S)	5/4(S)

I-40 Warm Mix Asphalt - Summary of Test Results and Field Data

	Lot 21 Evotherm	Lot 22 Evotherm	Lot 23 Control
Station	1391+00-1354+00	1354+00-1319+00	1319+00-1286+60
Milepost	223.2 to 222.5	222.5 to 221.8	221.8 to 221.2
Direction	WB	WB	WB
Lane	#2 (Travel)	#2 (Travel)	#2 (Travel)
Tons in Lot	1122.80	1123.22	1083.02
Fuel Consumption	1547	1121	1324
Fuel (gal/ton)	1.38	1.00	1.22
Avg Temperature			
Hot Plant	273	269	306
Windrow	253	251	294
Behind Screed	220	233	261
Breakdown	178	187	211
Intermediate	147	176	182
Finish	139	160	159
Rolling Pattern			
Breakdown	6V, 1S	6V	6/7(V)
Intermediate	6/8(P)	5P	5P
Finish	5/4(S)	6S	7/6(S)

Dugas Test Strips

- * Early 2014 ADOT asked Fann Contracting if we would be willing to do AR-ACFC WMA test strips.
- * Negotiate - wasn't bid that way.
- * Choose the I-17 project as the best candidate.
- * Lots of resistance from the field.

CORDES JCT. - FLAGSTAFF
HWY (I-17)
DUGAS TI - CHERRY ROAD

- * ADOT chose 3 technologies - No Foam!
- * Finally started placing ACFC in September
- * Placed AR-ACFC with WMA technologies:
 - * Sasobit
 - * Advera
 - * Evo-Therm

Sasobit - September 16

- * Started at normal temp +/- 320 Degrees
- * Dropped down to 290 degrees in 10 degree increments.
- * Didn't like it - tearing and pulling - "Looked weird"
- * Went back up to 310 degrees until mat looked good again - No clumps
- * "Fear Factor" ? Don't Know

Advera - September 18th

- * Weather nasty - got rained out - pushed 1 day
- * Started normal temp +/- 320 degrees
- * Dropped down to 295 degrees
- * Then broke Baghouse
- * Had 11 loads in trucks - "Milked" them for 3 hours w/o making joint.
- * Finished shift at 295 degrees
- * No issues with mix at paver - 1006 tons
- * Then broke Rubber Plant - Short Day

Advera - September 22nd

- * Ran 1517 tons @ 295 degrees
- * No problems on grade

EvoTherm - September 24

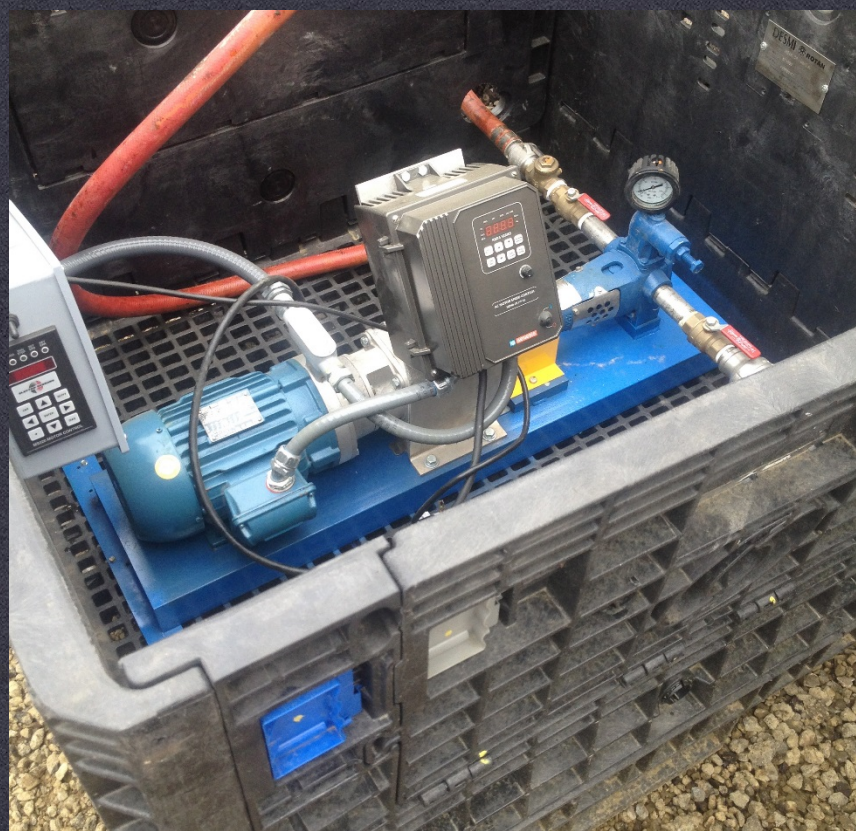
- * Started at 310 degrees - Down to 280 degrees by 10 degree increments
- * Everything looked good - everybody happy

EvoTherm - September 25

- * Started at 310 degrees - Down to 270 degrees by 10 degree increments on advise of Sales Rep. for product
- * Everyone happy - Clump factor good!
- * Shut down early - heavy traffic

Contractor Experience

- * ADOT will gain lots of good information
- * We were looking for benefits:
 - * Burner Fuel?
 - * “Clumps” or Goobers in windrow / ie. Handling
 - * Ridability





AquaBlack

- * In 2013 ADOT implements WMA in specs
- * Special Provisions
- * Bulletin: Approval Process:

ADOT - POLICY AND PROCEDURE DIRECTIVES

- * WMA may be used at the contractor's option provided all requirements of the specs are met and the WMA technology is approved by ADOT for use in asphaltic concrete.
- * WMA technologies may be used to produce WMA as described above, or may be used in standard asphaltic concrete mixes as a compaction aid or as a component to allow workability in long haul applications

Approval Process

- * WMA technologies must be approved by ADOT Materials Group for use in production of asphaltic concrete
- * The “Approved Warm Mix Asphalt Technologies List” is maintained by ADOT Materials Group, Pavement Materials Testing Section.
- * Approved list is available on ADOT’s website

AquaBlack

- * Started discussions, research, etc.
- * Bought Aqua Black machine on April 11, 2014
- * Used it on the base mix for the same I-17 project that we did the ACFC on. I-17 Dugas to Cherry Rd

Mix Design Requirements for WMA

- * When WMA technology is used in the mixture, all specified mix designs requirements shall apply to the development of the asphaltic concrete mix design.
- * With the exception of Immersion Compression Testing, the mix design may be developed without the WMA technology for all mix design requirements.
- * Test results must meet minimum requirements of the specs both with and without the WMA technology.

- * When WMA technology is using in the mix, the following information shall be included in the mix design:
 - * WMA technology information and/or additive information.
 - * Recommended temperature range for mixing during production
 - * recommended temperature range for compaction during production
 - * WMA manufacturer's established target rate for water and additives and the acceptable variation during production
 - * Actual laboratory mixing and compaction temperatures used during mix design testing
 - * Immersion Compression test results







Summary

- * Do we like it? - The Jury is still out!
- * The project supers & paving supers aren't sold
- * Only used it on one project so far