Cold-In-Place-Recycling: Cost-Effective & Environment-Friendly

Roadtec cold-in-place recycling (CIR) equipment makes it possible to repair damage to a roadway in one single pass, while reusing up to 100% of the existing material. Savings potentials are tremendous, not only through re-use of material, but also by reducing equipment requirements, and through time savings. CIR technology allows making of mix right there at the job site. No haul trucks are running back and forth to the asphalt plant; very little virgin material, if any, is used, and you can open the road to traffic very quickly.

CIR is the Future of Road Rehabilitation

Roadtec has been developing and refining this technology over many years and offers a number of equipment configurations to help you meet your goals. The basic concept of CIR is to remove damaged layers, to process the removed material, and then to place it and compact it to make the new structure. A new surface course can then be applied.

Roadtec Cold-In-Place-Recycling History

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
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<tbody>
<tr>
<td>1991</td>
<td>First Roadtec Cold Recycler with a scalping screen, crusher, weigh bridge and pugmill.</td>
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<tr>
<td>1993</td>
<td>Second Generation Roadtec Cold Recycler with a scalping screen, crusher, weigh bridge and pugmill.</td>
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<tr>
<td>1997</td>
<td>Sizing and mixing in cold planer cutter housing. Emulsion sprayed before housing. Emulsion spray rate based on entered cut width, depth and measured speed.</td>
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<tr>
<td>2001</td>
<td>Sizing and mixing in cold planer cutter housing. Emulsion sprayed before housing. Emulsion spray rate based on entered cut width, depth and measured speed.</td>
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<tr>
<td>2009</td>
<td>Roadtec Recycling Train with Cold Planer, RT-500, Paver, Screen, Crusher, Pugmill, and computerized metering of additives.</td>
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CIR Can Address All Types of Pavement Distress in an Economical Way

If a road has good structural strength, then CIR can be an effective treatment for all types of cracking, ruts and holes in the asphalt layer. It is not necessary to remove all of the old asphalt. Usually the treatment is applied to a depth of 2 - 4 inches (5 - 10 cm). Only a thin overlay or chip seal is required as a wearing course for most projects.

Cost Saving Factors CIR vs. Conventional Resurfacing
- Time
- Hauling cost
- Raw Materials
- Manpower
- Fuel
- Energy
- Extended Life of Roads

Fix It Fast. Fix It Now.
CIR can repair fatigue (alligator) cracking, bleeding (of excess liquid asphalt), block cracking, corrugation and shoving, joint reflective cracking, longitudinal cracking, patching, polished aggregate, potholes, raveling, rutting, slippage cracking, stripping, and transverse (thermal) cracking. The root cause of the pavement failure should always be investigated to rule out base failure. Other determining factors include the traffic volume and the loads the roadway should support. CIR can and has been used successfully on high-traffic-volume roads but may require a thicker overlay.

When is CIR the Best Way to Go?
If there is no damage to the base, you can consider CIR. All types of surface cracking and distress can be fixed. Grade and slope of the pavement can be improved if the depth of treatment is sufficient. Ride quality will also be improved. CIR is much more economical than mill-and-fill. A rule of thumb is that CIR costs 50% less than the same thickness of hot mix and provides 80% of the strength.

Cold -In-Place Recycling Makes the Most Effective Crack Barrier

Old pavement rutted and cracked, but structurally sound.

With only a new overlay ruts improve somewhat but cracks migrate through.

Milling and then overlaying fixes rutting but cracks still come through.

CIR and overlay fixes ruts and cracks.

The CIR layer acts as a crack barrier. CIR has relatively high air void content and therefore cracks don’t transfer through.
Advantages of the Roadtec Train Concept

As government agencies adopt CIR technology because of its proven cost savings, they will also create CIR specifications for road builders to meet. With its on-board screen, crusher, weigh bridge, and computerized metering of additives, the RT-500 cold recycler gives contractors unprecedented control of the characteristics of the modified recycled asphalt product they produce. The Roadtec recycling train is capable of processing 500 tons of material per hour. Conveyors are outfitted with cleated belts for maximum production. A water spray system prevents dust build up on rollers, and the conveyors are covered for safety and to prevent roll off.

The RT-500 Cold Recycler: Screening, Crushing, and Mixing Plant

The RT-500 s JCI brand double deck screen receives the milled up material from the RX-900 conveyor. Any oversized material goes through a Telsmith 3048 impact crusher and back to the screen via a two-conveyor return circuit. Material that passes the screen drops onto a weigh belt. The belt’s electronic scale, accurate to +/− 1%, communicates with the blending computer, which in turn adjusts the flow of additives that go into the JCI/KPI Model 52 pugmill mixer. This twin shaft mixer has a capacity of 500 tons per hour.

After a thorough mixing in the pugmill the material is discharged in a windrow onto the roadway or conveyed directly into a paver. The whole RT-500 system is run by electric motors powered by a Caterpillar C-9 generator set.

The RX-900 Cold Planer Provides the Material and the Power

The Roadtec 950 horsepower RX-900 cold planer is the recycling train’s sole source of propulsion. It tows the RT-500 cold recycler as well as any additive tankers connected to the train. Even the replenishing tankers that hook to the train to pump off their product are pushed or pulled by the powerful RX-900. Replenishing tankers are attached to the train just long enough to pump off their products and then go to a staging area where they are refilled to return to the train.
Making the New Mix

Material passing the screen moves on to the 48” (123 cm) diameter twin shaft pugmill mixer. The distance from paddle tip to the wall of the mixing chamber is adjustable, and paddle tips can be rotated up to 90° for longer dwell times in the mixer. Select from six paddle positions. Paddles are heavy duty and clad with wear resistant ni-hard.

The pugmill mixer thoroughly mixes the sized material with emulsion and other additives. The finished mix is either discharged into a window or conveyed straight into the paver hopper.

Precise Metering of Additives

The computer-controlled additive system meters up to three additives. These are usually emulsion or foamed liquid asphalt cement, slurry, and water. After you’ve entered your desired percentage of additives depending upon the mix formula, the computer adds the correct amount of liquid to the aggregate in the pugmill mixer.

Data flows from the extremely accurate belt scale (±1%) (located between the screen and the pugmill mixer) to the emulsion metering system, assuring that the amount of additives is correct for the amount of aggregate at all times. Spray and return valve operation is also fully computer-controlled.

Production Log for Accurate Reporting

The RT-500 computer will log all production data at desired intervals. The data then can be downloaded for a complete history report, which includes rates of all materials used, date, time, distance (or station), and speed. Data can be shown in either Metric or English units.

Integral System Purge for Clean-Out

The emulsion system includes strainers and a positive clean-out feature for easy flushing.

A solvent tank is attached to the machine and allows easy clean-up at the end of the workday. Emulsion residue is removed from all hoses and spray nozzles by simply circulating the cleaning fluid through the system.

* Refer to the flow diagram on the previous page.
Choose Paver-Loading or Windrow Equipment on Your Cold Recycler

Depending upon your needs, you can select the RT-500 with various options, including a choice between paver-loading and windrow models. The capacity of both machines is the same, yet shipping dimensions and weight are lower with the dual axle windrow version. Please see the last pages for more information.

Conveyor discharge directly into the paver.

Windrow discharge uses a windrow pick-up machine (shown at right) to load the paver.
Cold-In-Place Options Add Profit Hours to Your Roadtec Cold Planer

Some CIR applications require only a Roadtec cold planer outfitted with an emulsion package. These simple arrangements work well when precise sizing of aggregate is not required and for roads with lighter traffic loads. The RX-500, RX-700, and RX-900 cold planer models are available with emulsion packages.

**Exclusive Bi-Directional Capability**

With the bi-directional feature, you can use a Roadtec cold planer as a downcut or upcut pulverizer, while either rear-loading or front-loading. Gradation of the material will be different depending on whether you re-upcutting or downcutting. Roadtec’s exclusive bi-directional feature adds versatility to the machine and lets you use it in applications other than straight-up milling. Every contractor who owns construction machinery knows it’s important to get as many profitable hours as possible out of any given piece of equipment.

**Using the Cold Planer with an Emulsion Package for CIR**

The principal of the process is the same as with a recycling train, but without sizing and weighing of milled up material. Mixing is accomplished in the cutter housing of the cold planer.

Sometimes the contractor will choose to spread stone onto the surface to be rehabilitated to improve the gradation of the recycled mix and to provide uniform volume. A bitumen tanker is attached to the front of the Roadtec cold planer. A pushbar connects the two and the Roadtec cold planer will be pushing the tanker.

The supply hose from the tanker attaches to the Roadtec cold planer emulsion package. Emulsion is drawn from the tanker by the emulsion package’s pump and distributed in the cold planer cutter housing spray bar. All the action is in the cutter housing where the drum cuts the old pavement to the desired depth and the emulsion is mixed in. The rotating cutter drum serves as the mixing mechanism. Most commonly, cutting depths will be up to 4 inches (10 cm).

With the adjustable rear door at the Roadtec cutter housing, it’s possible to leave a window of material as the cold planer moves ahead. A window elevator follows, picks up the material and transfers it to the paver hopper.

**Choices in Handling Treated Material**

Whether you’re adding emulsion or simply pulverizing you’ll want to spread the material in the cut to be compacted for the new surface. With Roadtec cold planers you can:

- Feed the material into a paver via the secondary conveyor.
- Temporarily remove the secondary conveyor and allow the primary conveyor to deposit the material into a window.
- Turn both conveyors off and adjust the height of the rear mold board, letting material exit out the back of the cutter housing. A chute can be installed at the rear mold board to form the window.

**Special Application: Using Your Cold Planer As a Pulverizer**

Some deteriorating, low traffic farm-to-market roads may only need their top layer worked into the flex base. No binding agent may be required or dry additives may be used. You can run the planer forward (upcutting) and backward (downcutting) to determine which resulting gradation is the most suitable. Then simply adjust the rear cutter housing door to spread the material in the cut. A grader to evenly distribute the material followed by a compaction roller is all that is needed to prepare the surface for a layer of hot mix at a later time. Even without the asphalt surface course the road can be opened to traffic.

**Special Applications: Dedicating your Machine to CIR**

If the contractor wants to use a Roadtec cold planer cold-in-place work strictly for cold-in-place recycling work, Roadtec can modify the machine into a recycler. The emulsion package could be installed at the front of the machine and supplied without any conveyors.

Please refer to the Roadtec Cold Planer Brochure for all the information on our line of cold planers.
GENERAL FEATURES RT-500 Cold Recycling Trailer

900 TPH (453 metric tons per hour) Cold In Place Recycling Trailer

Single Trailer Unit - High Portability

Designed to be pulled by RX-900 milling machine or to be used in as a stationary mixing plant

Two dollys for use during operation

Capacity - 500 tons per hour (453 metric tons per hour)

Hydraulic powered landing gear for stationary applications

Electronic Switch Gear with lighted and sealed buttons, circuit breakers, overload protection, master stop, and interlocks

Caterpillar Tier III generator set - C9 or C13 depending on options chosen

Optional Weightage, Hertz, Emission Standards, 223kW to 330 kW

Wide spread axles for stability and flotation with spring brakes

Axle is raised in center on windrow unit to clear windrow

Conveyors

Cleated belts for maximum production

Skirted for safety and to prevent roll-off

Lagged head pulleys for non-slip traction

Water sprays to prevent raps dust build-up on rollers

Under screen conveyor tilts up to improve access to pugmill

KPI Model 50-488 Pugmill

45” (914mm) diameter Twin Shaft mixers x 6’-0” (.91M) long

Paddle tips arranged in a 45° spiral around each log to promote aggressive mixing

Paddle tips are adjustable 1” (19mm) to 3” (5mm) from paddle tip to chamber wall

Paddle tips can be rotated 90° to increase retention time in mixing chamber

Tired gear drive

Heavy duty oil filled gear box with heavy duty spur gears for positive shaft rotation

Long life paddles, extra wear plates on inlet and discharge

Drop out bottom for ease of clean-out & paddle tip maintenance

Curved bottom for minimal dead weight

Nh-Hard paddles with 6 positions to increase retention, improve mixing, & increase life

Telsmith Crusher Impactor 3048 HSI

Mainshaft and bearings for maximum wear life

Shaft and rotor assembly feature needlebearers to provide lack of shaft and rotor without press fits or keys (allows for easy removal of shaft from rotor)

4 Rows of massive hammer bars

200 bars per hour (811 metric tons per hour) crushing

Patented Hammer and Wedge Design provides 4 wear surfaces for maximum life

Hammer bars are 23% chrome iron alloy

Precision machined surfaces provide 100% backing for hammers

Two - movable aprons to allow for hammer wear

Spring return on movable aprons to eliminate shear bolts for tramp iron relief

1” (.25mm) Thick AH400 Ubers

Hydraulic access door for easy maintenance

Minimum 150 hp (112kW) electric motor drive

Fully enclosed belt guard

JCI 5142-24 "LP" Screen

5’ x 14’ (1.5 m x 4.3 m) double deck “Low Profile” flat screen

Screen is fully adjustable in amplitude and frequency (Maximum Stroke 14” or 19.0mm)

Adjustable oval motion length and tilting angle provides exclusive flexibility

Frequency - 675-875 RPM

Triple Shaft Vibrating Mechanism provides:

- Less plugging and blinding

- Maximum bearing life

- Haul-bolted construction coupled with triple shaft design, spreads the shaft/force out over a wider area, and provides reduced basket stress and maximum service life of frame

- Heavy duty feeder box

- Patent Pending “Tilling Oil Seal” provide leak free bearings

- Rubber springs or mounting donuts for smooth and quiet operation

- 25 hp (19kW) electric motor with belt tensioner

- Allows for maximum production with varying types of material

Additive Control System

Ability to control up to three additives – water, asphalt (emulsion or expanded) and slurry.

One touch buttons for instant additive percentage changes

Automated flush system with onboard solvent tank - automatically flushes entire additive system with solvent and returns to solvent tank

Hydraulic variable drive positive displacement asphalt pump with reversing capability and suction strainer

Positive displacement flow meter

Full circulating system to guarantee flow/spray bar when needed

Automatic computer controlled hydraulic Spray/Pull Down valve operation

Computer is directly connected to belt scale load cells and belt speed sensor

Fully automatic belt scale calibration using test weights or materials

Desired proportions of each product are entered as a percentage of RAP by weight

Computer automatically adjusts the flow rates of each product to get the desired percentage based on belt scale rate

Display of forward speed and totalization of distance processed

Beginning station can be entered to allow for current station number to print on the production report

Computer will calculate the theoretical production rate based on speed, width, depth, and density of uncut pavement - can be used in place of belt’s scale if desired

Alarm horn will sound if flow rate of any product cannot be controlled to the desired percentage, and also if the product values do not move to “spray” positions

Computer logs all production data at desired intervals - data then can be downloaded for a complete history report including date, time, RAP total weight, RAP production rate, additive total weights, average additive rates, additive percentages of RAP, distance (or station), and speed. All parameter descriptions and values can be downloaded for a back-up of calibration data and set-up information

System will work in either Metric or English units

OPTIONS

- 6’ Pugmill in lieu of 6’ Pugmill

- 1,000 gal (3785 l) insulated and heated surge tank – mounted on RT-500, visual level indicator on tank as well as graphical display on additive control computer. Automatically fills when low and shuts off when full

- Conveyor discharge orientation in lieu of window discharge – reverses trailer to provide discharge conveyor to feed directly into paver

- Expanded Asphalt Tray Additive System – includes foaming additive spray bar and water piping

- Heat trace system for additive pumps and piping – recommended with Expanded Asphalt Additive System

- Weigh Bridge Calibration Bin

- Flow Meter Calibration Tank

Specifications subject to change without notice.
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