

CUTLER COURIER

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PEACH OF A PROJECT

Peach Harvest Uninterrupted as New Technology Helps Colorado Hot In-Place Recycling Job Win Smoothness Honors

Use of new technology helped a hot in-place pavement recycling project in the mountains of west Colorado win three awards from the Colorado Asphalt Pavement Association, including two for smoothness.

The project, U.S. 6 from Clifton to Palisade near Grand Junction for the Colorado DOT, won *Best in Colorado Smoothest Pavement*, *Smoothest Paving Crew for a Resurfacing Project*, and *Urban Highway Resurfacing* awards from CAPA. The awards were presented to recycling subcontractor Cutler Repaving, Inc., Lawrence, Kan., at a banquet Feb. 9, 2005 during CAPA's 32nd annual Rocky Mountain Asphalt Conference and Equipment Show in Denver.

And despite the early fears of produce marketers in the western corner of the state, that area's highly anticipated peach crop made it to markets along U.S. 6 and into the hands of customers, who were assured continued access to the markets by the one-pass asphalt recycling method.

"Palisade peaches are the best in the world, and the peach harvest here is a big deal," said Jim Shea, SEH Consultants Inc., and project manager for Colorado DOT. "At first, we were not going to be popular with the fruit merchants along the route, because the timing of our project clashed with the peach harvest. The peaches were ripe when our project came through. But Cutler kept the project moving through the peach area, the train kept out of the way, and patrons weren't very upset after all."

HARVEST SEASON IS CONSTRUCTION SEASON

"The public wasn't very receptive to our doing work during their fruit season, which also happens to be construction season," said David A. Eller, P.E., region materials manager, Colorado DOT. "But we really had little choice. There were a lot of interested citizens, and I felt we had different options: We could mill out sections, level them out and then come back and overlay. We



Cutler's new preheater-conveying-vehicle (PCV).

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could have tried a leveling course, then overlay. But this operation gave us one pass through. It may not have been fast on the ground, but we went through once, versus two or three times.”

The one-pass repaving also kept the work zone compact, Eller said. “On a small job like this, if we have multiple operations, the job gets spread out, and you get work for six miles, instead of work in one half-mile section. So we thought in the long run this might be better, because we would be in and out quicker.”

Successful ingress and egress to businesses during the one-pass repaving project was the key to satisfied patrons, Shea said. “Access to business always is a problem with a resurfacing project,” Shea said. “This company worked very hard to get people through. You can’t always get everybody exactly where they want to go at any time, but they did a good job.”

“With a well-trained crew by a company that knows the process, repaving can be used in an urban area, as opposed to other recycling methods that are even twice as long as this machine,” said Devin Ray, assistant project manager, Colorado DOT.

Shea said despite the size of Cutler’s recycling “train”, the process was well-suited for a busy, populated area like U.S. 6 from Clifton to Palisade. “The confined, urban area really worked well with the Cutler process,” he said. “At many intersections extra work had to be done to cover everything properly. But the crew knew how to maneuver the machine. Delays at intersections were very insignificant.”

Prime contractor for this project was Elam Construction Inc., Grand Junction, Colo.

‘BEST IN COLORADO’

Award criteria for the Colorado Smoothest Pavement, and Smoothest Paving Crew for a Resurfacing Project awards, include results of profilograph tests, and improvement in smoothness from the initial profilograph data to the final profilograph data. Both smoothness awards are evaluated according to the number of paving passes and if the surface was milled prior to the paving operation.

CAPA’s criteria for the Best in Colorado Urban Highway Resurfacing Award include overall appearance, segregation, longitudinal joints, transverse joints and ride quality.

Cutler’s unique repaving process heats, scarifies and applies recycling agent to an existing, aged driving course, and places that material as a new leveling course. The same machine then tops that leveling course with a virgin HMA overlay — simultaneously fed into the repaver from the front — which bonds thermally with the recycled leveling course to form a monolithic pavement.

In this project, one inch of surface was hot in-place recycled, then topped with at least an inch of fresh hot mix asphalt. Because of the need to correct variances in cross-slope the actual overlay varied from 1 to 2 inches, but averaged 1½ inches. The virgin mix was a Superpave design, a half-inch nominal aggregate size with PG 64-22 binder, appropriate for that climate and traffic load, but also readily available from area suppliers. The binder was not polymer-modified.

That one inch of recycling equates to 9,400 tons of asphalt pavement and construction aggregates that were kept in-place — rejuvenated on the original right-of-way — rather than landfilled or stockpiled indefinitely. And because the asphalt pavement was used in-place, the state was able to eliminate a stream of dump trucks needed to receive the old asphalt pavement, and the diesel emissions and traffic congestion that those trucks would otherwise cause.

The Colorado smoothness honors are due to the performance of the “smoothest” crew in Colorado in 2004, according to the award.

“I’m very proud of my crew,” said Don Allensworth, paving superintendent for Cutler. “We had good weather and good state people to work with. Everything was ideal on the job and it came out really well for us. Our type of work creates smoothness,

because the pavement we recycle in-place becomes a smooth leveling course. We recycle-out any deformities in the road, and that leaves a hot, uniform mat to lay the new mix on. The machine gives us our first opportunity for smoothness, and our constant paving operation does the rest.”

“The ‘Best in Colorado’ awards recognize quality asphalt pavement construction in our state,” said Tom Peterson, executive director, CAPA. “In Colorado each year there are between 800 and 1,000 asphalt paving projects, and to be recognized as ‘the best of the best’ is truly a worthy recognition and something to be proud of.” Each of the 14 award categories received five to 10 nominations.

NEW TECHNOLOGY AIDS SMOOTHNESS

But the crew had a weapon in reserve, Cutler’s new preheater-conveying-vehicle (PCV). The self-propelled PCV preheats the aged asphalt pavement in advance of the main recycler, while receiving virgin HMA for the surface course. Much like a material transfer vehicle, the PCV isolates the main repaver from HMA delivery trucks, eliminating the ubiquitous “bumps” between paver and truck which cause mat discontinuities, thus assuring a smooth surface.

The new PCV does several chores: Because it must operate closer to the repaver than the conventional preheater, there is less cool-down between the preheater and repaver; it eliminates the traffic-disrupting backing of the truck up to the paver; and quells thermal segregation of virgin mix. Its 260-square-foot heating hood generates 12.5 million Btus of heat.

“We developed this unit to function as a material transfer vehicle which could store 15 to 20 tons of hot mix asphalt ahead of the paver, but with a heating hood up front,” said John Miles, Cutler vice president of operations. “The key to getting smoothness is to never stop the paver. The PCV feeds the hot mix from the trucks to the paver so we can maintain a constant, uniform speed without stopping and starting. And in our process, we need to preheat the pavement ahead of the repaver. The new PCV combines heat with HMA storage ahead of the main machine.”



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"We would not have gotten the smoothness award without the PCV," Miles said. "It gets a continuous flow of HMA to the paver, it gets rid of the truck bumping into the paver, it eliminates thermal segregation, which all contribute to poor rides."

Compaction was achieved by an Ingersoll-Rand Model DD 110 HF breakdown roller, an I-R PT 125 pneumatic roller for intermediate compaction, and an I-R DD 90 HF finish roller. A target of 92 to 94 percent density was aided by vibration at the finish screed of the repaving machine.

"Colorado requires a pneumatic roller for hot in-place recycling," Colorado's Eller said. "A lot of studies show that pneumatic rollers will knead and seal a surface more than just compact it. Some contractors don't like the pneumatic rollers, saying it marks the pavement or makes it less smooth. This job belies that as a myth."

"We're very proud of Cutler Repaving's accomplishment," Peterson said. "Their quality speaks for itself. We expect to see them on the award platform every year because of the good work they do."

ROAD AT END OF LIFE

"The road was in fair to poor condition," Eller said. "We had some locations that were patched ahead of time, and much of the pavement had chip seal on it from the last application. There was not a lot of fatigue cracking, but certainly a lot of transverse cracking with a little rutting. It was in need of treatment."



One-pass repaving keeps work zones compact, traffic flow smooth.

The seven-mile project recycled and paved 171,000 square yards to a depth of 1 inch. The project repaved a two-lane road in an urban setting, but the project in actuality varied widely in width. "We had to change the width of the machine at least seven times," said Lyle Smith, regional manager for Cutler. "We would go through a

community with a 40-ft. road, then narrow down through orchards and wineries, then open up again for drop-lanes for schools. The width changed and changed; there was little that was consistent."

The project was funded through Colorado's pavement resurfacing program, which includes rehab and preventive maintenance. This project qualified as a rehabilitation. "Our analysis showed it needed a half-inch of additional asphalt," Eller said. "We don't have an application for a half-inch of additional asphalt, so that's when we thought we could scarify the cracks, get rid of them, and put an inch and a half on top."

Despite the urban nature of this project, Eller's Region 3 is primarily a rural area with east-west highways, such as I-70. Geographically, Region 3 is Colorado's biggest district. "A lot of our roads have plant-mix seal coats placed in the 1980s," Eller said. "These were 3/4-inch wearing courses, with a highly permeable section on top. A lot of those are coming up for treatment now, and these plant-mix surface treatments have to be either milled off or recycled. We've done a lot of in-place recycling in this region because by the time we've gone through the process of milling or rejuvenating those plant-mix seal coats, and replacing, instead we can compact them and have a good nonpermeable mat in one pass.

"U.S. 6 had a plant-mix seal coat, and maintenance had come back and put a chip seal on top, so there was enough oil and aggregate there to recombine and get close to a dense graded mat," Eller said. "So our predominant type of existing surfaces offer a lot of opportunities to in-place recycle, and we've had good luck doing that."

DEFEATING LONGITUDINAL JOINT

In an effort to construct more durable, smoother pavements, Colorado is paying special attention to the phenomenon of longitudinal joints.

A longitudinal joint in a hot mix asphalt (HMA) pavement forms when fresh hot mix asphalt is laid next to an existing lane of HMA. Differences in temperature and mat plasticity lead to incomplete bonding between the hot, fresh HMA and the older, cooled mat. A longitudinal crack usually occurs between the asphalt lifts, encouraging intrusion of water, increasing roughness and potentially limiting the life of the pavement.

Because joints with high densities generally show better performance than those with relatively low densities, getting high joint density is a centerpiece of Colorado's efforts at defeating longitudinal joint problems. In 2003 the state implemented a longitudinal joint density spec requiring 92 percent (plus or minus 4 percent) compaction on the joint itself.

But Cutler's unique process eliminates the longitudinal joint, because repaving also reheats the edge of adjacent paved lanes, resulting in a more durable, higher-density seam between the driving lanes. In essence, the longitudinal joint is eliminated. "Longitudinal joint density was tested, along with final profile of the entire project," said Colorado DOT's Ray. "The state measures density in the longitudinal joints, but with this project they got the highest longitudinal joint density we've experienced, because the process reheats the existing joint, and matches them up. We were getting joint densities of 92, 93, up to 96 percent in some areas. Really, there is not a joint to speak of, and that gives us a smooth process. We did not find any must-grinds."



Elimination of longitudinal joint produces smooth process.

"A key to smoothness here on the U.S. 6 project is that this longitudinal joint was reheated, cut out and replaced by the repaver," Shea said. "It really made a difference. Cutler's people knew what they were doing and took care of all the details. Density and leveling were taken care of. The reason this project won three awards was that the repaving process levels prior to final paving, and rolling happens all at once at the end. It is an interesting process that produces a fine product."

PAVEMENT HEATED TO 300 DEG F

In Cutler's exclusive repaving process, the existing pavement is heated to 300 deg F. When in the resulting softened, pliant condition, the pavement is scarified to a depth of 1 inch, and a recycling agent that restores the viscosity of the aged asphalt is mixed into the scarified, reclaimed asphalt.

This reclaimed material then is reapplied and distributed with a screed as a 1-inch leveling course. While that material remains at a minimum 225 deg F, a virgin hot mix asphalt overlay is placed over the recycled leveling course.

Cutler's repaving machine scarifies, applies recycling agent, places the leveling course, and applies the new overlay simultaneously in one pass. That benefits road users because there is no delay between the time the pavement is recycled and the time a riding or friction course is placed, resulting in a safer work zone for road users and for contractor personnel. And because the hot virgin mix is placed over the heated, recycled leveling course, the process achieves a thermal bond between the recycled layer and the new layer.

"You're getting two passes from one machine," Colorado's Ray said. "The first screed lays down the recycled, rejuvenated mat. The second screed lays down the virgin material. And then it's all rolled together. It's a leveling course and new mat in one process."

"From an engineering point of view, there is no delamination between the recycled layer and the new overlay," said Cutler vice president of sales John

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*Jim Sbea, SEH Consultants Inc., and
project manager for Colorado DOT*

Rathbun. "That's very important in predicting life cycle performance. The same heat that's used to take the road apart is used to put it back together, and the two layers are effectively compacted into one lift."

The entire machine moves forward at a rate of 15 to 20 feet per minute. The virgin surface is applied by a four-section vibratory screed no more than

3.0 feet behind the leveling course screed, fed from a hopper at the front of the repaver via a drag/slat conveyor chain which brings the HMA through a tunnel along the length of the machine, to the paving screed. The result is a monolithic, 2-inch, finished pavement that is equivalent in ride to a 2-inch mill and overlay.

The complete HIP repaving pass takes place over a very short time, meaning traffic barricades can come down quickly, with all reclaimed material used on the spot without hauling, so user delays are kept at a minimum compared to conventional mill-and-fill recycling projects.

Traffic can drive on the new pavement as quickly as with conventional paving, while driveways and intersections are blocked for about 15 minutes. And the objectionable tack coat ahead of HMA paving is eliminated.

More information about Colorado's Palisade peaches is available at <http://www.palisadepeachfest.com/>. The official web site of the Colorado DOT is <http://www.dot.state.co.us>. And more information about Cutler is available at <http://www.cutlerrepaving.com>.

VISIT THE CUTLER WEBSITE AT WWW.CUTLERREPAVING.COM

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