METAL LOCKING SERVICE INC.

68 HAYES PLACE
BUFFALO, NEW YORK 14210
PHONE 824-4359

A PRACTICAL APPROACH

TO MACHINE PART AND CASTING REPAIR

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If this booklet is your introduction to "Metal Locking" as a repair process, look closely! Herein we offer a permanent solution to many of your maintenance problems. If you already know of this type of repair, let the following pages serve as a reminder that the "cold repair" method has a broad scope of application.

By "cold repair," we mean mechanically applied, as opposed to a repair involving heat. "Metal Locking" is a precise engineering method of repairing fractured castings, machine parts and pressure vessels, and is particularly applicable to Cast Iron. Whether the unit is cracked or completely broken; permanent, stress-free repairs are accomplished without the use of heat. Heat being absent, so too is distortion, misalignment, and subsequent re-machining of the unit prior to its return to service. "Metal Locking" provides strength against tension, vibration or shock load and is used successfully in effecting pressure repairs upwards of 5000 lb. P.S.I.

Our repair service extends to every conceivable type of industry, public utility and transportation entity. Every day, new applications are being discovered as the list of users increases. We are particularly proud of our acceptance and recommendation by equipment manufacturers and their representatives. "Metal Locking" is also approved by insurance underwriters and official inspection agencies.

We welcome your further comment or inquiry.

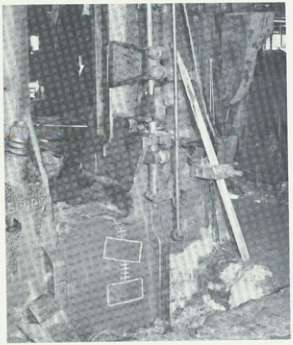
REMEMBER : METAL LOCKING SERVICE INC.

THE NAME TO REMEMBER FOR SERVICE!

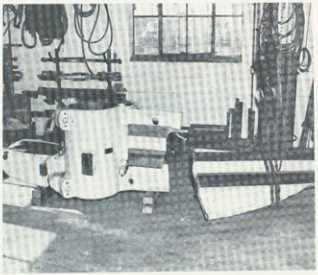
ANYTIME! ANYWHERE!

A REPAIR THAT CAN TAKE IT !

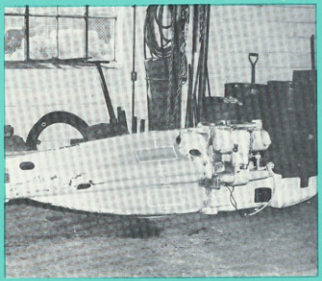
3500 lb. Drop Hammer cracked vertically through base as shown. Repair will require the installation of steel inlays at right angles to the crack.



The completed repair showing the inlays installed flush with parent metal, in combination with metal locks. Base is now ready to operate efficiently for many more years.

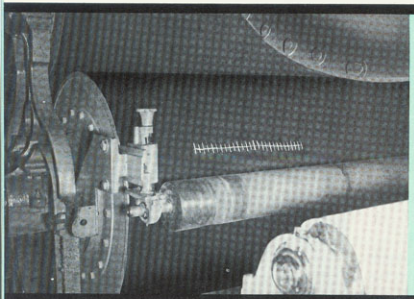


Arm of a 5 ft., 15 in. column Radial Drill, broken into two pieces. Unit was broken accidentally during unloading.



Completed repair showing the application of both steel inlays and metal locks. Strength and alignment completely restored.

PERFORMANCE BEYOND THE USUAL ...



NO DISMANTLING

Finish roll from paper machine showing 30" of repaired fracture along roll surface. Completed repair required to seal against steam pressure from within the roll, as well as having to be finished mirror-like on the outside surface.

PRESSURE PROOF

Piston Head from Great Lakes freighter with approximately 10 feet of fracture on both sides. Replacement would have taken months. The Metal Locking repair was completed within 48 hours from discovery of damage. Repair was inspected and approved by marine surveyors and ship's underwriters.

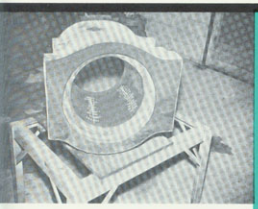
Crown from 250 Ton Press, showing bearing lug broken completely away. The other lug on this same side is also starting to break away.

The completed repair indicates re-alignment and repair of broken lug, as well as re-inforcement of the other lug.

A GOOD REPAIR HABIT!

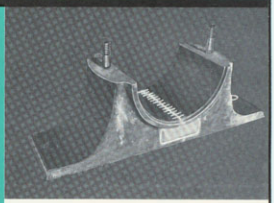
STRENGTH RESTORED ALIGNMENT ASSURED

1000 Ton Forging Press with repair having been completed through heavy section of main frame. Large double Steel inlay (6" thick) has been installed flush and metal locks applied over the remaining fracture.



Bearing Housing from main roll of rubber pulverizer. Sealed against water pressure.

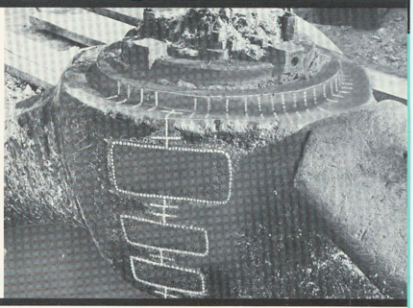
Typical repair on 60" Bull Gear, broken through spokes where fracture often occurs.



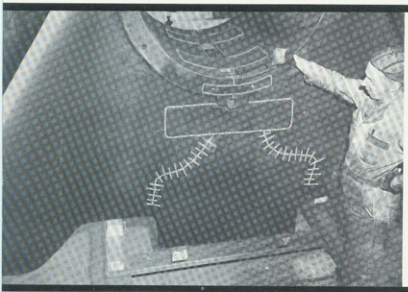
Bearing Pedestal from 6 ft. x 22 ft. Ball Mill. Casting was broken completely in two.

"ON THE JOB" REPAIRS SAVE PRODUCTION

Main Bearing housing from Spider frame of 30" Gyratory Crusher. Dismantling this unit and replacement of Spider would have been extremely costly as well as time-consuming. Unit has been operating efficiently since 1956 when repairs were completed.



PERMANENT RESTORATION

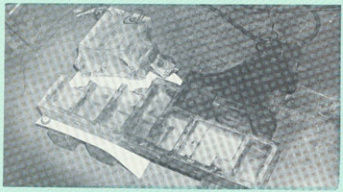


SCRAPPING BECOMES UNNECESSARY

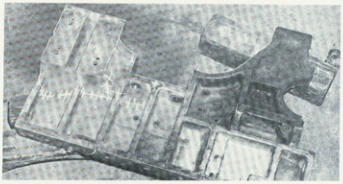
4 Ton Bearing Pedestal unit which supports main shaft of Horizontal Gas Blowing Engine. Repair required the installation of 4 large steel inlays and 2 small ones in addition to metal locks in the intermediate areas of fracture.

This 75 Ton OBI Press Frame was broken completely into two pieces. Customer thought it was "ready for the scrap heap."

Completed repair has maintained alignment and remachining was unnecessary. Strength has been fully restored for capacity operation.



Bearing Frame from Pulp-log Grinder in paper mill. One section has been broken completely away.



Completed repair showing installation of metal locks along the line of original separation. Alignment has been maintained throughout.

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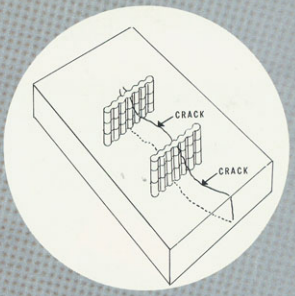
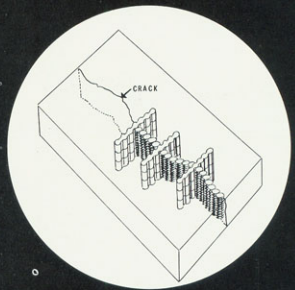
THE MECHANICS OF METAL LOCKING

1 Preformed locks of high tensile strength alloys (which might be likened to the carpenter's corrugated fastener) are inserted into accurately prepared slots along the entire length of the crack or joint as illustrated. These locks, of varying sizes, are peaned into slots with pneumatic tools, to a depth limited by the casting thickness and determined by the strength required, at intervals of from ¾ inches to 1¼ inches apart. It will be noted that since the locks transverse the crack or joint, each of the serrated edges of the locks are placed in shear, in much the same way as would be a key in a key-way.



2 After the installation of locks, which may be from one to ten or more deep, illustration (of three locks deep) shows holes drilled and tapped to depth equalling the depth of installed locks. Metal studs or dowels or a combination of both, are placed, tangent and overlapping each other, along the entire length of crack. These, after cold working, ultimately fill the crack or joint with new metal. Purposes served are: (1) pre-stressing the metal locks; (2) insuring against leakage of pressure, i.e. water, steam, gas, etc. and (3) by the added means of the threaded walls of studs, working in the parent metal is prevented as is looseness of joint in any direction, thus completely rigidizing the area under repair.

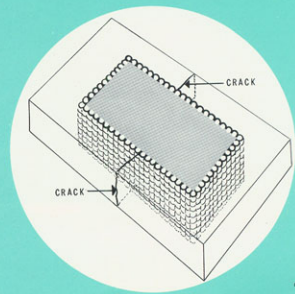


3 Another form of lock is this metal inlay. Size, shape and metal used for inlay varies with the requirement of each repair or equipment operation. This is used in areas of high stress concentration, particularly where it is necessary to dissipate local stress over wider area; gain strength from internal ribs; or to obviate local cavitation such as sand holes, etc.

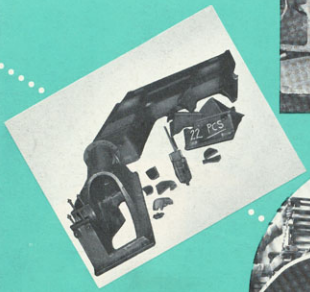
GENERAL — EACH REPAIR PRESENTS A SEPARATE ENGINEERING PROBLEM AND THE SIZE, SHAPE AND MATERIAL USED AS LOCKING DEVICES DEPENDS UPON THE UNIT UNDER REPAIR.

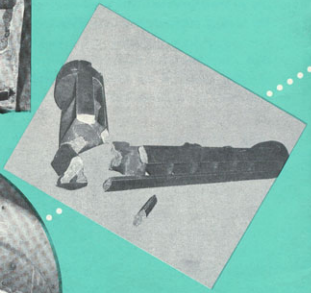
MATERIAL IS CHOSEN FOR ITS DUCTILITY, HIGH STRENGTH AND EXPANSION QUALITIES. BECAUSE OF THE POSSIBILITY OF VARYING THERMAL CONDITIONS OF THE UNIT UNDER REPAIR, EXTREME CARE IS TAKEN IN THE CHOICE OF MATERIAL TO MATCH THE CO-EFFICIENT OF EXPANSION OF THE PARENT METAL.

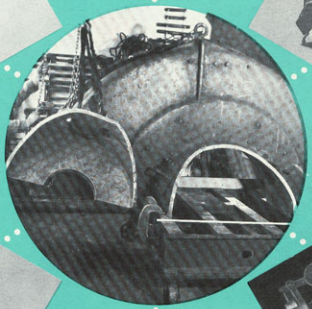
ALL REPAIRS ARE FINISHED SMOOTH AND FLUSH WITH THE PARENT METAL AND ARE DIFFICULT TO DETECT. ALL PICTURES IN THE PRECEDING PAGES ARE "TOUCHED UP" TO SHOW THE AREA OF REPAIR.

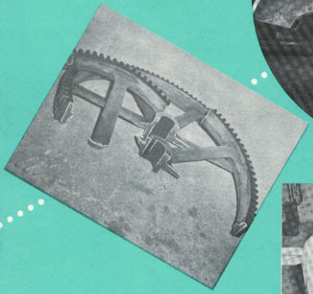


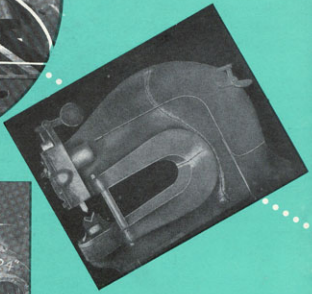
REPAIRING MACHINERY SINCE 1944

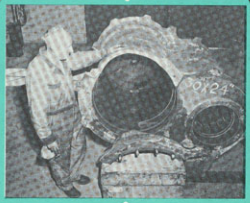












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