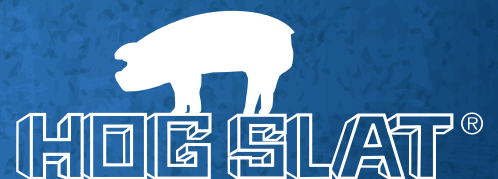




# SLAT REPAIR AND REPLACEMENT

**The Field Guide to Slat Repair and Replacement**





## CONCRETE SLATTED FLOORING

Concrete slatted flooring is an important part of modern day production buildings. Selection of new slats, observation of any developing problems and proper repair or replacement will protect a producer's investment.

It is important to inspect the condition of the slats and beams each time the building is emptied and cleaned between groups. Schedule an annual inspection for slats and beams in breeding/ gestation facilities.

Routine examination of slats will allow an operator to identify premature wear and to correct the problem before deterioration becomes severe. It will also help in detecting developing structure flaws to beams and slats enabling timely repair or replacement.

### **Section 1, Slat surface damage.....Pages 3 – 7**

Section 1 describes varying levels of premature wear on slats from mild to severe and suggested products used to repair the damage.

### **Section 2, Slat and beam failure .....Pages 8– 12**

Section 2 is a DIY guide to identifying common slat and beam failures.

### **Section 3, Selection of replacement slats.....Pages 13-15**

Section 3 offers a discussion of factors important in the manufacturing of quality replacement slats.

### **Disclaimer**

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## SECTION 1 - SLAT SURFACE DAMAGE

Premature damage to slat surfaces results from acidic compounds found in building environments, particularly near feeders and waterers. If left untreated these rough, eroded surfaces can cause animal injuries and lead to structural damage of the slats. We identify three levels of damage with suggested repair products.

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### LEVEL 1

#### New Slats and Slight Wear



The first areas to exhibit significant wear will be around the feeders and waterers. These areas may show damage in as little time as six months. This wear is expected and does not indicate poorly made or inferior slats.



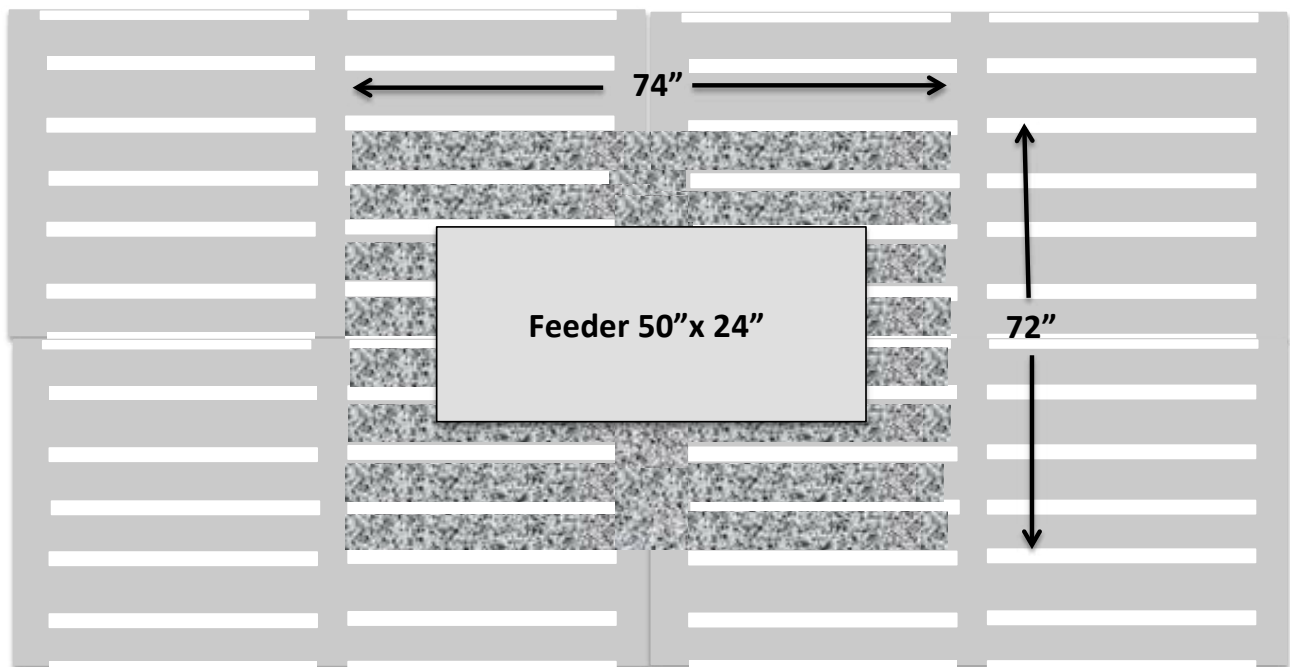
A conventional method of preventing this damage is to cover the slats around feeders with a plastic mat. While this does protect the slats directly under the mat, it only moves the problem to the edge of the mats. Water, manure and feed salt gather on the mat surface and run off the mat edge damaging the concrete slats. The pigs can also chew and damage the plastic mat. The same limitations occur when a concrete feeder pad is used; the corrosion is moved to the edges, and in this case, the concrete pad is subject to the same wear and deterioration as the slats.

A better solution is to cover the slat surfaces around the feeders with a protective coating to protect the concrete from acid compounds and pig traffic. Instead of pooling on a solid surface, any moisture or manure drains away through the slat openings.



Vanberg Coating's Armor-Rock is an excellent product to create an improved "slat mat." Armor-Rock is a unique blend of epoxy resin and aggregates providing an exceptionally tough wearing and chemical resistant overlay.

Armor-Rock allows slats to drain properly preventing the spread of corrosive liquids.



Typical dimensions for the coated area would be 12" longer than the feeder and 24" out from the feed trough on each side. For example, Hog Slat's 4-hole Wean to Finish Feeder measures 50" long by 24" wide. The coated area for the slats under this feeder would be 74" long by 72" wide.





The application begins by masking off the borders of the area with duct tape and cutting a 1/4" x 1/4" groove along the perimeter for the epoxy to flow into. Next, the surface is prepared before coating. Uniformly apply Vanberg's Clean and Etch with a plastic sprinkler can and scrub in with a stiff broom. Allow acid to work for 5-10 minutes, or until the bubbling reaction ends. Rinse with water and allow the surface to dry completely.



Combine the Armor-Rock epoxy resin and hardener products, mixing thoroughly. Incorporate Vanberg Admix, an aggregate mixture that adds additional strength and wear properties, into the epoxy liquids.



Apply to slat with Armor-Rock Applicator to a uniform depth of between 3/16" and 1/4". Or, pour the epoxy slurry as a bead down the slat center and spread with a Notched Squeegee to a uniform depth.



The next step is to broadcast Vanberg Topping Mix over the wet epoxy until the surface appears dry. Allow to cure for 6-8 hours.



Areas around nipple drinkers and cup waterers also benefit from the same Armor-Rock coating. The suggested coverage is approximately 24" x 24" per water location.

## LEVEL 2

Moderate wear 1/4" to 1/2" deep. The surface is rough with lightly exposed aggregate showing.



Vanberg's Con-Korite is the product of choice for basic repairs. Formulated with Pure Cement Technology instead of a standard portland base, Con-Korite is a dense, abrasion resistant mortar that sets quickly without shrinking.



Clean and remove all debris and loose material from the damaged area. Uniformly apply Vanberg's Clean and Etch with a plastic sprinkler and scrub in with a stiff broom. Allow acid to work for 5-10 minutes, or until the bubbling reaction ends. Rinse with water.

Prime repair area by brushing with KB25 Acrylic Resin to improve bonding.



Add 3-4 qt. of Con-Korite to 1 qt. of KB25 and blend into a uniform mixture.



Place mix on prepared surface and smooth to desired finish with a trowel.



After rebuilding them to their original profile, slats near waterers and feeder will benefit from a protective layer of Armor-Rock. If Con-Korite will be coated with Armor-Rock create a gritty surface by embedding sand into the surface.

## LEVEL 3 Severe Wear



Very severe damage with deep pitting and/or including exposed rebar that will require additional labor to reshape the defective areas. While it is possible to create long-lasting repairs with the correct products, buildings with large numbers of Level 3 repairs are candidates for partial or complete slat replacement.



Common Level 3 damage includes mechanical breakage to a slat edge caused when installing gating or other equipment. The slat opening becomes wide enough to allow pig's legs to become caught. Rebuilding the slat edge restores the correct gap width and reduces pig injury.



Clean and remove all debris and loose material from damaged areas. Prime slat edges by brushing with KB25 Acrylic Resin to improve bonding.



Place Con-Korite mortar over primed surface shortly after mixing. Shape with trowel and/or mud hawk to form new slat edge. For the most durable repair, wrap the mortar completely over the top of the slat.

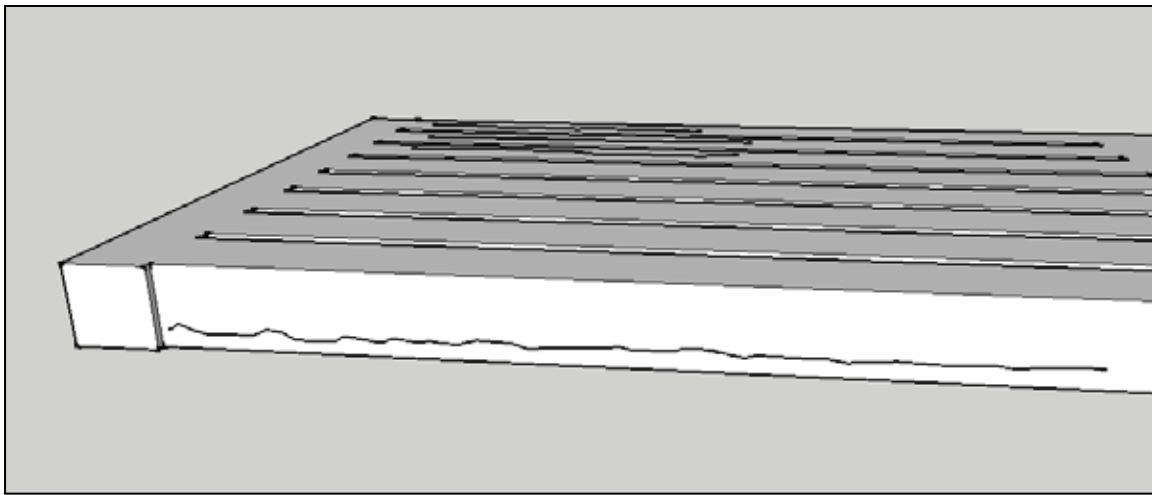


Armor-Stone Epoxy Mortar is the most durable product available for this type of repair. This specialty mortar combination of Armorcoat epoxy and sand is easily shaped to repair the slat edge profile.

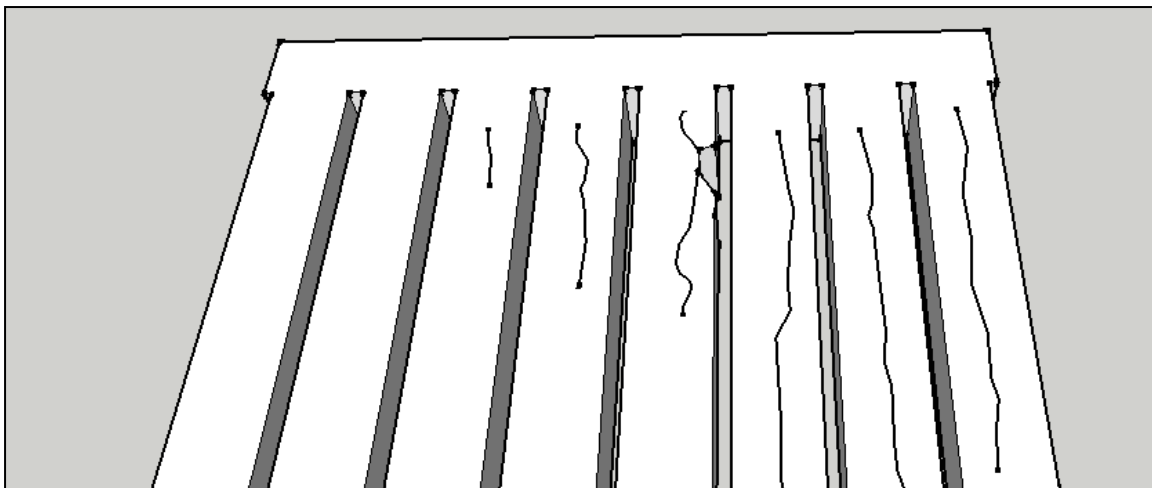
All Vanberg repair products have detailed application guides available. Ask your Hog Slat representative for your free guide.

## SECTION 2 - SLAT AND BEAM FAILURE

At some point all concrete slats and beams will reach the end of their useful life and need to be replaced. Some of this damage is difficult to identify as it occurs below slat level. Complete slat replacement is cost effective when 40% or more of the slats in a building show physical damage. The labor required to replace 40% of the slats is equal to replacing the entire barn. The only additional expense will be the cost of slats.

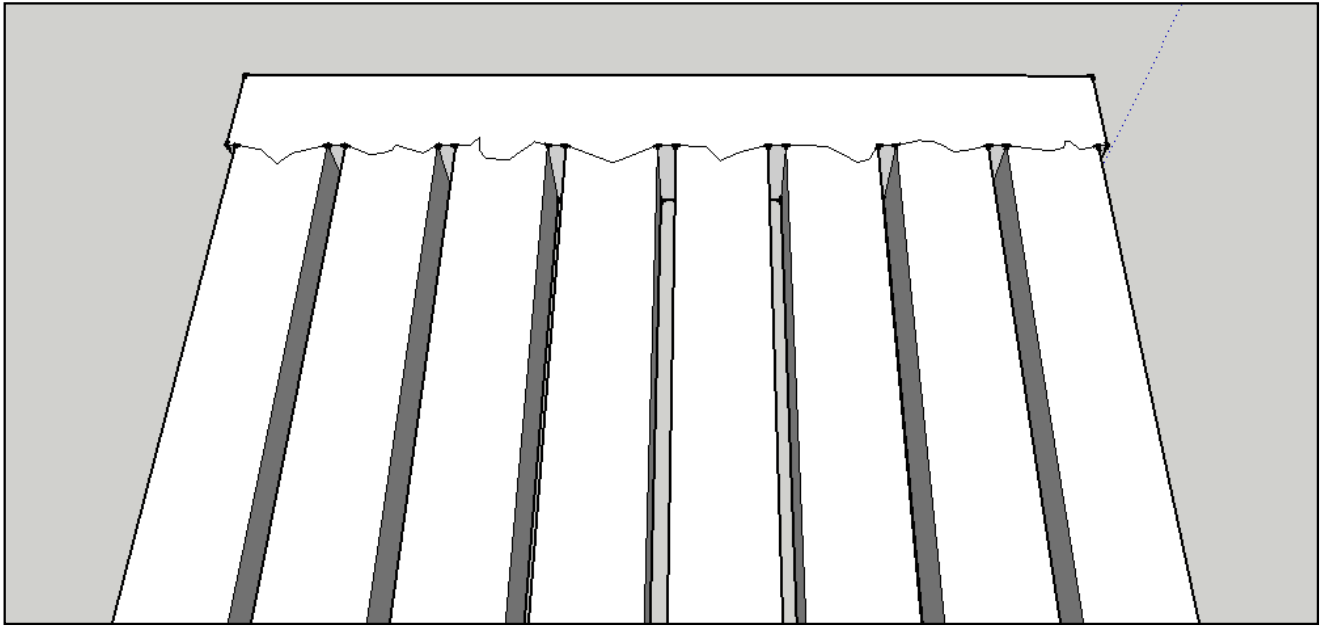


One common flaw occurs as a crack roughly two inches above the slat base. Moisture penetrates through the crack causing the rebar to rust and swell, damaging the concrete on the underside of the slat. It is almost impossible to repair this damage and the slat should be replaced.

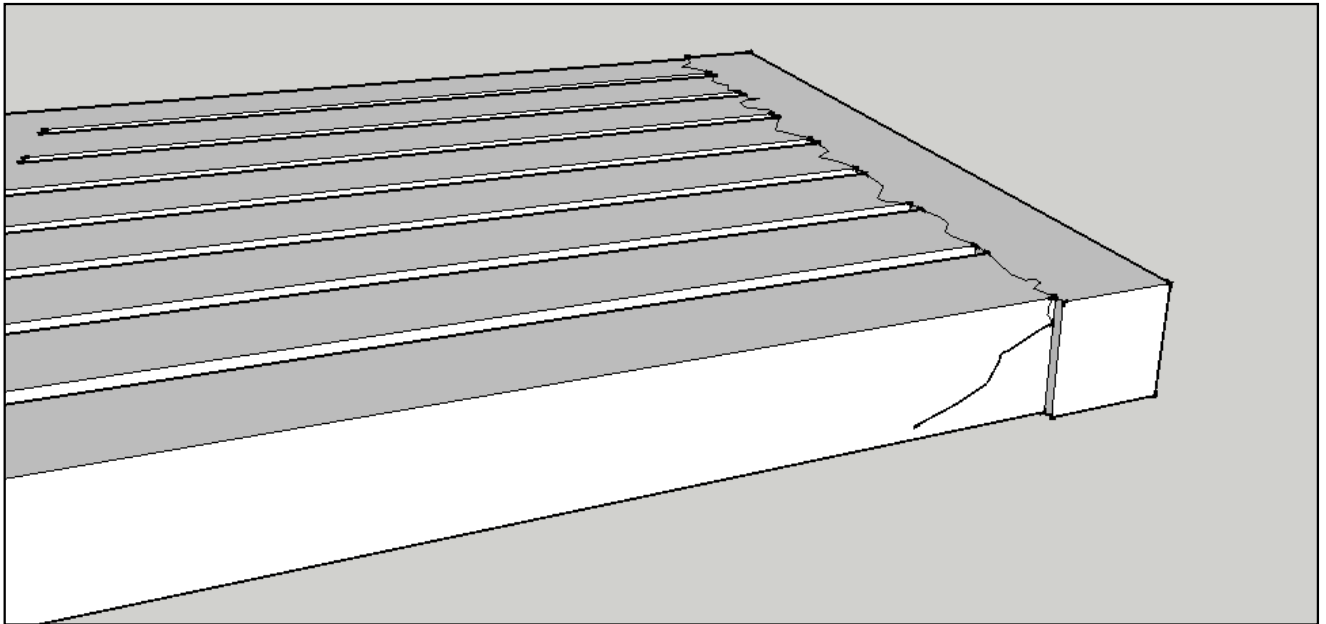


A second common flaw appears as cracks in the top surface of the individual slat. Applying an epoxy-based repair product such as Armor-Rock will arrest further damage and prevent moisture from reaching the rebar.



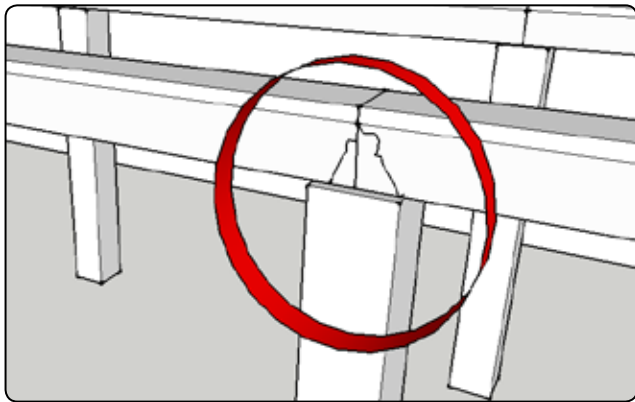


Surface cracks appearing where the individual slats meet the support webbing at the end or middle of the gang. Cracks in this area are common and are not usually a structural problem unless they become wider allowing moisture to reach the bottom load bearing rebar.

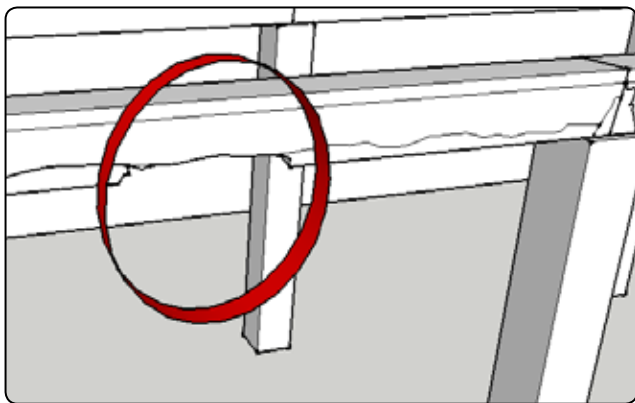




Pay particular attention to the support beams under the slats. According to slat replacement specialists at Altenburg Construction beams are many times a bigger cause for concern than the slats themselves. Deterioration of support beams is the cause of most catastrophic slat failures.



As they age, beams tend to develop cracks in the areas above the columns. Moisture seeps through the crack reaching the bottom support causing the rebar to rust.



The rusting metal expands breaking the concrete causing the lower portion of the beam to fall off. A dangerous situation occurs as the structural integrity of the support lintel is compromised.



Deteriorated beams shown with slats removed. Note the deep cracking, indicating damage to interior support rods.



Another example of a beam with severe damage including exposed rebar.



Carefully examine the support beams by shining a flashlight down through the slat openings. Look at both sides of the beams; occasionally a beam will appear to be structurally sound on one side while having rebar protruding out the opposite side.

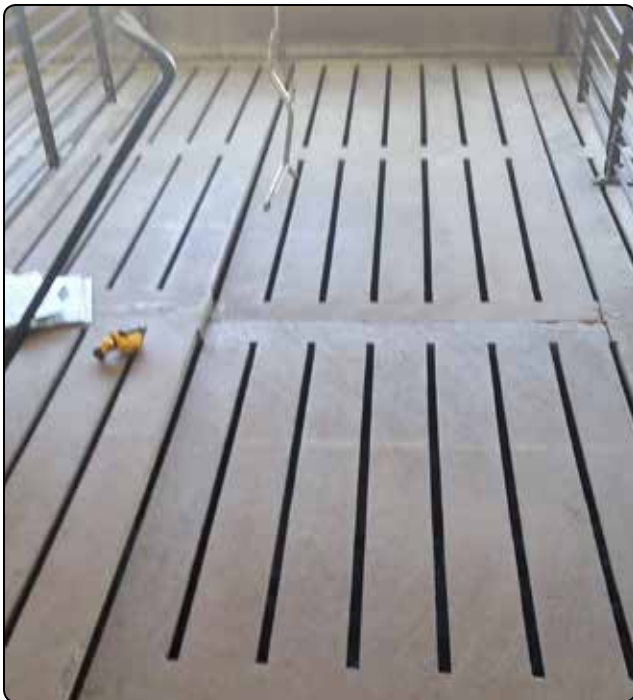
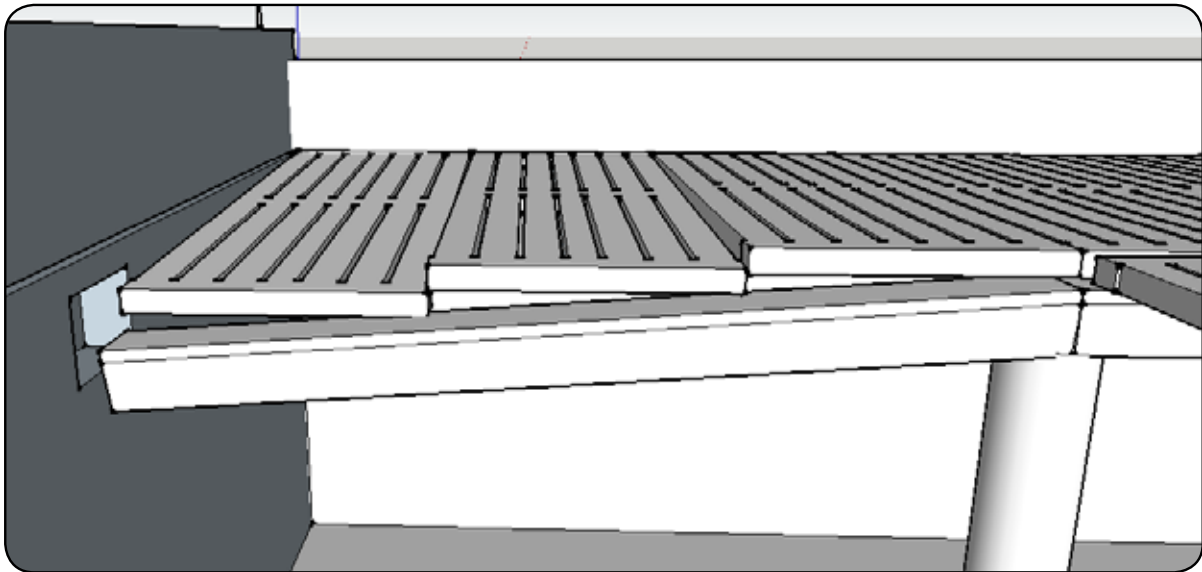
Note circled area in the opposite photo. The bottom of the beam has started to crack and separate. The damage has occurred even though the slats appear to be in good condition.



Close up view of a beam showing cracks and separation.



Another critical area is the amount of bearing surface a beam has on a column or end wall pocket. At least 3" of bearing surface should be present. Over time a building can shift, especially on the end walls allowing the beam to fall out of the pocket. When this condition is discovered the slats and beams must be removed and column added at the end wall.



The appearance of uneven slats can be an indication of a beam starting to fall from a column or end wall pocket.

## SECTION 3 - SELECTION OF REPLACEMENT SLATS

Choosing replacement slats is a large investment that requires careful evaluation comparing quality vs. cost. Slats are not a commodity product. There is a difference in production methods and materials that affect product longevity and pig performance.

### *Machined Slat* (cross-section)



**It is important to choose slats with a level, flat top surface to aid pig movement. Slats with an uneven and inconsistent surface place additional stress on pig's feet and joints.**

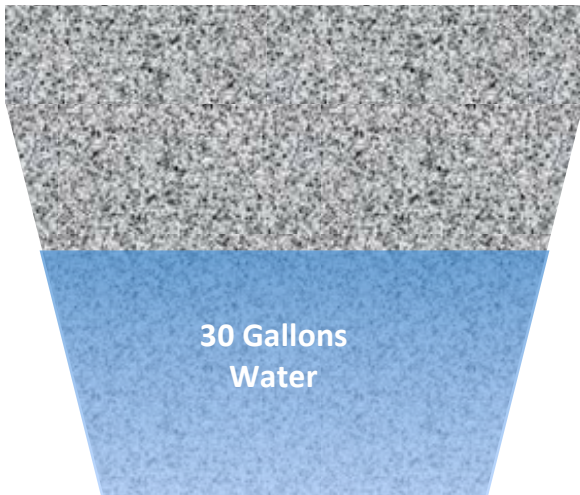
**Many methods used for producing concrete slats consist of placing wet cast concrete into multiple steel forms and hand troweling to finish. It is difficult to build slats with a consistently flat surface using hand-finishing methods.**



**Machined slats manufactured by Hog Slat are produced with a different process that eliminates the uneven surface found on hand cast slats. Automated Rotoscreeds "strike off" the mold creating a level, uniformly flat top that is easier for pigs to move across.**

**Slat longevity is an important consideration as worn or damaged areas create uneven surfaces that can injure pigs. Slats built using concrete with a low water-to-cement ratio are longer lasting and more resistant to wear.**

**Wet Cast Concrete**



**. 5 Cement- Water Ratio  
500 lbs. Cement**

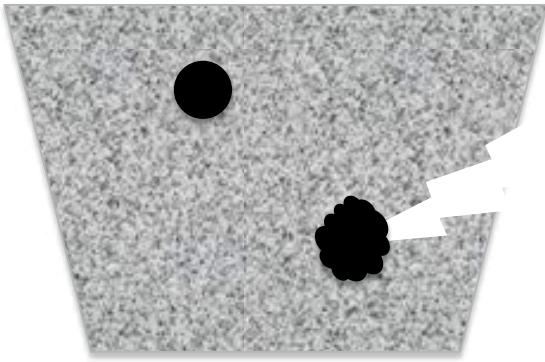
**Dry Cast Concrete**



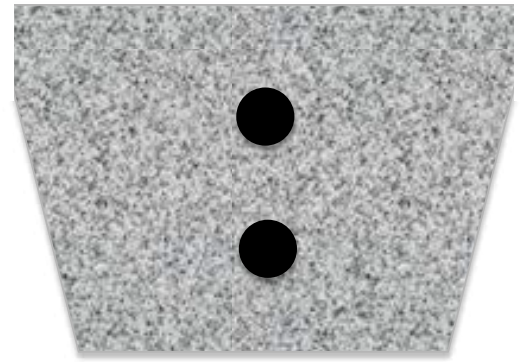
**. 39 Cement- Water Ratio  
500 lbs. Cement**

**The water-cement ratio refers to the ratio of the water weight to the cement weight used in a concrete mix. A lower ratio leads to higher strength and durability but makes the mix difficult to work with and form. For this reason, most slats are produced with wet cast concrete using a water-cement ratio of 0.5. Hog Slat's machined slats are produced from dry cast concrete with a water-cement ratio of less than .39.**

**A cubic yard of wet cast concrete formulated with 500 pounds of cement contains 250 pounds of water, while a dry cast mix only contains 195 pounds. As the excess water leaves during the curing process, it creates microscopic pores that reduce the final strength of a slat. Compromised slat strength can lead to many problems down the road, including expensive repairs, equipment damage and injury to pigs and farm personnel.**



**Rebar placed too close to side can corrode causing concrete to crack and flake off.**



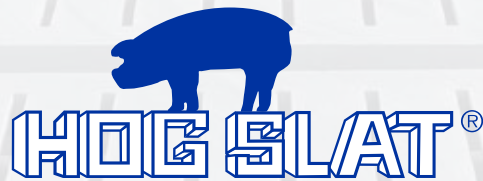
**Rod placement with welded mats is consistent and exact.**

**Improper placement of reinforcing rods is a common cause of premature slat and beam damage. Individual rods placed too close to the side of a slat or beam can cause the rods to swell bursting or cracking the concrete. Hog Slat uses pre-welded steel mats to assure correct rod placement in each gang slat produced.**



**After casting, Hog Slat steam cures slats in climate-controlled tents. Steam provides the heat necessary for accelerated curing and the moisture to prevent stress cracks and shrinkage. In only a few hours, we can harden slats that exceed 28-day strengths of typically cured concrete. Hot, dry weather or cold, wet conditions don't affect the quality of the slats delivered to your farm. It is important proper steam curing procedures are followed to ensure long-term durability of the slats. The rate of temperature gain and the maximum temperature in the curing chamber must be controlled and monitored using accepted industry guidelines and practices. Failure to do this can result in a shortened lifespan of the concrete slats due to delayed ettringite formation (DEF), a condition that leads to early deterioration of the concrete when exposed to an environment similar to that found in a hog barn.**

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Contact Hog Slat at 800-949-4647 for a quote on slats and beams.  
Go to [www.hogslat.com](http://www.hogslat.com) to order Vanberg repair products.



Go to [www.vanbergcoatings.com](http://www.vanbergcoatings.com) to see detailed instructions  
and videos on repairing concrete slats.



Call 1-888-435-2210 for more information on slat replacement.  
You can also contact us by email: [office@altenburgconstruction.com](mailto:office@altenburgconstruction.com)  
Go to [www.altenburgconstruction.com](http://www.altenburgconstruction.com) to the RESOURCES tab  
and click on EDUCATION to watch a slat replacement video.