

# SPECIAL INSTRUCTION



## Cylinder Block Salvage Procedure Using Belzona® Ceramic R Metal

005  
1201

### Cast Iron Cylinder Blocks

#### Introduction

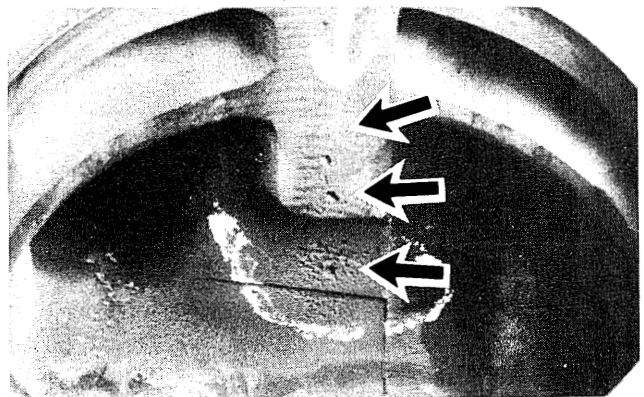
This instruction gives the procedure and the materials needed for the salvage of a cast iron cylinder block that has damage caused by cavitation erosion. See the topic *Examples of Erosion* for the type of erosion that can be repaired with this procedure.

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#### Examples of Erosion

Shown below are the types of erosion that can be repaired using Belzona® Ceramic R Metal.



Pitting in sidewall of cylinder block.



Pitting in cylinder bore (head bolt boss).

#### Protective Equipment, Tools and Materials Needed

The following listed materials will be needed to make the repair according to the procedure given in this instruction.

- Electric grinder.
- Rotary carbide tool bits.
- Air powered needle scaler and/or ice pick.
- Rubber gloves.
- Protective face shield.

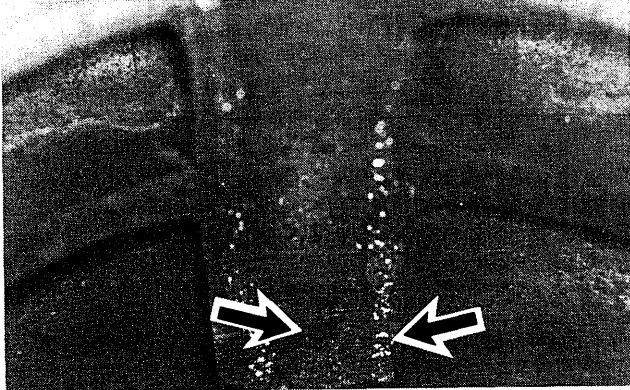
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Provided to <u>L. Sunkin</u>	Organization <u>Belzona Molecular</u>	

• Belzona® Ceramic R Metal.  
• Cleaner degreaser (available from Belzona®).

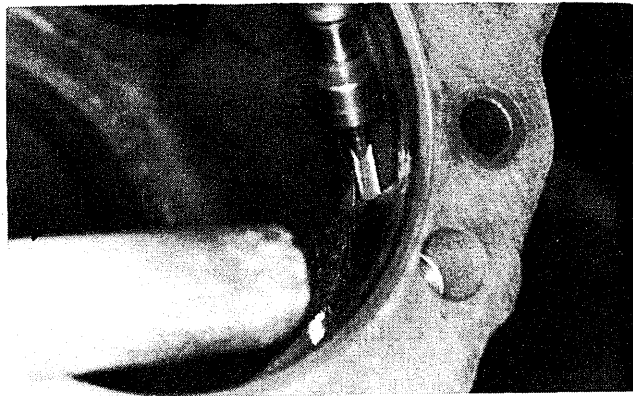
## Surface Preparation

After all machining or salvage work has been completed as required, the cylinder bore must be thoroughly cleaned.

**NOTE:** The cylinder block must not be put in a caustic cleaning solution after the Belzona® repair material has been applied.



Deep pitting within cylinder liner bore.



**1.** If the eroded area has deep pitting, as shown above, all corrosion must be removed from the pitted area. This can be done manually by using an ice pick, or by using an air powered needle scaler.

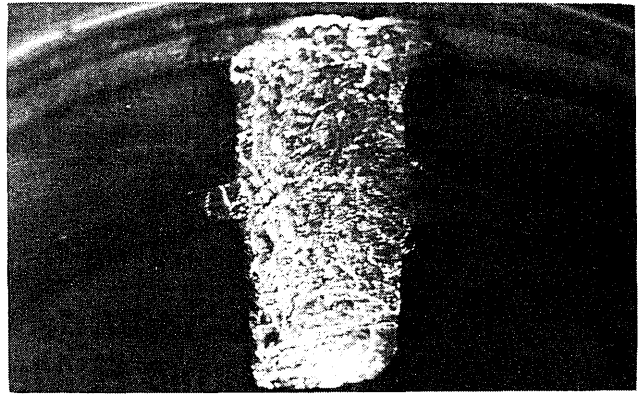
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### NOTICE

Do not apply too much force against the thin wall section of a cylinder block. It may cause the thin wall to break through.

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**2.** After the corrosion has been removed, grind the entire repair area, including an additional 25.4 mm (1.00") around the outer edge of the damage. This will provide a rough finish for good adhesion of the repair material.



The ground surface should appear dull and have a finish that feels like the surface of a medium grade sandpaper. This grinding can usually be done with an electric grinder and a medium coarse carbide bit, or a rotary file.

**3.** Apply light pressure only. Allow the tool to bounce slightly to get the maximum roughness. If the section to be repaired has limited clearance with a cylinder liner, remove additional metal as necessary to permit a slight build-up with the Belzona® repair material.

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### NOTICE

Avoid grinding all the way through the cylinder block. **DO NOT** remove more than 3.1 mm (.125") of the base material.

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**NOTE:** DO NOT permit any power tools to come in contact with the cylinder liner seat area, or an improper seal around the cylinder liner will result.

**4.** After the required surface finish has been obtained, the area to be repaired must be cleaned. All dirt and oil residue must be removed. Use the cleaner/degreaser to thoroughly clean the area to be repaired.

**NOTE:** Oil base cleaners must not be used because they leave an oily film. This oily film will prevent the repair material from adhering to the cylinder block.

**5.** Use a clean shop towel to check cleanliness of the area to be repaired. Repeat the cleaning procedure until the area is completely clean.

After the final check for cleanliness has been made, apply the cleaner one more time and let it dry without the surface being touched again.

Surface finish and cleanliness are both essential for a successful repair.

## Application of the Repair Material

### Mixing the Repair Material



**The repair material will not normally harm the skin. To prevent any possible injury it is recommended that rubber gloves be worn.**

1. To make the repair material use the tools provided, or a clean putty knife, and mix one part solidifier to three parts (by volume) of the base material.

**NOTE:** Be certain that the amount of recommended solidifier mixture (1 part to 3 parts) is not exceeded. Incorrect mixing of the repair material will result in a reduction in the final strength of the repair.

2. Mix the repair material in small amounts only. This should give plenty of time for application before the repair material hardens and becomes difficult to apply.

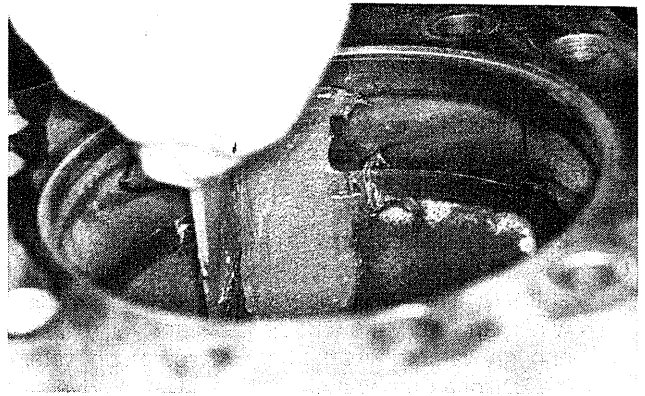
**NOTE:** The time required for the repair material to solidify will vary according to the ambient air temperature. The repair procedure for the information given in this instruction was performed at a temperature of 20° C (68° F). The repair material will solidify faster at warmer temperatures, or slower at cooler temperatures.

To determine the length of time for the repair material to solidify, according to the ambient temperature, refer to the temperature and time chart included with Belzona® repair material.

3. Mix the repair material thoroughly by spreading it out, then folding it together. Use this method of mixing rather than a stirring motion. Mix the material until it has a consistent (uniform) color.

Keep the mixed material spread out as it is used instead of in a pile. This will slow the time needed for the repair material to cure.

**NOTE:** If more than one cylinder liner bore in a cylinder block is in need of repair, it is preferred that only two liner bores at a time be repaired when using this procedure. This should be strictly adhered to until more experience is gained with the characteristics of this repair material.

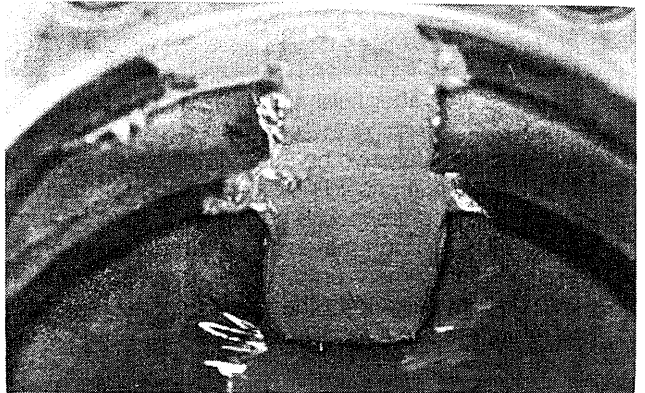


4. Begin the procedure by taking a small amount of the repair material, and working it into any holes or pitted areas in the section that is to be repaired. Be sure to work the material firmly into place to remove any air pockets that may have formed.

Now apply a thin layer of the repair material to build-up the repaired area to the original dimension.

Keep cylinder liner clearances in mind when doing the build-up of material procedure. There will be a tendency to apply too much material.

If too much material is applied, it will result in a longer grinding time for the finishing procedure. Make sure to feather (taper) the edges of the material, so it will blend into the surrounding metal.



Do not go beyond the area that has been prepared and cleaned! Any repair material that accidentally goes beyond this area must be removed.

When working with the repair area, it is not necessary to get a smooth finish when the material is being applied. The procedure in the topic *Surface Finishing of the Repaired Area* that follows, will provide the smooth finish.

**NOTE:** When repairing an area that has eroded into an oil gallery, do not contaminate the inside of the oil gallery with excess repair material. The repair material will not adhere to the unprepared surface of the base metal. Any repair material that is pressed through a hole and into the oil gallery must be removed.

## Surface Finishing of the Repaired Area

1. After approximately 30 minutes from the original mixing time, the applied repair material can be smoothed. Be sure to wear rubber gloves and check to see if the surface of the repair material has a dried film, or is somewhat sticky.
2. If the repair material sticks to the finger of the glove it is still too wet. To get a smooth finish for the material at the repaired area, dip your fingers (with gloves on) in water, and work the surface back and forth. Use only enough water to wet the fingers. Too much water on the Belzona® repair material can have an adverse effect on its mechanical strength.
3. Press firmly to force out any air that may have been trapped in the material during the smoothing process. If this smoothing procedure is done correctly, it will reduce the time needed for grinding once the Belzona® repair material has cured.



Repaired area after finish grind of repair material.

4. Approximately two hours after the repair material has been applied, it should be hard enough for the finish grind. In those areas where there are close clearances, grind away enough material to get the piece part back to its original dimension(s). Other areas should be left with a slight build-up of the repair material for resistance to future erosion.

The cylinder block can now be steam cleaned to remove the debris left after the grinding procedure.

### NOTICE

**DO NOT** put the cylinder block in a caustic hot tank after this type repair has been made. Some caustic solutions, at higher temperatures, can damage the repair material.

After the cleaning procedure is completed, the cylinder block can be assembled.

**NOTE:** When the Belzona® Ceramic R Metal is mixed and used at a temperature of 21° C (70° F), it will develop its full mechanical capabilities in 24 hours.

## Ordering the Repair Material

The Belzona® Ceramic R Metal must be ordered from one of the Belzona® worldwide distributors. To locate the distributor that is near you, contact one of the following offices:

Belzona Molecular, Inc.  
100 Charles Lindbergh Boulevard  
Long Island, New York 11553


Telephone:

(516) 542-1000  
Telex 645549  
FAX (516) 222-6259

Belzona Molecular Limited  
Claro Road  
Harrogate, HG14AY, England

Telephone:

(0423) 67641  
Telex 57938  
FAX 423-505967

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