FLOORING SOLUTIONS & KOESTER AMERICAN CORP



ORS APPLICATION

AT THE TRAVELER'S ST. PAUL TRAINING FACILITY Windsor, CT December 13, 2006



January 12, 2007

On December 13, 2006 Koester American personnel arrived on-site to assist Flooring Solutions of Warwick, RI to begin work on an ORS contract for the Traveler's St. Paul Training facility in Windsor, CT. Flooring solutions received the contract to clean (remove oil contamination) and coat approximately 45,000 sq ft of contaminated concrete inside the Traveler's St. Paul facility in two phases of 22.5K each with the first starting on December 13-20th. The ORS Division of Koester American had previously agreed to assist Flooring Solutions in getting this project started and to make sure that their personnel were properly trained in all aspects of the ORS treatment, and that Flooring Solutions could use the Koester ORS equipment until their equipment arrived on-site.

The Traveler's St. Paul facility is a state-of-the-art training facility for insurance agents, investigators, engineers, safety personnel and general insurance investigative training. The facility was apparently converted from an old manufacturing facility and the concrete floors are contaminated with oil and other hydrocarbon contaminates that will cause failure mode in standard coating systems. Flooring Solutions bid on this job as an ORS certified applicator and as such has received the full attention of the ORS Division in getting their crew started on a successful project.

This project has been broken into two distinct phases, with each phase being approximately 22,000 square feet of contaminated concrete to be treated and coated. The Koester American ORS Division personnel, Joachim Bohlmann (manager) and Mac Krauss arrived on-site at approx. 9:00 am on the 13th and began unloading the Koester equipment in preparation for the 1st phase of the ORS treatment to commence.

The following picture gallery will show the ORS treatment in full swing on a large scale job. The treatment is comprised of two distinct operations; 1) deep cleaning of the concrete substrate to remove surface oil and contamination; 2) application of the ORS-C epoxy coating to seal the concrete surface and prevent any further migration of oil to the surface. In this picture gallery we will show how the system can be applied in a rhythmic manner where cleaning operations and coating operations can progress together to complete a given job within a structured timeframe. Some of the pictures will seem redundant at first look but it will become clear at the end of the gallery just how the entire system works.

In preparation of this project, the floor was shot-blasted by Flooring Solutions prior to the ORS application on the 13th. The rigid completion time was accomplished using time tested operation sequences, methods and the systematic use of the ORS treatment that as has been successfully applied in Germany for the past 14 years. At this writing, the first phase of the project has been completed and the second half is to start in mid January of 2007. The final topping system has been applied onto the finished ORS treatment on phase I, and the project is proceeding as originally scheduled. The concrete floor and the subsequent coatings in this facility now have a 10 year warranty against any delamination of flooring systems due to oil migration to the surface.



The Flooring Solutions truck unloading at the back door or the Traveler's St. Paul Training facility in Windsor, Ct.



Part of the first section of phase I to be treated with the ORS treatment. This facility was converted from a manufacturing plant to a training facility.



More shots of the first phase area. The shiny strips are new-pour concrete that was treated with Koester VAP $I^{\textcircled{R}}$ 2000 vapor mitigation treatment and will not be coated with ORS.



Very oily concrete, (dark stains) that is to be treated with ORS. Some parts of this floor are in poor condition and will need to be rehabbed.



Oil contamination in the concrete. Oil will always migrate to the surface of the substrate regardless of any vapor drive in the concrete.



One more shot of the first phase area. There are more, smaller rooms in the back of the building that are also part of this phase.



Joachim Bohlmann of Koester American gives Flooring Solutions team, (Steve-left & Tony-R), instruction on the ORS-D special detergent.



Joachim applying the ORS-D special detergent with the Koester ORS "foam gun" the spread rate for this material is approx. 200–350 sf/gal.



Tony takes a turn at foaming, after the first foaming a 1 hour wait is necessary to allow the foam to penetrate into the concrete capillaries.



The ORS-D foam on the deck in the first application. After approx 45 min. the foam will turn clear indicating that cleaning operations will soon commence.



Kevin Haughey (L) Pres. of Flooring Solutions confers with Mike Farraher the New England Koester American Representative.



Another shot of the foamed area as show in the last picture. These areas should not be allowed to dry out during the wait period.



Joachim uses the floor spinner with 180° F hot water to drive the detergent deep into the substrate and remove deep down oil.



Oil coming to the surface of the concrete as shown by the yellowish streaks in the foam. The special detergent penetrates deep into the capillaries of the concrete, hot water assists.



Steve, of Flooring Solutions, takes over with the high pressure spinner. Every square foot of concrete floor will be treated to this operation.



The equipment set-up: the water heater is on the left, the 5000 psi washer in the center and a 250 gallon Haz-mat tote on the right. This is the Koester American ORS Division equipment.



First section spinning operations under way. Men are using squeegees to manage excess water. The floor spinner has a vacuum hookup to control this water, (black hose).



Spinning on first section is complete, excess water removed and waiting for the second application of the foam.



Second foaming operation begins with a spread rate a little greater than the first.



Spinning operations commence again using hot water. Note vacuum attachment to spinner at top of machine with black hose to vacuum.



First section with the second application of the foam, this will be allowed to sit for approx. 15 - 20 minutes then...



Tony operating the spinner while Steve manages excess water. This operation will remove the remaining oil contamination from the top cap of the concrete.



First section after 2nd spinning and final rinse with hot water. Puddles and all standing water must be removed then deck is ready for coating.



All puddles must be vacuumed up prior to coating application. Concrete does not have to be dry, however, as the ORS-C will apply directly onto damp concrete.



Mixing the ORS-C special epoxy coating with a jiffy mixer. The 3 minute mix time and 1 hour pot life makes for easy mix-station set up.



Here Tony (background) is using a squeegee to spread the material and Joachim is using a $\frac{3}{8}$ " nap roller to back-roll, evening out the material.



After approx. 15 minutes or so, silica sand is broadcast into the coating, (note white sand in upper right of picture). This is broadcast to rejection. Sieve size 30-40, washed and dried silica sand works best. Note the material application & rolling operations continue on.



Steve pours a ribbon of ORS-C out on the deck. The epoxy coating requires the use of standard coating procedures for application.



Spread rate is usually 100 sf/gallon applied, but this may vary according to the surface porosity and absorbs ion of the concrete surface.



This is the first area cleaned and coated after a 12 hour cure. The floor is now protected with a 10 year warranty against any further oil migrating to the surface. This section is now ready for the final flooring system to be applied.



The next section receives the first foaming...



And spinning with hot water. Note the coated floor in the background. Thoroughly rinse any detergent that may get onto this coated floor.



Water management: It is very important to maintain and control excess water. The first wash and rinse cycle yields the most contaminated water...



And the second wash and rinse is much less contaminated. Here the high pressure wash and spinning continues, note the 4 point vacuum attachment.



Final Rinsing of this section, note the assistant with the red sweatshirt (Arnold) helping with the rinse hose and the coated floor behind the crew.



Using a squeegee to get up standing water. Note the piles of sand swept up in the background. If this sand is clean, dry and uncontaminated, it can be re-used.



Operations continue down the floor. Foaming, spinning, second foaming and final rinse. If the crew and floor size allows, coating can be done simultaneous to cleaning operations.



Make sure that each can, (4 gallon kit) is mixed for the full 3 minutes and that all the material is thoroughly mixed: pre-mix "A" cans to get all material off the bottom and sides of the can.



After an initial application of epoxy (ORS-C), fiberglass matting is applied and worked into the epoxy material...



This shot shows the vacuum set-up with the particle/solids separator, (the black 55 gallon barrel). The separator holds any solids from the floor and keeps them out of the vacuum pumps.



Coating progresses across the floor. Here the crew is preparing to coat over some metal rails imbedded in the concrete. They are going to use an industry accepted method for this area...



Then more material is applied over the matting creating a mechanical bond-bridge over the rails for proper adhesion as the ORS-C material is not warranted when applied directly to metal.



Be careful not to mix too far ahead. Mix only what you are going to use on a given section. Pre-mix the "A" component prior to adding the "B", this will make the final mixing much easier.



OIL! The yellowish streak is oil being forced to the surface by the special detergent; The detergent makes the oil rise to the surface.



The ORS-C is comprised of a standard "A" and "B" component in separate cans. Always mix the "B" slowly into the "A" and mix @ approx. 400 rpm's with a jiffy type mixer.



More oil streaks. Oil is a bond breaker for any subsequent coating system and untreated, will always try to migrate to the surface of the concrete.



Vacuum operations after final hot water rinsing.



Coating operations continue on the deck. The orange wheeled object on the right of photo is an electric sand broadcast machine.



Entire section cleaned, coated and sanded. The sand is being swept up into piles. If this sand is uncontaminated and dry, it can be re-used.



The clear, shiny strips are <u>new pour</u> areas, (uncontaminated concrete), that have been coated with the Koester VAP I 2000 vapor mitigation System and the ORS is not required..



All the excess sand must be swept up with brooms or sweepers. In this case, Flooring Solutions also used leaf blowers to help remove all sand & surface debris.



Joachim Bohlmann, Koester ORS Technical Manager, (and one of the system inventors), signaling a finish & job well done to the first section.



Joachim with the Flooring Solutions crew: (L to R) Erroll, Arnold, Steve, Joachim & Tony.



The next section of the first phase to be done after the Christmas holiday. The dark areas are oil contamination.

FLOORING SOLUTIONS ORS STATE-OF-THE-ART APPLICATION EQUIPMENT:



This shot shows the equipment set-up from L to R: Filtration unit; Vacuum (red); Water Heater & the yellow end of the Power-washer.



The high pressure (5000 psi) electric water power-washer. All fittings and hoses are also rated for 5000 psi.



Close up of the electric high temp water heater. All equipment is on wheels for easy movement on floors to be treated.



This shot shows the power-washer with the water tank in the background. This is a closed loop water/filtration supply system that allows for a constant supply and re-use of water.



Stainless steel high pressure floor spinner with 3 point vacuum attachment on the top deck.



Another shot of the vacuum system hooked to the filtration system. This is a real money saver with a positive environmental aspect which allows for constant re-use of available water.



This shot and the next few shots are taken in 2007, (right after the holidays) of the finished floor system as applied in the phase 1 section.



This area is topped with an aggregate/epoxy floor system in a section that will apparently be used for insurance automotive training.





Both these sections were heavily contaminated with oil and grease.



This area was treated with ORS and the topping is ceramic tile over the Ardex K-15 self-leveling underlayment. This area was also a heavily contaminated concrete section prior to the ORS treatment.



Here is the next phase, (phase II-22,000 sq ft) to be treated and coated, which is to begin in late January of 2007. *ORS is the solution*.