

## MECHANICAL REPAIRS TO MACHINERY AND COMPONENTS



<b>TRK19065</b>	<b>Rapid Setting Super Metal</b>
<b>TR105</b>	<b>Super Metal Rebuilding System</b>
<b>TR110</b>	<b>Fluid Super Metal System</b>
<b>TR115</b>	<b>Extended Life Super Metal System</b>
<b>TRK19060</b>	<b>PlasSteel Twist Stick</b>
<b>TRK19062</b>	<b>PlasBronze Twist Stick</b>
<b>TRK19063</b>	<b>Plastic Steel</b>
<b>TRK19064</b>	<b>Plastic Bronze</b>



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Engineering Repair & Maintenance Manual

## SUPER METAL REPAIR SYSTEMS- CHARACTERISTIC CHART

Product Code	Product Name	Pack Size	Mixing Ratio	Usable Life (20C)	Initial Set	Machine Time	Coverage Rate per unit	Applied By	Max Pipe Width	Continuous			Surface Prep	Degreased	- Manual	- Blasted
										Max Temp Dry	Max Temp Wet	Max Temp				
TRK19065	Rapid Setting Super Metal	2 x 175gm	1:1	3 mins	10 mins	30 mins	N/A	Spatula	N/A	250	120	70	*	*	*	
TR105	Super Metal Rebuild System	1 kg	3:1	25 mins	60 mins	2 hours	N/A	Spatula	N/A	250	120	70	*		*	
TR110	Fluid Super Metal System	2 x 1kg	3:1	40 mins	4 hours	8 hours	2 sqm	Brush	N/A	250	120	70	*		*	
TR115	Extended Life Super Metal	3 kg	3:1	60 mins	4 hrs	12 hours	N/A	Spatula	N/A	250	120	70	*		*	
TRK19060	PlasSteel Twist Stick	125gm	1:1	6 mins	15 mins	30 mins	N/A	Hand	N/A	250	120	70	*	*		
TRK19062	PlasBronze Twist Stick	125gm	1:1	6 mins	15 mins	30 mins	N/A	Hand	N/A	250	120	70	*	*		
TRK19601	ThistleWrap Pipe Repair Tape	50mm x 1.5mtr	N/A	2-3 mins	15 mins	30 mins	N/A	Hand	60 mm	260	260	260	*	*		
TRK19603	ThistleWrap Pipe Repair Tape	50mm x 3.6mtr	N/A	2-3 mins	15 mins	30 mins	N/A	Hand	100mm	260	260	260	*	*		
TRK19604	ThistleWrap Pipe Repair Tape	75mm x 3.6mtr	N/A	2-3 mins	15 mins	30 mins	N/A	Hand	180mm	260	260	260	*	*		
TRK19605	ThistleWrap Pipe Repair Tape	100mm x 3.6m	N/A	2-3 mins	15 mins	30 mins	N/A	Hand	250mm	260	260	260	*	*		
TRK19063	Plastic Steel	500gm	3:1	30 mins	60 mins	2 hours	N/A	Spatula	N/A	250	120	70	*	*	*	

Max Temp Dry – maximum temperature when in contact with dry products ie – powders

Max Temp Wet – maximum temperature when in contact with wet products ie – water, sewage, chemicals



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## SUPER METAL REPAIR SYSTEMS

Use the table below to choose the right product for the application, then look at the following page for general characteristics on the product chosen. **NOTE** the table below is only a guide, if in doubt please contact our technical department for confirmation of the choice made.

Product Name	Batteries -	Base Plate - Cracked	Bearing Housing - Worn	Bearing Support - Worn	Brake Test	Rollers - Worn +	Corrosion Spots	Drive Rollers - Worn	Flange Face - Damaged	Heat Exchanger - Damaged End Plates	Hydraulic Rams - Scored	Keyways - Sloppy	Pipes - Leaking	Pipes - Leaking Couplings	Pipes - Repair Stripped Threads	Pipes - Sealing Leaking Threads	Pumps - Cracked Casing (Outside)	Pumps - Damaged Shroud	Pumps - Worn Backplate	Pumps - Worn Shaft	Sump - Cracked	Tanks Seams - Leaking	Non Slip Coating - Steel +	Repair Copper/Bronze Fittings
TRK19065 Rapid Setting Super Metal							*		*	*		*		*	*	*		*			*			
TR105 Super Metal Rebuilding System	*	*	*	*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
TR110 Extended Life Super Metal	*	*	*	*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
TR115 Fluid Super Metal+					*																	*		
TRK19060 PlasSteel Twist Stick							*		*				*											
TRK 19062 PlasBronze Twist Stick																								*
TRK19601/3/4/5/ ThistleWrap Pipe Repair Tape												*	*	*	*	*								
TRK19063 Plastic Steel	*	*					*		*	*	*	*	*	*	*	*	*	*	*	*	*	*		
*Ideal for use for this particular application.																								

± When used in conjunction with LD/HD/XHD Grip

## **EMERGENCY UNDERWATER REPAIRS AND BONDING UNDERWATER**

The following ThistleBond section is concerned with emergency underwater repairs and should be read in conjunction with the Technical Data sheets of the following ThistleBond Products: Super Metal Rebuilding System, Flexibilised Ceramic Carbide Paste.

### **COMMON DEFECTS**

Splits or fractures and impact damage allowing escape of fluids or ingress of water.

### **PREPARATION**

All work should be carried out in strict accordance with the relevant ThistleBond Technical Data Sheet. Product selection should be made on the basis of the location of the problem, the severity of the damage, the ambient temperature and chosen application method.

Where possible and practical, a steel plate should be fabricated, and clearance holes should be drilled and spaced equidistantly around the periphery of the plate. The damaged hull section should also be drilled and tapped. These tapped holes must match the positions of the clearance holes in the prefabricated plate.

### **SURFACE PREPARATION**

Where possible, any cracks should be treated as follows:

- a) Terminate the crack by drilling holes at each end.
- b) Vee-out the crack between the termination holes.

All surfaces to be treated should then be made as rough as possible, ensuring that any surface contamination is removed and where possible, bright clean metal is exposed.

### **APPLICATION TECHNIQUE**

#### **a. Minor Damage**

Where minor damage has occurred, a temporary solution may be achieved solely by the use of the ThistleBond Super Metal Rebuilding System. Mix the product in accordance with the Technical Data Sheet and place inside a small polyethylene bag, in order to minimise its contact with water. Transport material to the site of repair, release the neck of the bag and force material into the damaged area, in order to plug any cracks or holes. Alternatively, apply the mixed material onto a sheet of polyethylene before taking below water and pressing onto the damaged area.

#### **b. Major Damage**

Mix an appropriate amount of material and apply a thin, even film over the entire surface of a pre fabricated steel plate or patch, ensuring that the material is pushed well into the roughened surface profile. Mix further material and apply to the plate forming a central peak. Transport the plate to the site of the damage where it is forced against the damaged area, until excess material is exuded around the periphery of the plate. Remember to ensure that trapped water is kept to a minimum. The plate may be held in a position if required by using set bolts which are pushed through the clearance holes in the platen and

screwed in to tapped holes in the damaged substrate. Any exuded material may then be used to fair down the edges of the plate and bolt heads.

When using either of these methods it is always best to minimise the distance between the point of mixing and the point of application. In order to achieve this, it may be advantageous to consider the use of a suitable diving bell or other similar equipment.

NOTE: ThistleBond Super Metal Rebuilding System should be allowed to cure approximately half its working life before taking it underwater.

### TECHNICAL SUMMARY

PRODUCT	CONSISTENCY	COMPRESSIVE STRENGTH	WORKING LIFE	FULL CURE
SUPER METAL REBUILDING SYSTEM	PASTE	15,500psi	25 MINUTES	72 HOURS
FLEXIBLISED CERAMIC CARBIDE PASTE	PASTE	2800psi	20 MINUTES	7 DAYS

## WORN LINER SEAL HOUSINGS

The following ThistleBond section is concerned with the repair of corroded tubular heat exchangers and should be read in conjunction with the Technical Data sheets of the following ThistleBond Products: Super Metal Rebuilding System.

### COMMON DEFECTS

Scarred and pitted surfaces from excessive wear.

### PREPARATION

All work should be carried out in strict accordance with the relevant ThistleBond Technical Data Sheet. The product selection and application techniques should be based on the nature of the repair.

### SURFACE PREPARATION

The surface of the seat should be prepared using a conical grinding wheel or needle gun to produce a coarse profile and remove all corrosion spots. Sweating and regrinding may be necessary to remove all ingrained products. The surface should then be degreased using ThistleBond Universal Cleaners.

### APPLICATION TECHNIQUE

Sufficient Super Metal Rebuilding System should be mixed to complete the repair. The mixed product should be applied to the effected area. The product should stand proud of the liner surface and allowed to cure. Once cured, the product can be machined down to sit flush with the liner surface. Sanding with wet 400-600 emery paper will help to give a smoother finish.

## TECHNICAL SUMMARY

PRODUCT	ABRASION RESISTANCE	WORKING LIFE (20°C)	FULL CURE (20°C)
SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS
EXTENDED LIFE SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS

The following ThistleBond section is concerned with the repair of splines and should be read in conjunction with the Technical Data sheets of the following ThistleBond Products: Super Metal Rebuilding System, Extended Life Super Metal Rebuilding System.

#### COMMON DEFECTS

Worn and sloppy splines are normally caused by general wear and excessive machine vibration.

#### PREPARATION

All work should be carried out in strict accordance with the relevant ThistleBond Technical Data Sheet. The product selection and application techniques should be based on the nature of the repair.

#### SURFACE PREPARATION

Separate the splined shaft from the hub then clean and degrease the surface ensuring complete removal of oil and grease. File down the ends of the splines, to give a 45 degree chamfer. This will prevent complete removal of the ThistleBond Super Metal Rebuilding System when the shaft is replaced into the splined hub. The surfaces inside the hub should now be thoroughly roughened using a coarse file or similar tool, surfaces should then be wiped using the ThistleBond Universal Cleaner. Smooth down any high spots or rough areas on the spline by filing or sanding, then treat with ThistleBond Release Agent.

#### APPLICATION TECHNIQUE

Sufficient product (usually ThistleBond Super Metal Repair System) to complete the repair should be mixed. The product should be applied generously to the splined shaft by spatula, the product should not be applied in to the hub, unless it is badly worn. The coated spline shaft can now be pushed into the prepared hub. Excess product will be scraped off the hub as the shaft is installed. Extra pressure can be applied to the shaft on the insertion to extrude the excess product from the hub. Once the product has fully cured (see technical data sheet) the coupling can be put back into service.

#### TECHNICAL SUMMARY

PRODUCT	ABRASION RESISTANCE	WORKING LIFE (20°C)	FULL CURE (20°C)
SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS
EXTENDED LIFE SUPER METAL REBUILDING SYSTEM	GOOD	40 MINUTES	72 HOURS

The following ThistleBond section is concerned with the repair of damaged shafts and should be read in conjunction with the Technical Data sheets of the following ThistleBond Products: Super Metal Rebuilding System, Extended Life Super Metal Rebuilding System.

### COMMON DEFECTS

Worn shafts are normally caused from general wear and tear or ill fitting seals and packing. Damaged spines can be brought about by excessive machine vibration.

### PREPARATION

All work should be carried out in strict accordance with the relevant ThistleBond Technical Data Sheet. The product selection and application techniques should be based on the nature of the repair.

### SURFACE PREPARATION

Any oil on the surface of the shaft should be wiped away using cleaning oils and ThistleBond Universal Cleaner. If the shaft has operated in an oily environment, impregnated oil should be sweated out using a blow torch. The surface should again be degreased and the process repeated until a lint free cloth soaked in ThistleBond Universal cleaner shows no further oil contamination. The worn areas of the shaft should be undercut using a lathe, the undercut should be at least 2mm. If the shaft is already worn to the recommended depth then the area should be machined to a coarse thread profile. A shoulder should be left at both ends of the cut to provide reinforcement for the repair and to serve as a guide when rebuilding the shaft, however if the shoulder is 6mm or less, it should be removed.

### Undercutting Depths

<i>Shaft Diameter</i>	<i>Undercut</i>
13 – 25mm (½ – 1")	2mm (0.08ins)
Over 25mm (>1")	3mm (0.12ins)

Finish the undercutting by machining a coarse thread profile over the repair area. The rough surface cut increases the surface area and produces a surface for maximum adhesion of the products.

The following guidelines should be followed producing the coarse thread profile:

Shaft Diameter	<b>5cm (2") or less</b>	<b>over 5cm (2")</b>
Threads	16 per cm (40 per ins)	8 per cm (20 per ins)
Pitch	0.64mm	1.27mm
Depth	0.30mm (0.0012")	0.64mm (0.0025")
Angle	90%	90%

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In situ repair and out of service repair– Using the chosen ThistleBond product, apply the material, using the applicator provided, in to the undercut area. Ensure that the product applied has been pushed sufficiently into the surface of the shaft to force entrapped air out of the threads. The product should now be applied to the prepared area, building the material up to the level of the shaft and should be pressed firmly and carefully into the surface of the shoulder of the cut area. Once the product has cured sufficiently (see Technical Data Sheet for times), the shaft can be machined on a lathe. Polishing of the surface with 400 to 600 emery paper wet can be carried out to improve the finish of the repair.

**TECHNICAL SUMMARY**

PRODUCT	ABRASION RESISTANCE	WORKING LIFE (20 °C)	FULL CURE (20 °C)
SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS
EXTENDED LIFE SUPER METAL REBUILDING SYSTEM	GOOD	40 MINUTES	72 HOURS

## RESEATING / ISOLATING BEARING BUSHES

The following ThistleBond section is concerned with the Reseating and Isolating of Bearing Bushes and should be read in conjunction with the Technical Data sheets of the following ThistleBond Products: Super Metal Rebuilding System, Extended Life Super Metal Rebuilding System, Abrasion Resistant Ceramic Carbide Fluid, Flexiblised Ceramic Carbide Compound

### COMMON DEFECTS

Excessive movement of bush within housing is caused by electrolytic corrosion or impact wear.

### PREPARATION

All work should be carried out in strict accordance with the relevant ThistleBond Technical Data Sheet. The product selection and application techniques should be based on the nature and severity of the damage and the application technique. For in situ repairs a work area must be created in order to protect the repair area from the weather conditions. It may also be necessary to control the temperature within the work area in order to reduce humidity and prevent condensation. Specific attention should be given to the method used to align and centralise the bearing bush within the damaged housing and consequently jacking bolts, shims, jig or mandrel must be prefabricated. The techniques described below can be used to rebuild, realign and electrically isolate types of bearing bush housing, including, Rudder Bush Housing, Internal Stern Tube Bush Housings, A Frame Bracket, bush Housings, Stabilizer in Shaft Bearing Bush Housings, Oversized Cutlass Bearing Housings.

### SURFACE PREPARATION

Wash down all components to be treated with ThistleBond Universal Cleaner to remove all dirt, grease and other surface contamination. Coat the entire surface of a new bearing bush or cutlass bearing and all centralising and aligning equipment with a minimum of 2 coats of ThistleBond Release Agent to prevent bonding. Grit Blast the internal surfaces of the damaged Housing to give a surface finish of Swedish Std Sa2½ ensuring a profile of 75 microns minimum using angular abrasive. On completion of all preparation, rewash all blasted surfaces with ThistleBond Universal Cleaners.

### APPLICATION TECHNIQUE

There are two techniques available for rebuilding housings.

#### 1. SLIP METHOD

Mix the selected ThistleBond Product and using the flexible applicator provided apply a thin, even film to the prepared inside surface of the housing and also to the outside surface of the liner or bush. Ensure the product is pushed well into the prepared surface of the housing. Apply further material, in excess to the internal surface of the housing. The liner or bush must then be jacked into position in the housing and correctly aligned. Any excess product extruded during the assembly should be removed immediately.

## 2. INJECTION METHOD

The liner or bush should be aligned with the housing. Seal the annular space between the bush and the housing where required, to prevent loss of product during the injection process. This may be done by mechanical means or by the use of a fast curing grade of ThistleBond Product. Injection holes should be carefully positioned together with the vent holes to prevent formation of the air traps ideally, injection points should be spaced no more than 24" apart. The selected product should be loaded into disposable injection cartridges and injected using pneumatic equipment. The application should progress from the lowest injection point to the highest injection point. Material is injected until it is exuded from the next highest injection point. This process should be continued until the annular space between the bush and the housing has been completely filled with the product indicated by leakage of the product through small vent holed drilled at the highest point available.

### TECHNICAL SUMMARY

PRODUCT	COMPRESSIVE STRENGTH	WORKING LIFE (20°C)	FULL CURE (20°C)
SUPER METAL REBUILDING SYSTEM	15,500 PSI (ASTM D 965)	20 MINUTES	72 HOURS
ABRASION RESISTANT CERAMIC CARBIDE FLUID	13,000 PSI (ASTM D 965)	25 MINUTES	5 DAYS
EXTENDED LIFE SUPER METAL REBUILDING SYSTEM	10,000 PSI (ASTM D 965)	60 MINUTES	5 DAYS
FLEXIBLISED CERAMIC CARBIDE COMPOUND	2,800 PSI ELONGATION 35% (ASTM D412)	30 MINUTES	7 DAYS

### MAIN SELECTION SYSTEM



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For general applications

Application requiring  
extended work times

Applications on  
Equipment subject to  
Differential movement

For applications by  
Injection methods

SUPER METAL REBUILDING SYSTEM

EXTENDED LIFE SUPER METAL SYSTEM  
REBUILDING SYSTEM

FLEXIBLISED CERAMIC CARBIDE COMPOUND

ABRASION RESISTANT CERAMIC CARBIDE FLUID

## CRACK REPAIRS TO MECHANICAL EQUIPMENT

The following ThistleBond section is concerned with the repair of cracked mechanical equipment and should be read in conjunction with the Technical Data sheets of the following ThistleBond Products: Super Metal Rebuilding System, Extended Life Super Metal Rebuilding System, Ceramic Carbide Wearing Compound.

### COMMON DEFECTS

Cracked mechanical equipment can be caused by general wear, excessive internal/ external pressures and excessive machine vibration.

### PREPARATION

All work should be carried out in strict accordance with the relevant ThistleBond Technical Data Sheet. The product selection and application techniques should be based on the nature of the repair.

### SURFACE PREPARATION

Thoroughly clean the surface to remove grime, grease and accumulated dirt, surfaces should then be blast cleaned to Sa2½ Swedish standard or ground down using rotary grinding equipment. The end of the cracks should be found (using a crack detecting dye if necessary). Extend the prepared area 5-7cm (2-3") either side of the crack. Drill a hole at each end of the crack to stop the crack from spreading, if the crack continues to spread do not attempt to repair it. Please note the drill holes should be 5mm wider than the width of the crack.

The drilled holes should now be tapped using a coarse thread, bolt heads should be cut so the repair is flush with the coating surface. Using a drill or a grinding wheel, "vee" the crack out between the installed bolts. The depth of the cut should be slightly less than the wall thickness. Where cracks are subject to tensile stress, the crack may need to be stitched by fixing metal strips across the crack. These strips should be fixed by bolts or studs, the strips should be coated with ThistleBond Super metal Rebuilding System prior to being tightened into position.

### APPLICATION TECHNIQUE

Using a spatula force the mixed product into the crack. Avoid pushing the product through the crack to the inside of the wall. Fill the V and overlap the product by 2.5cm (1") on either side of the V. Cut a piece of reinforcing cloth 2.5cm (1") wider than the V. Lay the cloth over the applied product and embed the cloth into the mixed material. Once the ThistleBond Super Metal Rebuilding System has set, a further quantity of product should be mixed and apply another layer at least 6mm (¼") thick and overlap the edge of the reinforcing tape onto the prepared surface. After curing the machinery can be placed back into operation. (See Technical Data Sheet for curing times).

## TECHNICAL SUMMARY

PRODUCT	ABRASION RESISTANCE	WORKING LIFE (20°C)	FULL (20°C)
SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS
EXTENDED LIFE SUPER METAL REBUILDING SYSTEM	GOOD	40 MINUTES	72 HOURS

## WORN LINER SEAL HOUSINGS

The following ThistleBond section is concerned with the repair of corroded tubular heat exchangers and should be read in conjunction with the Technical Data sheets of the following ThistleBond Products: Super Metal Rebuilding System.

### COMMON DEFECTS

Scarred and pitted surfaces from excessive wear.

### PREPARATION

All work should be carried out in strict accordance with the relevant ThistleBond Technical Data Sheet. The product selection and application techniques should be based on the nature of the repair.

### SURFACE PREPARATION

The surface of the seat should be prepared using a conical grinding wheel or needle gun to produce a coarse profile and remove all corrosion spots. Sweating and regrinding may be necessary to remove all ingrained products. The surface should then be degreased using ThistleBond Universal Cleaners.

### APPLICATION TECHNIQUE

Sufficient Super Metal Rebuilding System should be mixed to complete the repair. The mixed product should be applied to the effected area. The product should stand proud of the liner surface and allowed to cure. Once cured, the product can be machined down to sit flush with the liner surface. Sanding with wet 400-600 emery paper will help to give a smoother finish.

## TECHNICAL SUMMARY

PRODUCT	ABRASION RESISTANCE	WORKING LIFE (20°C)	FULL CURE (20°C)
SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS
EXTENDED LIFE SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS

## **DISTORTED/ SCORED FLANGES AND MATING SURFACES**

The following ThistleBond section is concerned with the repair of corroded tubular heat exchangers and should be read in conjunction with the Technical Data sheets of the following ThistleBond Products: Super Metal Rebuilding System.

### **COMMON DEFECTS**

Distorted and scored surfaces from repeated dismantling  
Scored mating surface from ill fitting gaskets.

### **PREPARATION**

All work should be carried out in strict accordance with the relevant ThistleBond Technical Data Sheet. The product selection and application techniques should be based on the nature of the repair.

### **SURFACE PREPARATION**

Damage to both mating surfaces: Both areas must be cleaned of any product residue using ThistleBond Universal Cleaner. The surfaces can either Blast Abraded to Sa 2½ Swedish standard using 50 micron angles grit, or abraded using a rotary grinding tool. The bolt holes in the flanges should now be plugged using wooden pegs, putty or plasticine. A flat metal plate larger than the external diameter of the flanges should now be coated on both sides with ThistleBond Release Agent.

Single face repairs: The most distorted flange face should be thoroughly degreased and abraded to Sa2.4 Swedish Standard using 50 micron angled grit or using a rotary grinding tool. The other face should be thoroughly cleaned and treated with ThistleBond Release Agent. The flange coupling bolts should also be cleaned and treated with ThistleBond Release Agent.

### **APPLICATION TECHNIQUE**

Damage to both mating surfaces: Mix sufficient Super Metal Rebuilding System to complete the repair. The mixed product should be applied by spatula to the two mating surfaces, to wet out the entire surface tapering the application from the centre to the edge of each face. The treated metal plate should be held between the two faces and the two faces should be squeezed together so that the Super Metal Rebuilding System is evenly over the surface. The two faces should then be clamped together using G Clamps, with further mixed product being squeezed out. Once cured (approx 2 hours at 20°C), the clamps can be removed and the metal plate taken away. The external and internal surfaces of the flange can be dressed using a file or rasp to remove ragged edges of the cured material, the bolts can be removed from the bolt holes and the flanges reassembled.

Single Face repairs: Mix the Super Metal Rebuilding System in accordance with the technical data sheet. The mixed product should be applied to the prepared face as in the previous section, the two faces should then be pressed together and the coupling bolts tightened into position. Excess product will be squeezed out and should be cleaned away.



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The two flanges should be allowed to cure in accordance with the Technical data sheet (2 hours at 20°C). Once cured the flange can be opened up and dressed as stated in the previous paragraph.

### TECHNICAL SUMMARY

PRODUCT	ABRASION RESISTANCE	WORKING LIFE (20°C)	FULL CURE (20°C)
SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS
EXTENDED LIFE SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS

**REPAIR HOLED SUMPS**

The Following ThistleBond section is concerned with the repair of corroded tubular heat exchangers and should be read in conjunction with the Technical Data sheets of the following ThistleBond Products: Super Metal Rebuilding System.

**COMMON DEFECTS**

Holed sumps are caused by excessive wear and duress.

**PREPARATION**

All work should be carried out in strict accordance with the relevant ThistleBond Technical Data Sheet. The product selection and application techniques should be based on the nature of the repair.

**SURFACE PREPARATION**

The damaged sump should ideally be removed from the engine and flushed with ThistleBond Universal Cleaner to completely remove any oil. The external surface around the holed area should then be thoroughly abraded using a rotary grinding tool. Surfaces should be sweated to drive out any ingrained oil and then thoroughly degreased using ThistleBond Universal Cleaners. If the hole being repaired is large, a metal plate formed to the shape of the sump to fit over the hole should be prepared on the internal surface.

**APPLICATION TECHNIQUE**

Mix sufficient product to complete the repair, spread mixed product into the surface of the sump. For small holes, impregnate reinforcing tape with mixed Super Metal Rebuilding System and apply as a patch over the hole, allow to set. Further mixed product can be applied to encapsulate the repair. For larger holes where a metal patch is being used, mixed material should be applied to the prepared surface of the plate and the plate then pressed over the hole in the sump. The excess product squeezed out should be scraped away before the material sets. The plate should then be held in place by clamps until the product is cured.

**TECHNICAL SUMMARY**

PRODUCT	ABRASION RESISTANCE	WORKING LIFE (20 °C)	FULL CURE (20 °C)
SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS
EXTENDED LIFE SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS

## **SLOPPY KEYWAY REPAIRS**

The following ThistleBond section is concerned with the repair of Sloppy Keyways and should be read in conjunction with the Technical Data sheets of the following ThistleBond Products: Super Metal Rebuilding System, Extended Life Super Metal Rebuilding System.

### **COMMON DEFECTS**

Worn and sloppy keyways are normally caused by general wear and excessive machine vibration.

### **PREPARATION**

All work should be carried out in strict accordance with the relevant ThistleBond Technical Data Sheet. The product selection and application techniques should be based on the nature of the repair.

### **SURFACE PREPARATION**

Surfaces should be thoroughly degreased using ThistleBond Universal Cleaner. Surfaces of the key way should then be roughened and scored using a file or a rotary grinding tool. All grinding swarf and loose material should be removed and surfaces then degreased again using ThistleBond Universal Cleaner. ThistleBond Release Agent should be applied to all surfaces of a new key and to the internal area of the hub, including the hub keyway.

DO NOT apply ThistleBond Release Agent to the key way or shaft. The purpose of applying the Release Agent is to prevent the ThistleBond repair material from sticking to the key hub and the keyway. Allow 25 minutes for the Release Agent to dry.

### **APPLICATION TECHNIQUE**

The Super Metal Rebuilding System or Extended Life Super Metal System should be used on this repair. The mixed product should now be applied to the prepared keyway. A thin coat should be applied to the bottom of the keyway and a heavy coat on the sides. The mixed product should be pressed into the corners and against the side walls to force out any trapped air. If too much product is applied on the bottom of the keyway it will raise the key too high and prevent it from sliding into the hub.

Press the new key into the keyway, this should cause excess ThistleBond Super Metal to squeeze out of the keyway. Using a spatula or putty knife remove the excess product and shape the surface to the shaft profile. Immediately reposition the hub on the shaft. This will properly align the key, shaft and hub.

Once the product has cured as indicated in the technical data sheet, the coupling can be placed back into operation. There is no need to dismantle the coupling as the Release Agent will ensure none of the components bond together.

## **TECHNICAL SUMMARY**

PRODUCT	ABRASION RESISTANCE	WORKING LIFE (20 °C)	FULL CURE (20 °C)
SUPER METAL REBUILDING SYSTEM	GOOD	20 MINUTES	72 HOURS
EXTENDED LIFE SUPER METAL REBUILDING SYSTEM	GOOD	40 MINUTES	72 HOURS