U.S. DEPARTMENT OF TRANSPORTATION

HANDBOOK OF DESCRIPTIVE TECHNICAL TERMS

TRANSPORTATION SAFETY INSTITUTE

6500 SOUTH MACARTHUR BOULEVARD
OKLAHOMA CITY, OKLAHOMA 73125

FSS 000878R

FOREWORD

We gratefully acknowledge the following organizations who participated in the original compilation and subsequent reprintings of this glossary:

USAF Inspection & Safety Center
USAF Air Training Command
Oklahoma Air National Guard (137 TAW)
The General Electric Company
General Motors Corporation
Pratt & Whitney Aircraft Group

Editors Note: Two experienced investigators will often use a different descriptive term when referring to the same damage. We see this in correspondence, published reports, safety inspections, accident/incident reports, and in normal conversation. This problem is not peculiar to any group of people and applies industry wide. This handbook is republished in an attempt to standardize the technical language used in aircraft accident and incident reports.

First TSI Reprint - February 1983

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PART CONDITION CODE

(Main Terms)

Condition	Definition	Asso. Terms	Illus.
Arced	Visible effects (burn spots, fused metal) of an undesired electrical discharge between two electrical connections.	Flashed Over	
Battered	Damaged by repeated blows or impacts (not humanly inflicted).		21
Bent	Sharp deviation from original line or plane usually caused by lateral force. Examples are: kinked pipe, creased or folded sheet metal.	Creased Folded Kinked	22
Binding	Restricted movement such as tightened or sticking condition resulting from high or low temperature, foreign object jammed in mechanism, etc.	Sticking Tight	
Bowed	Curved or gradual deviation from original line or plane usually caused by lateral force and/or heat.		23
Brinnelled	Circular surface indentions on bearing races usually caused by repeated shock loading of the bearing: i.e., ball or roller indention.		24
Broken	Separated by force into two or more pieces.	Fractured	25

Condition	Definition	Asso. Terms	Illus.
Bulged	Localized outward or inward swelling usually caused by excessive local heating and/or differential pressure.	Ballooned Swelling	26
Burned	Destructive oxidation usually caused by higher temperature than the parent material can withstand.		27
Burrs	A rough edge or a sharp projection on the edge or surface of the parent material.		
Carboned	Accumulation of carbon deposits.	Carbon covered Carbon tracked Coked	28
Chafed	Frictional wear damage usually caused by two parts rubbing together with limited motion.		
Checked	Surface cracks usually caused by heat.		
Chipped	A breaking away of the edge corner or surface of the parent material usually caused by heavy impact (not flaking).		
Circuit - Grounded	Undesired current path to ground (common).		
Circuit - Open	Incomplete electrical circuit due to separation at or between electrical connection points.		
Circuit - Shorted	Undesired current path between leads or circuits that normally are at a different potential.		

Condition	Definition	Asso. Terms	Illus.
Collapsed	Inward deformation of the original contour of a part usually due to high pressure differentials such as a collapsed bellows.	Crushed	
Corroded	Gradual destruction of the parent material by chemical action. Often evidenced by oxide build-up on the surface of the parent material.	Rusted Oxidation	
Cracked	Visible (not requiring special fluorescent or magnetic penetrants) partial separation of material which may progress to a complete break.		30
Crossed	Material damage to parts (as in the case of crossed threads) or part rendered inoperative (as in the case of crossed wires) as a result of improper assembly.		
Curled	A condition where the tip(s) of compressor blades or turbine buckets have been curled over due to rubbing against the engine casings.		31
Dented	A surface indention with rounded bottom usually caused by impact of a foreign object. Parent material is displaced, seldom separated.	Peened	32
Deposits	A build-up of material on a part either from foreign material or from another part not in direct contact.	Metalizing (Undesirable)	33

Condition	Definition	Asso. Terms	Illus.

NOTE

Dimensions under minimum and over maximum are condition codes involving the physical dimensions of a part, such as diameter, width, length, etc. where the discrepancy is not caused by normal wear and tear.

Dimension under min.	Under blueprint dimension or other dimensions published in an authoritative publication (not caused by wear).		
Dimension over max.	Over blueprint dimension or other dimension published in an authoritative publication (not caused by wear).		
Disintegrated	Separated or decomposed into fragments. Excessive degree of fracturing (breaking) as with disintegrated bearings. Complete loss of original form.	Shattered	34
Distorted	Extensive deformation of the original contour of a part usually due to impact of a foreign object, structural stresses, excessive localized heating or any combination of these.	Buckled Depressed Twisted Warped	35
Eccentric	Part(s) wherein the intended common center is displaced significantly.	Non-concentric	
Emission-Low	Applies to the output of electric tubes, indicates an unsatisfactory tube.		
Eroded	Carry away of material by flow of fluids or gases, accelerated by heat or grit.		

Condition	Definition	Asso. Terms	Illus.
Flattened Out	Permanent deformation beyond tolerance limits usually caused by compression.		
Frayed	Worn into shreds by rubbing action.		
Fused	Joining together of two materials usually caused by heat, friction, or current flow.		
Galled	Chafing or severe fretting caused by slight relative movement of two surfaces under high contact pressure.		36
Glazed	Undesirable development of a hard, glossy surface due to rubbing action, heat or varnish.		
Gouged	Scooping out of material usually caused by a foreign object.	Furrowed	37
Grooved	Smooth, rounded furrow or furrows of wear, usually wider than scoring, with rounded corners and smooth on the groove bottom. Example: a ball bearing wearing into a race would cause a grooved condition.		38
Hot-Spot	Subjected to excessive temperature usually evidenced by change in color and appearance of part.	Heat discolored Overheated Heated excessively	39
Indications	Cracks, inclusions, fractures etc. not visible without fluorescent or magnetic penetrants.		

Condition	Definition	Asso. Terms	Illus.
Magnetism-Low	Low or lost magnetism of permanetly magnetized parts such as motor field cores, etc.		
Melted	Deformation from the original configuration due to heat, friction or pressure as with melted bearings or insulation.		
Mis-matched	Improper association of two or more parts.		
Mis-positioned	Improper installation of a part resulting in damage to the installed part or to associated parts.	Mis-aligned Reversed	
Nicked	A sharp surface indention caused by impact of a foreign object. Parent material is displaced, seldom separated.		40
Out-of-round	Diameters of part not constant.		
Out-of-square	Deformation of right angle relationship of part surfaces.		
Peeled	A breaking away of surface finishes such as coating, platings, etc; peeling would be flaking of very large pieces; a blistered condition usually precedes or accompanies flaking.	Blistered Flaked	41
Pick-Up	Transfer of metal from one surface to another. Usual cause is the rubbing of two surfaces without sufficient lubrication.		42

Condition	Definition	Asso. Terms	Illus.
Pitted	Small irregular shaped cavities in the surface of the parent material usually caused by corrosion, chipping, or heavy electrical discharge.		43
Plugged	Pipe, hoses, tubing, channeling, internal passage, etc. which are totally or partially blocked.	Clogged Obstructed Restricted passage	
Porous	Voids located internally, in the surface or completely through a material. Usually applied to cast material or to welds.	Pock-marked Perforation-weld	44
Resistance-high	High electrical resistance in an electrical circuit, causing improper component or circuit operation.		
Rolled-over	Lipping or rounding of a metal edge.	Lipped Turned Metal	45
Rough	Usually applies to operation as opposed to surface finish; i.e., a condition of bearings (which cannot be disassembled further) where during the spin test the rotation is rough.		
Rubbed	To move with pressure or friction against another part - such as compressor rub.		
Ruptured	Extensive breaking apart of material usually caused by high stresses, differential pressure, locally applied force or any combination of these. Examples: burst bellows, blown casing, etc.	Blown Burst Split	46
Scored	Deep scratch or scratches made during part operation by sharp edges of foreign particles.		47

Condition	Definition	Asso. Terms	Illus.
Scratched	Light narrow, shallow mark or marks caused by movement of a sharp object or particle across a surface. Material is displaced, not removed.		48
Seized	Parts bound together because of expansion or contraction due to high or low temperature, foreign object jammed in mechanism, etc.	Frozen Jammed Stuck	
Sheared	Dividing a body by cutting action, i.e., division of a body so as to cause its parts to slide relative to each other in a direction parallel to their plane of contact.	Cut	49
Spalled	Sharply roughened area characterized by progressive chipping-away of surface material. (Not to be confused with flaking.) Usual causes are surface cracks, inclusions or any similar surface injury causing a progressive breaking away of the surface under load.		50
Stretched	Enlargement of a part as a result of exposure to operating conditions.	Growth	
Stripped	A condition usually associated with threads or insulation. Involves removal of material (threads) by force.		
Torn	Separation by pulling apart.		51
Worn excessively	Material of part consumed as a result of exposure to operation or usage.		

PART CONDITION CODE

(Associated Terms)

Condition	Reference
Arced	See Arced
Ballooned	See and code Bulged
Battered	See Battered
Bent	See Bent
Binding	See Binding
Blistered	See and code per peeled
Blown	See and code per Ruptured
Bowed	See Bowed
Brinelled	See Brinelled
Broken	See Broken
Buckled	See and code per Distorted
Bulged	See Bulged
Burned	See Burned
Burst	See and code per Ruptured
Burrs	See Burrs
Carboned	See Carboned
Carbon Covered	See and code Carboned
Carbon Tracked	See and code Carboned
Chafed	See Chafed
Charred	See and code per Burned
Checked	See Checked

Condition	Reference
Chipped	See Chipped
Circuit-Grounded	See Circuit-Grounded
Circuit-Open	See Circuit-Open
Circuit-Shorted	See Circuit-Shorted
Clogged	See and code per Plugged
Cocked	See and code Mispositioned
Coked	See and code Carboned
Collapsed	See Collapsed
Corroded	See Corroded
Cracked	See Cracked
Creased	See and code per Bent
Crossed	See Crossed
Crushed	See and code per Collapsed
Curled	See Curled
Cut	See and code per Sheared
Dented	See Dented
Deposits	See Deposits
Depressed	See and code per Distorted
Dimension under min.	See Dimension under min.
Dimension over max.	See Dimension over max.
Disintegrated	See Disintegrated
Distorted	See Distorted

Condition	Reference
Eccentric	See Eccentric
Emission-Low	See Emission-Low
Eroded	See Eroded
Flattened Out	See Flattened Out
Flaked	See and code per Peeled
Flashed Over	See and code Arced
Folded	See and code per Bent
Fractured	See and code per Broken
Frayed	See Frayed
Frozen	See and code per Seized
Furrowed	See and code per Grooved
Fused	See Fused
Galled	See Galled
Glazed	See Glazed
Gouged	See Gouged
Grooved	See Grooved
Growth	See and code per Stretched
Indications	See Indications
Heat Discolored	See and code per Hot-Spot
Heated Excessively	See and code per Hot-Spot
Hot-Spot	See Hot-Spot
Jammed	See and code per Seized
Kinked	See and code per Bent

Condition	Reference
Lipped	See and code per Rolled-over
Magnetism-Low	See magnetism-Low
Melted	See Melted
Metalizing (Undesirable)	See and code per Mis-positioned
Mis-matched	See Mis-matched
Mis-positioned	See Mis-positioned
Nicked	See Nicked
Non-concentric	See and code per Eccentric
Obstructed	See and code per Plugged
Out-of-round	See Out-of-round
Out-of-square	See Out-of-square
Overheated	See and code per Hot-Spot
Oxidation	See and code per Corroded
Peeled	See Peeled
Peened	See and code per Dented
Perforation-weld	See and code per porous
Pick-up	See Pick-up
Pitted	See Pitted
Plugged	See Plugged
Pock-marked	See and code per Porous
Porous	See Porous
Resistance-high	See Resistance-high

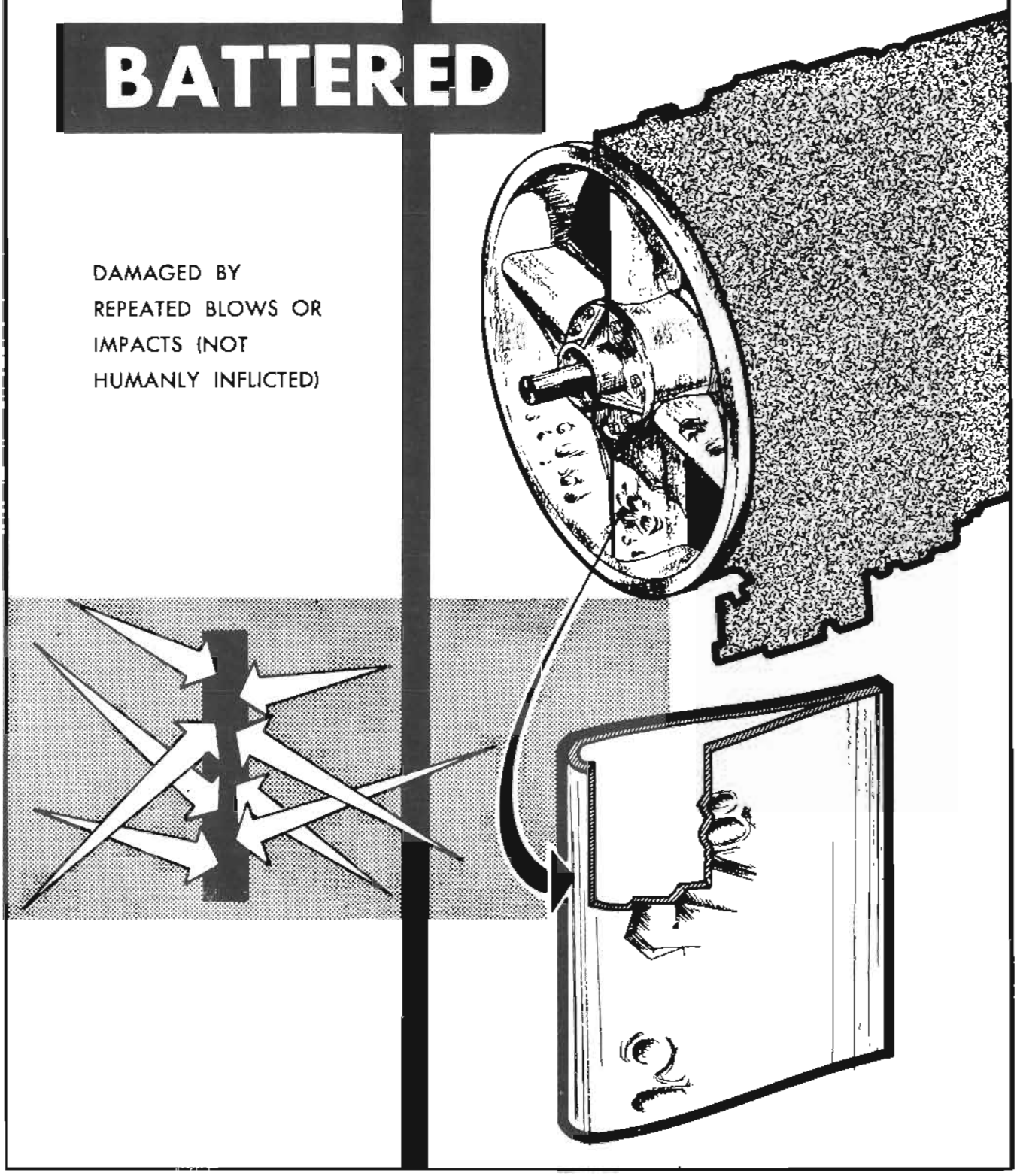
Condition	Reference
Resistance-low	See Resistance-low
Restricted Passage	See and code per Plugged
Reversed	See and code per Mis-positioned
Rolled-over	See Rolled-over
Rough	See Rough
Rubbed	See Rubbed
Ruptured	See Ruptured
Rusted	See and code per Corroded
Scored	See Scored
Scraped	See and code per Chafed
Scratched	See Scratched
Scuffed	See and code per Chafed
Seized	See Seized
Shattered	See and code per Disintegrated
Sheared	See Sheared
Spalled	See Spalled
Split	See and code per Ruptured
Sticking	See and code per Binding
Stretched	See Stretched
Stripped	See Stripped
Stuck	See and code per Seized
Swelling	See and code per Bulged

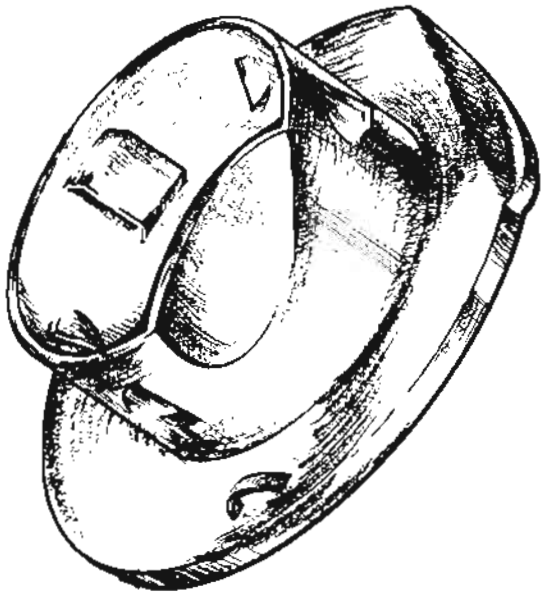
Condition	Reference
Torn	See Torn
Turned-metal	See and code per Rolled-over
Twisted	See and code per Distorted
Tight	See and code per Binding
Undesirable Metalizing	See and code Deposits
Warped	See and code per Distorted
Worn excessively	See Worn excessively

TABLE OF CONTENTS

BATTERED

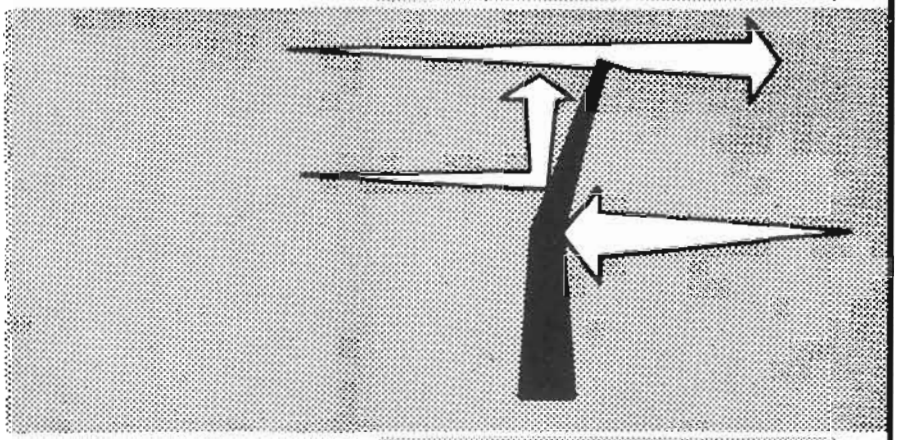
DAMAGED BY
REPEATED BLOWS OR
IMPACTS (NOT
HUMANLY INFLICTED)

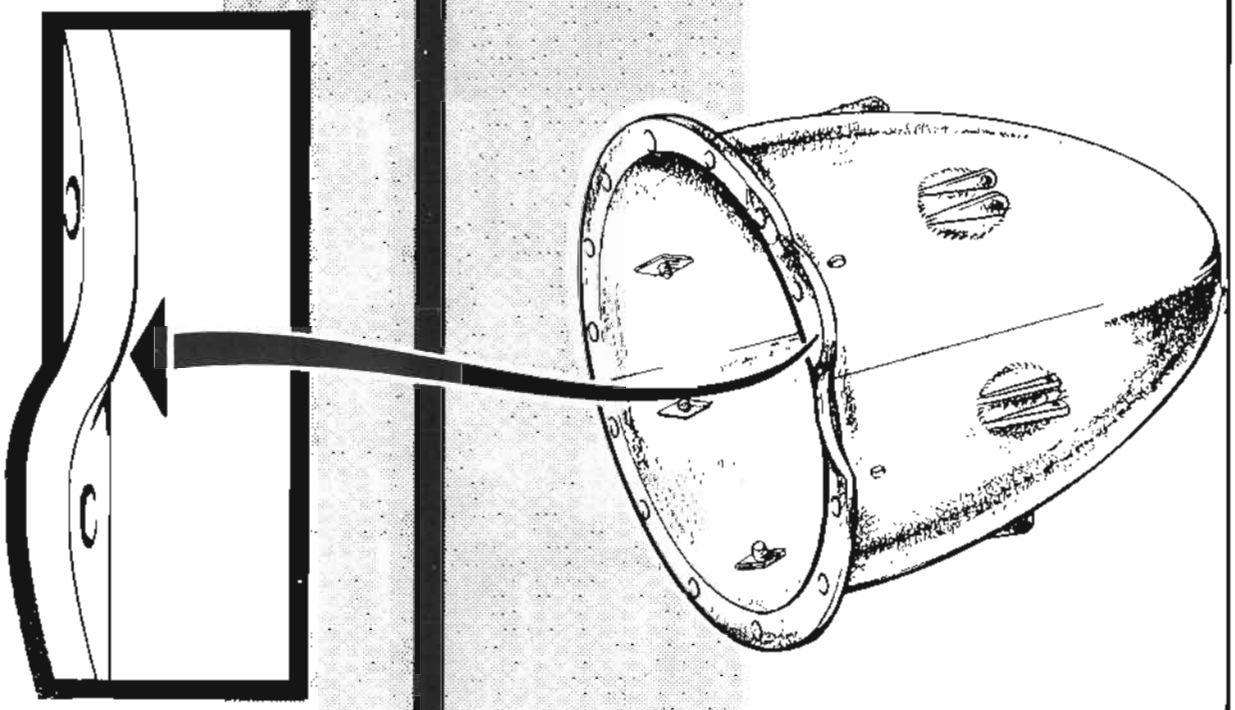




BENT

SHARP DEVIATION FROM ORIGINAL LINE OR PLANE USUALLY CAUSED BY LATERAL FORCE. EXAMPLES ARE: KINKED PIPE, CREASED OR FOLDED SHEET METAL





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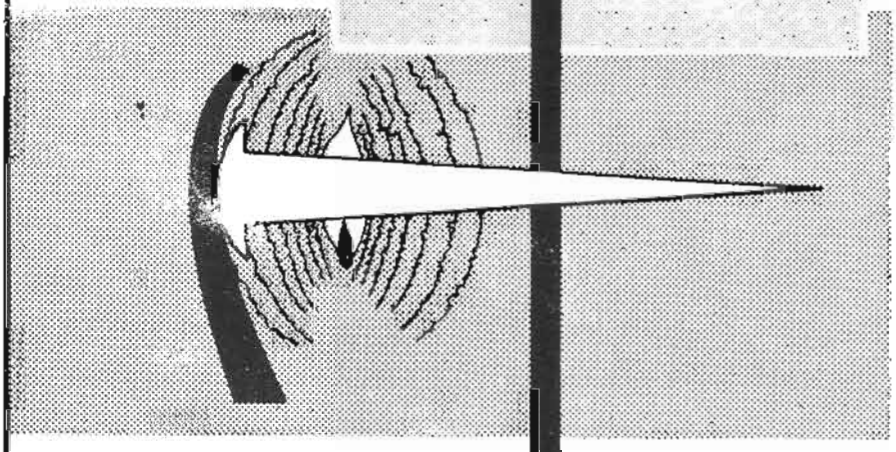
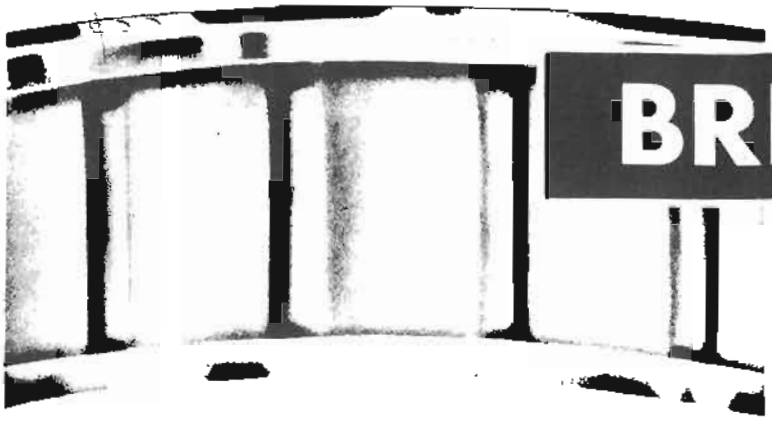


CURVED OR
GRADUAL DEVIATION
FROM ORIGINAL LINE
OR PLANE USUALLY
CAUSED BY LATERAL
FORCE AND/OR HEAT



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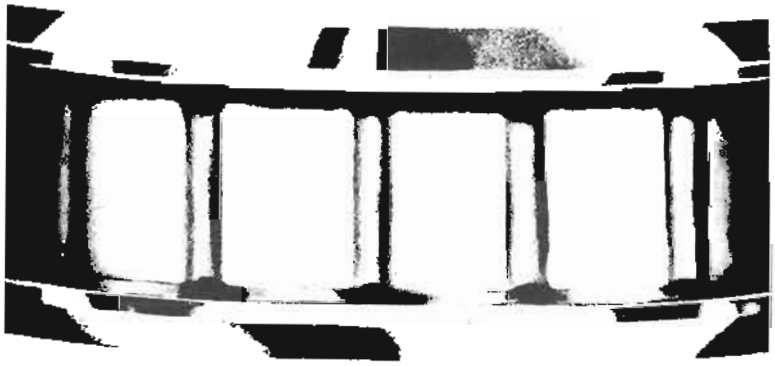
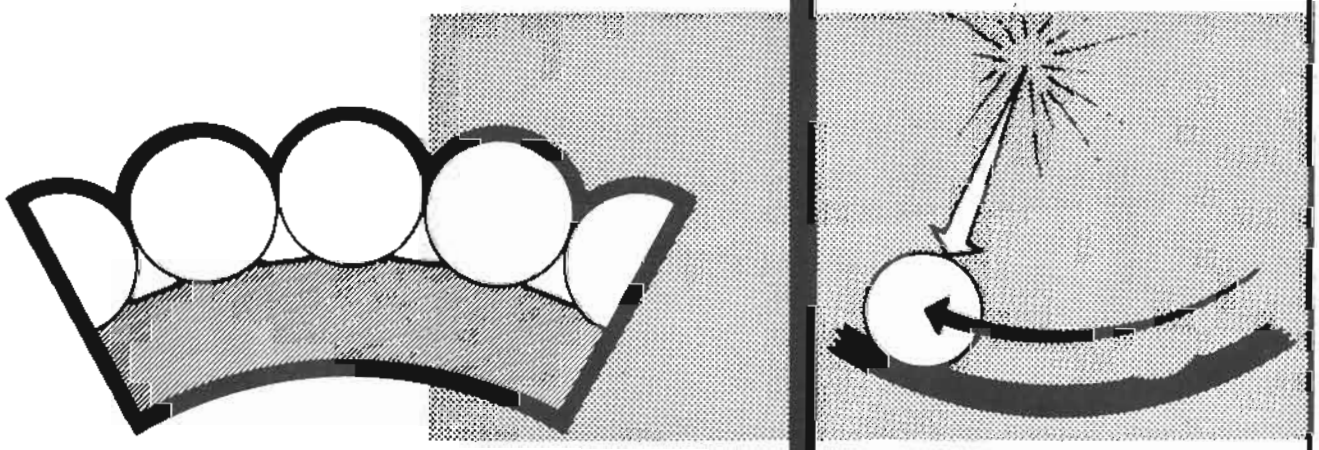


CIRCULAR SURFACE INDENTIONS ON BEARING RACES USUALLY CAUSED BY REPEATED SHOCK LOADING OF THE BEARING: i.e., BALL OR ROLLER INDENTION



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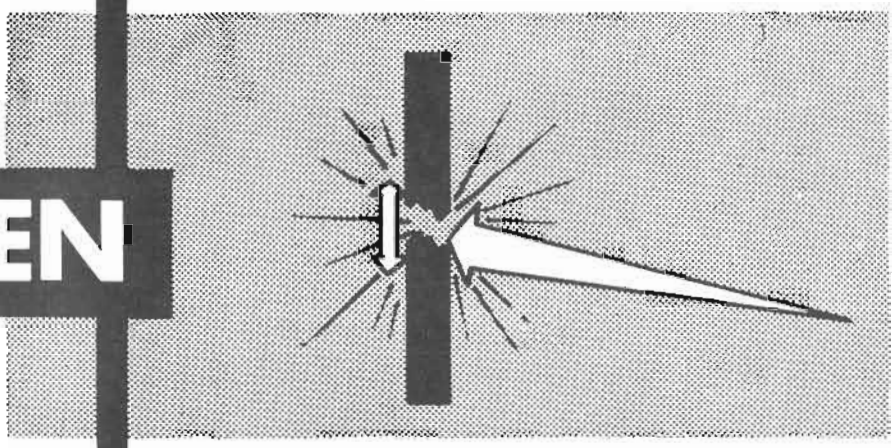
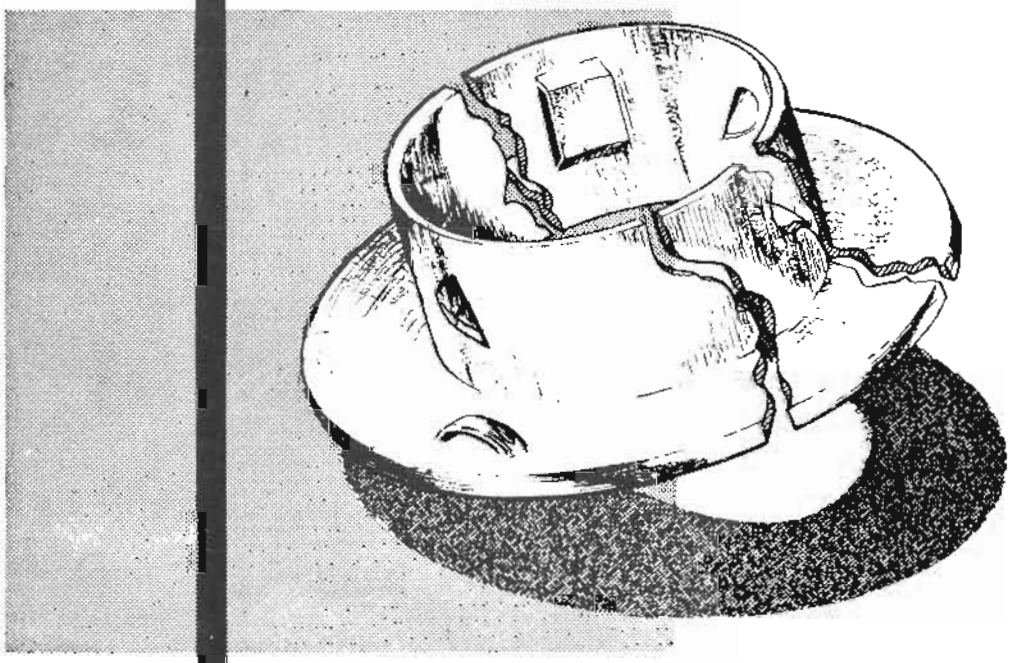
BROKEN



SEPARATED BY FORCE INTO TWO OR MORE PIECES



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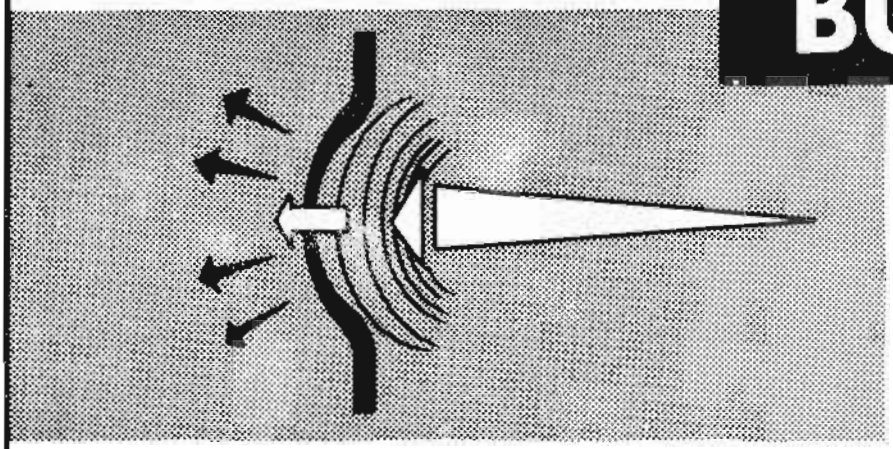
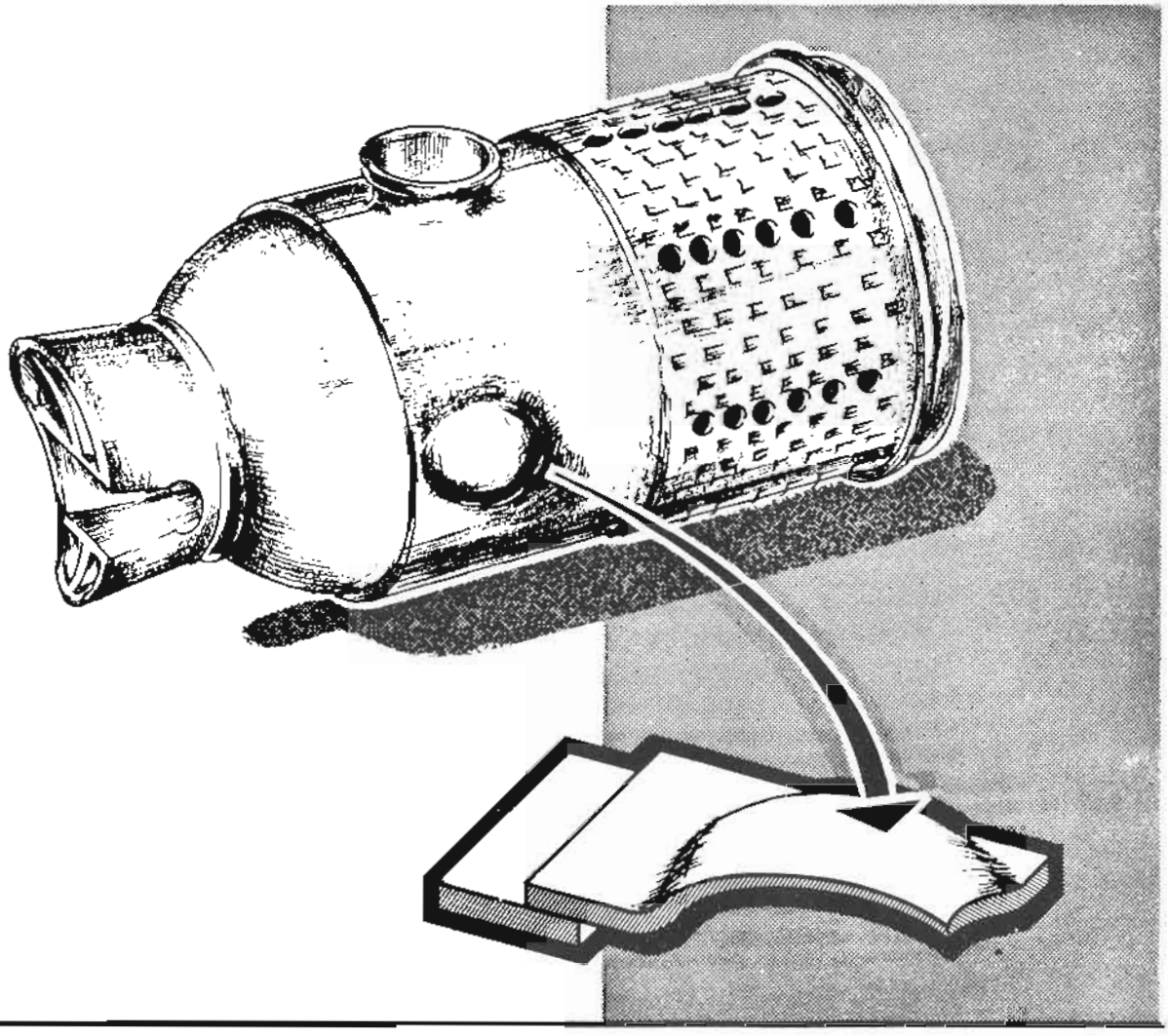


LOCALIZED OUTWARD OR INWARD SWELLING USUALLY CAUSED BY EXCESSIVE LOCAL HEATING AND/OR DIFFERENTIAL PRESSURE.



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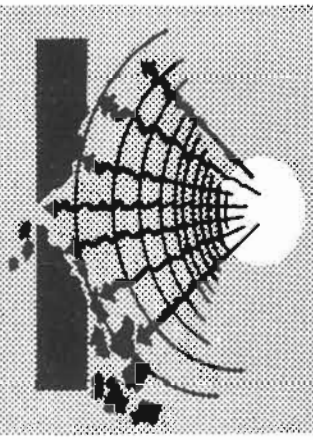
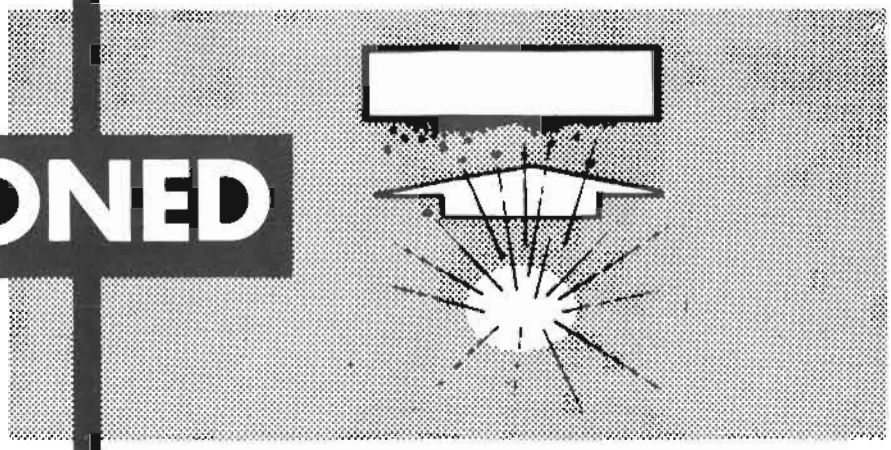
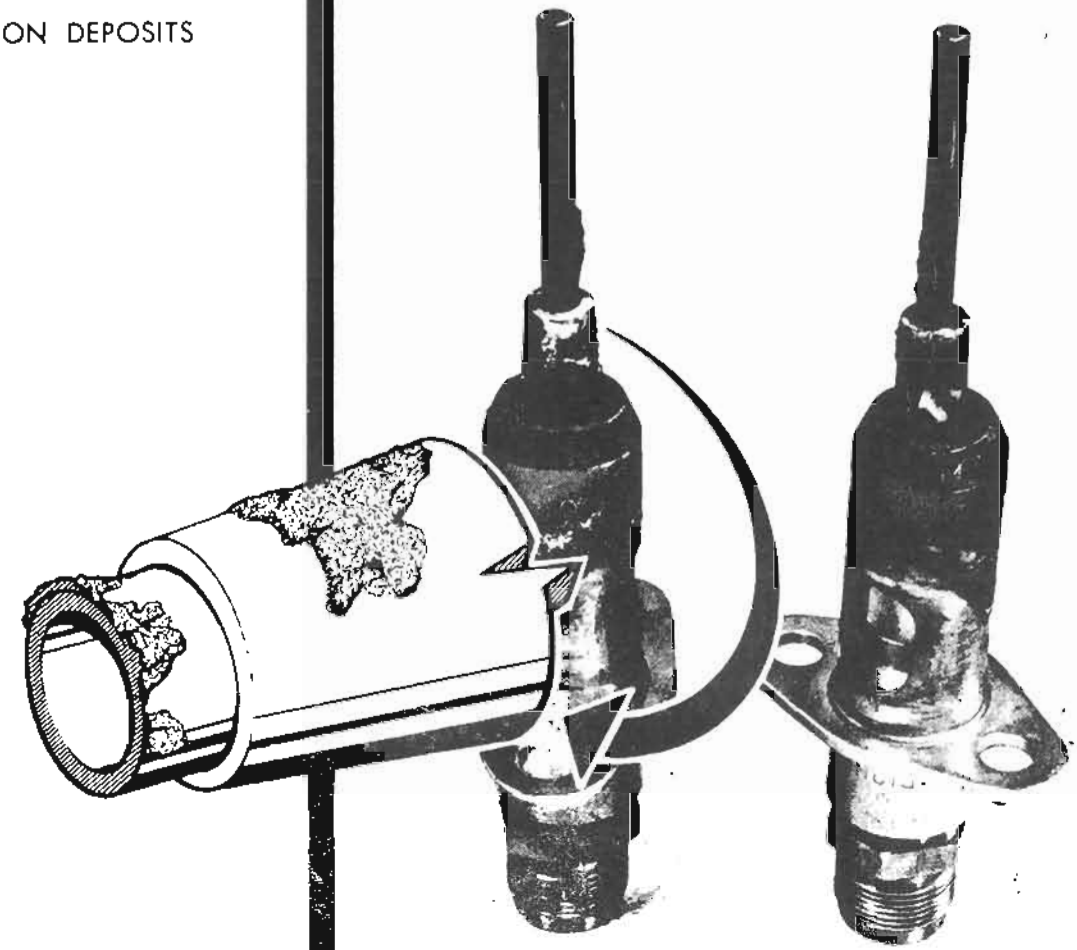


DESTRUCTIVE OXIDATION USUALLY CAUSED BY HIGHER TEMPERATURES THAN THE PARENT MATERIAL CAN WITHSTAND

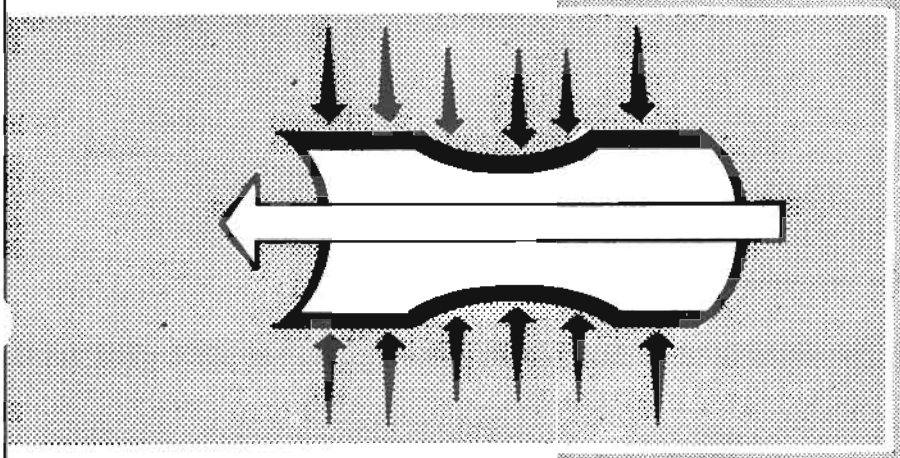
CARBONED



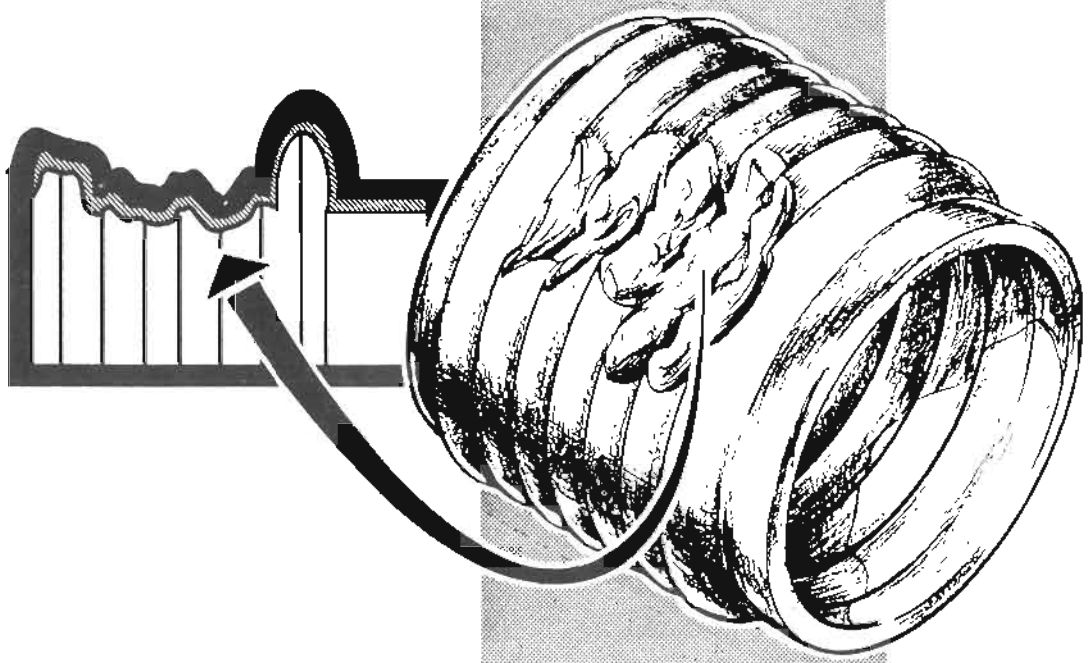
ACCUMULATION OF
CARBON DEPOSITS



COLLAPSED



INWARD DEFORMATION OF THE ORIGINAL CONTOUR OF A PART USUALLY DUE TO HIGH PRESSURE DIFFERENTIALS SUCH AS A COLLAPSED BELLOWS



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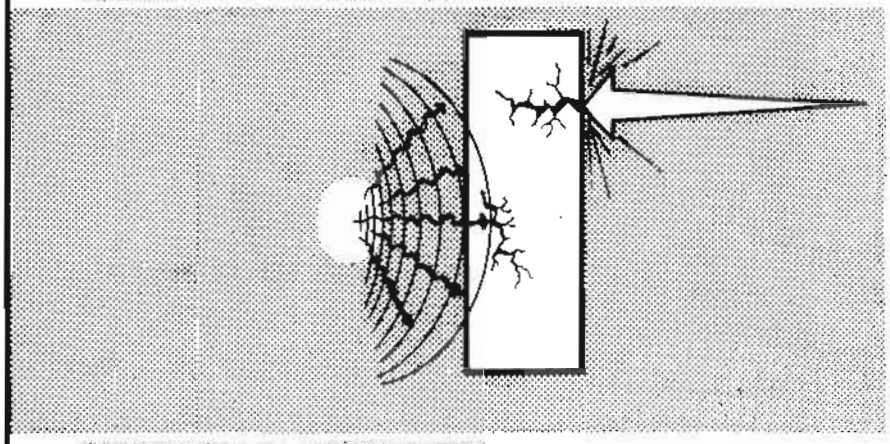
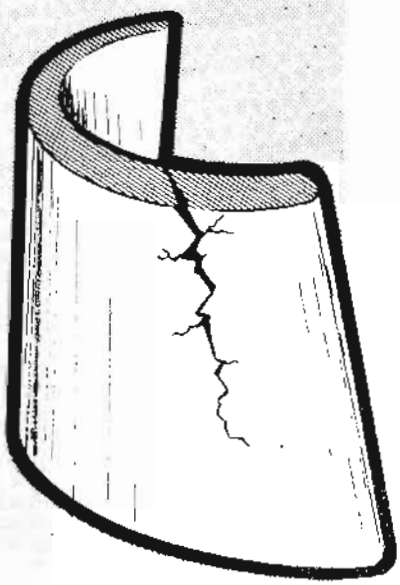


..VISIBLE (NOT REQUIRING SPECIAL FLUORESCENT OR MAGNETIC PENETRANTS) PARTIAL SEPARATION OF MATERIAL WHICH MAY PROGRESS TO A COMPLETE BREAK



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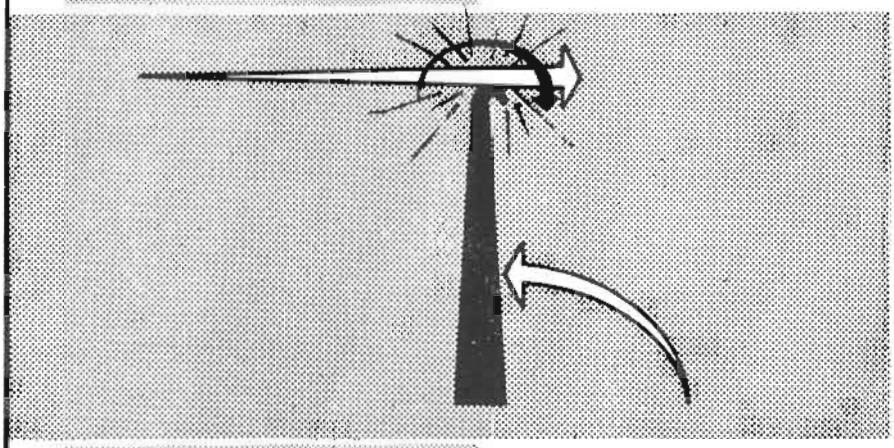
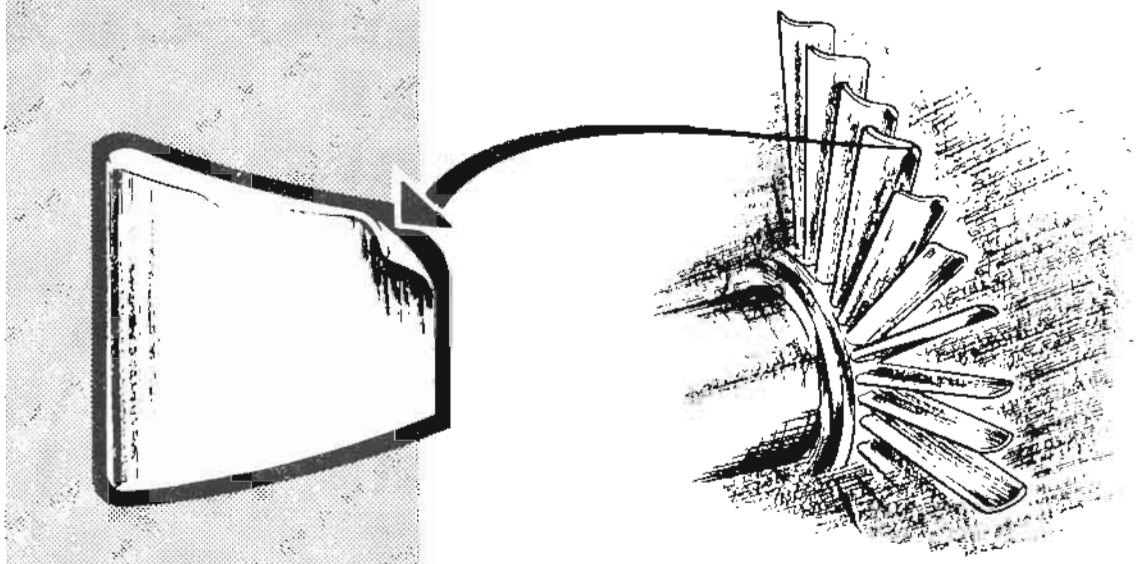
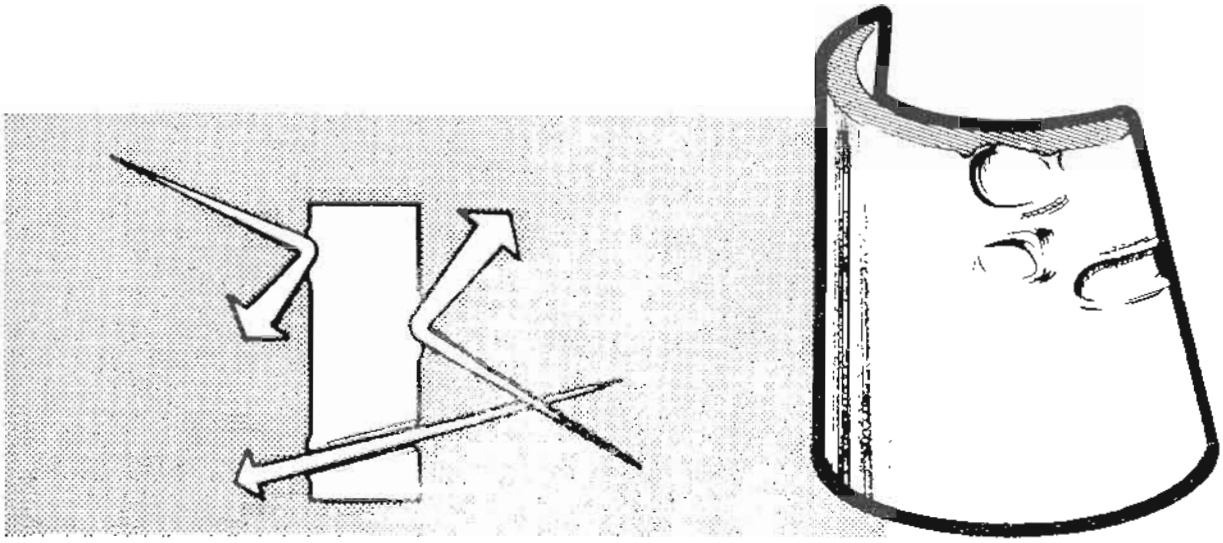


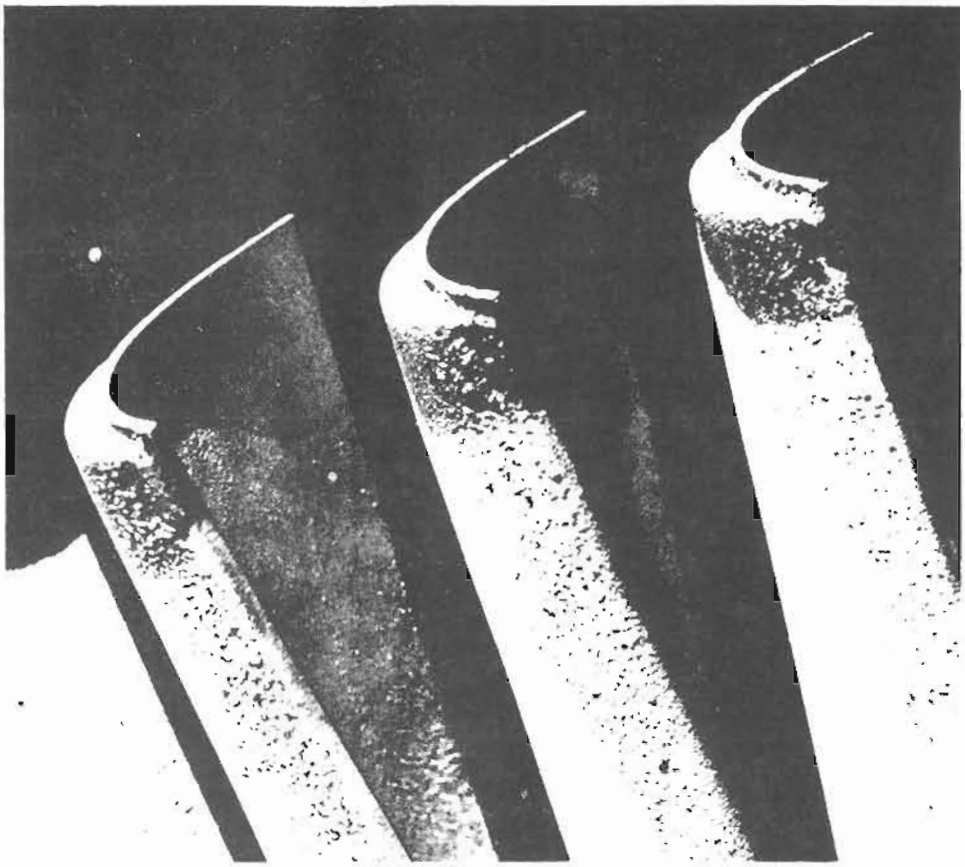
A CONDITION WHERE THE TIP(S) OF COMPRESSOR BLADES OR TURBINE BUCKETS HAVE BEEN CURLED OVER DUE TO RUBBING AGAINST THE ENGINE CASINGS



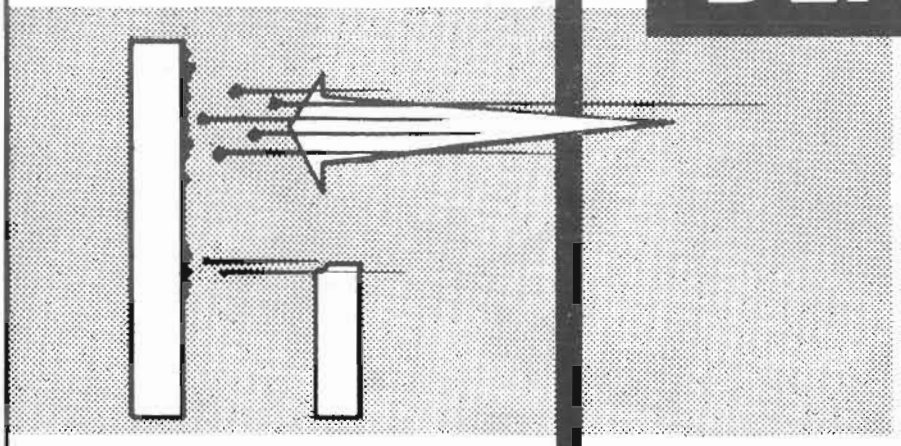
DENTED

A SURFACE INDENTION WITH ROUNDED BOTTOM USUALLY CAUSED BY IMPACT OF A FOREIGN OBJECT. PARENT MATERIAL IS DISPLACED, SELDOM SEPARATED



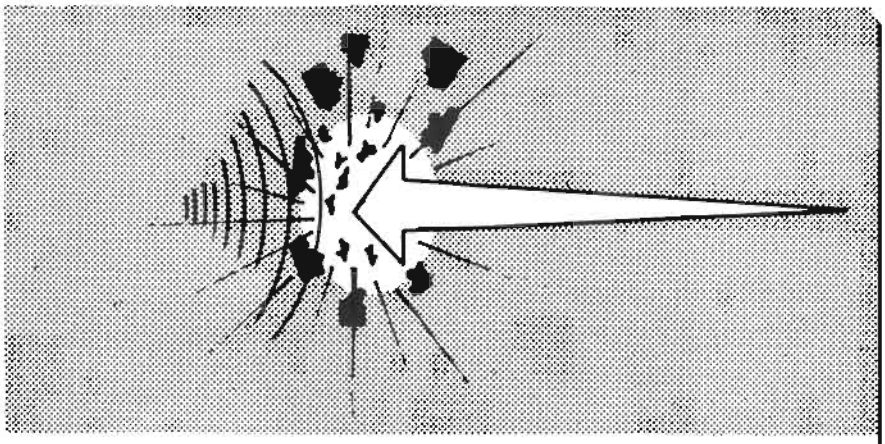


DEPOSITS·



A BUILD-UP OF MATERIAL ON A PART EITHER FROM FOREIGN MATERIAL OR FROM ANOTHER PART NOT IN DIRECT CONTACT

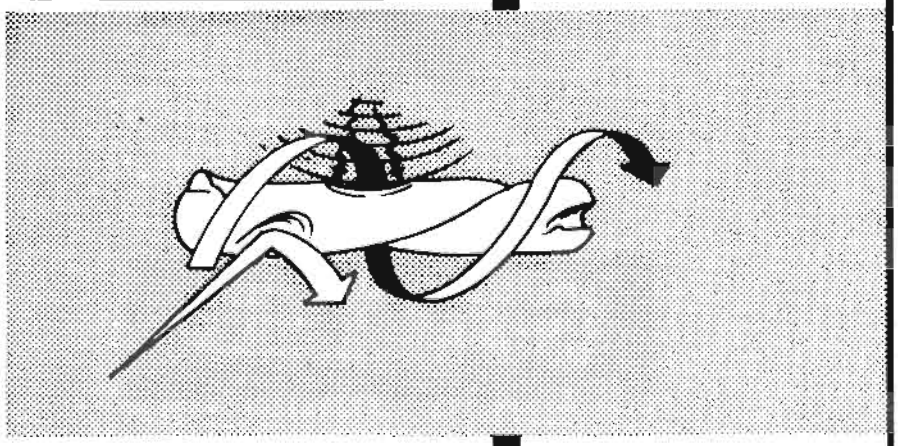
SEPARATED OR DECOMPOSED INTO FRAGMENTS. EXCESSIVE DEGREE OF FRACTURING (BREAKING) AS WITH DISINTEGRATED BEARINGS. COMPLETE LOSS OF ORIGINAL FORM.

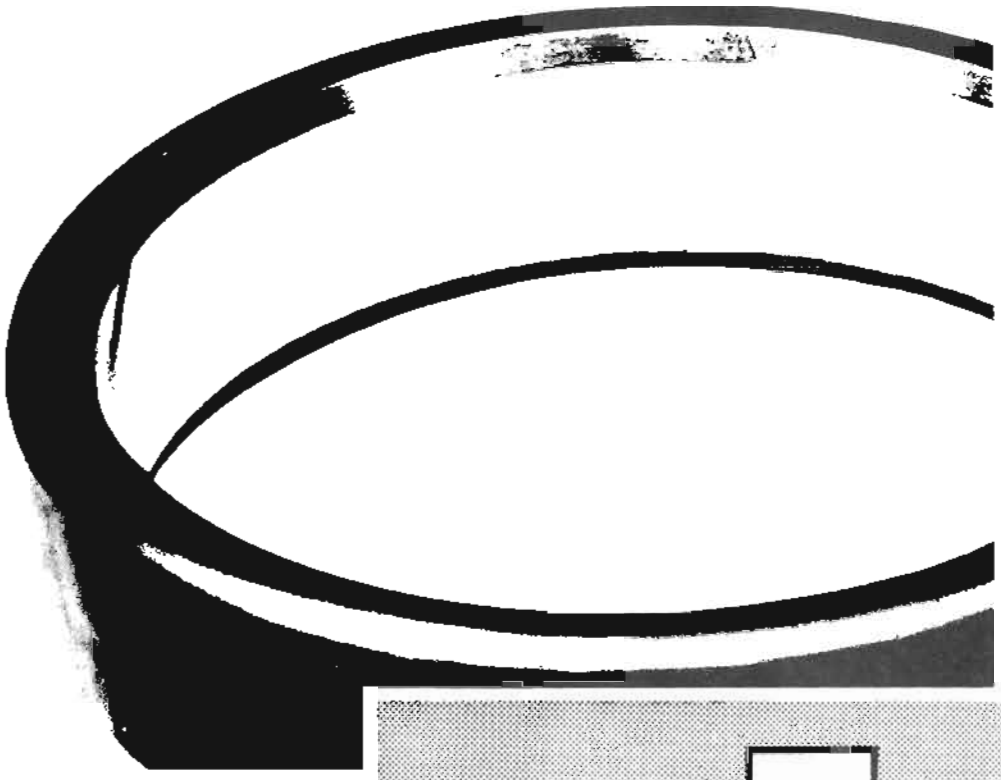


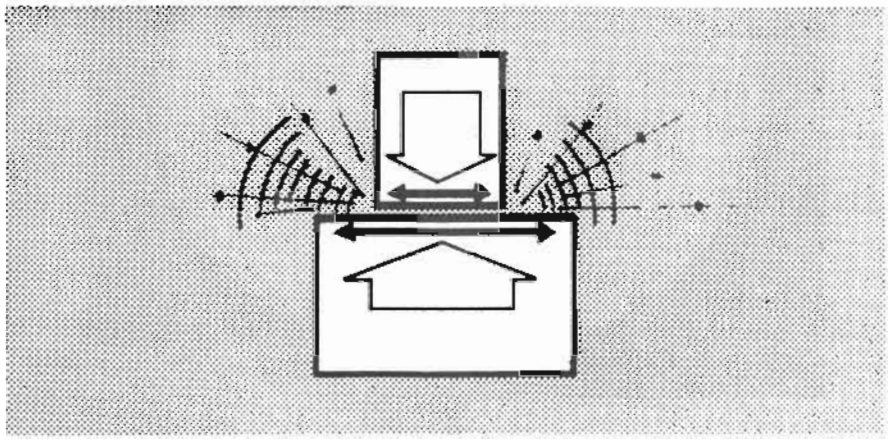
DISINTEGRATED

DISTORTED

EXTENSIVE DEFORMATION OF THE ORIGINAL CONTOUR OF A PART USUALLY DUE TO IMPACT OF A FOREIGN OBJECT, STRUCTURAL STRESSES, EXCESSIVE LOCALIZED HEATING OR ANY COMBINATION OF THESE





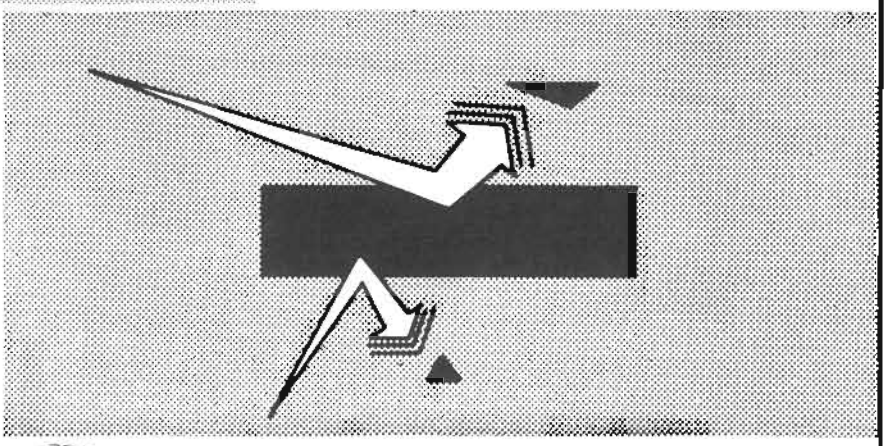


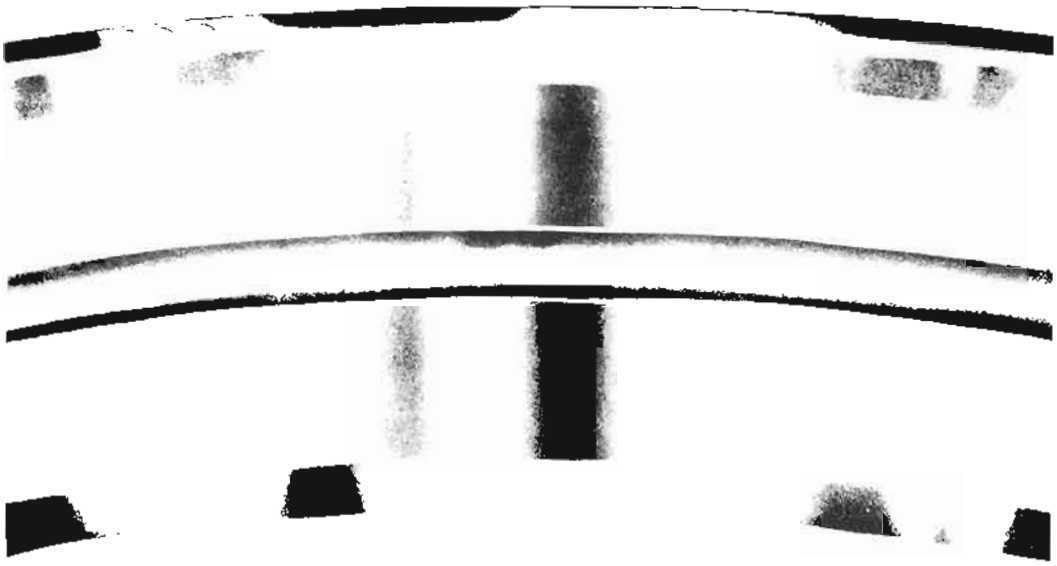
GALLED

CHAFING OR SEVERE FRETTING CAUSED BY SLIGHT RELATIVE MOVEMENT OF TWO SURFACES UNDER HIGH CONTACT PRESSURE

GOUGED

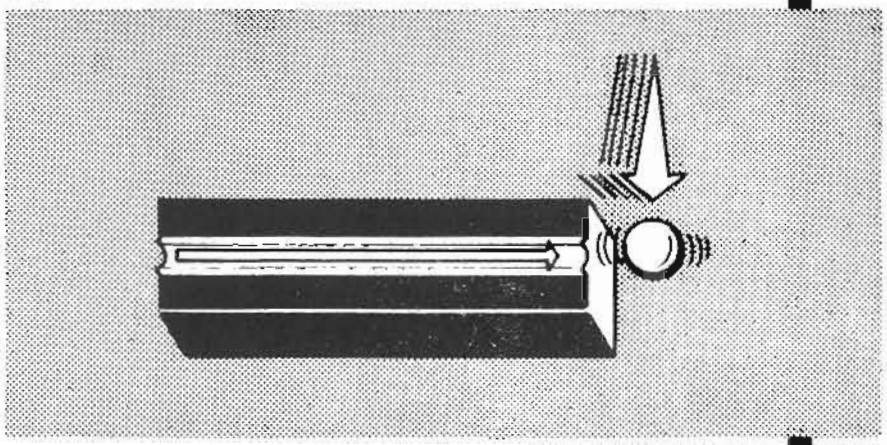
SCOOPING OUT OF MATERIAL USUALLY CAUSED BY A FOREIGN OBJECT





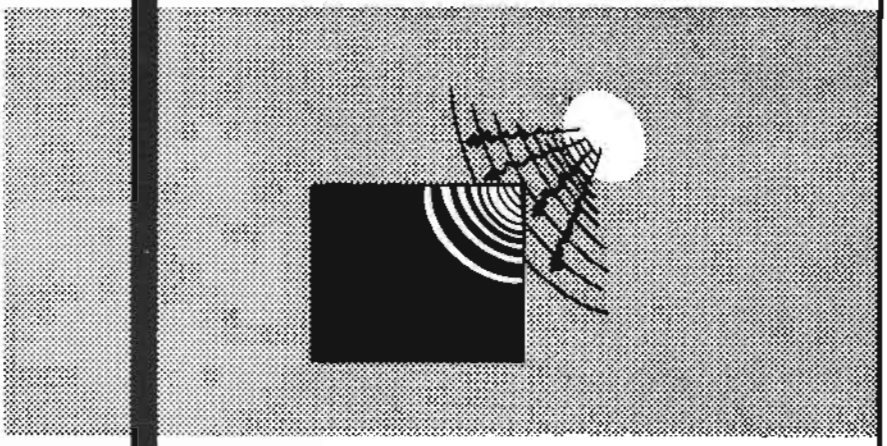
GROOVED

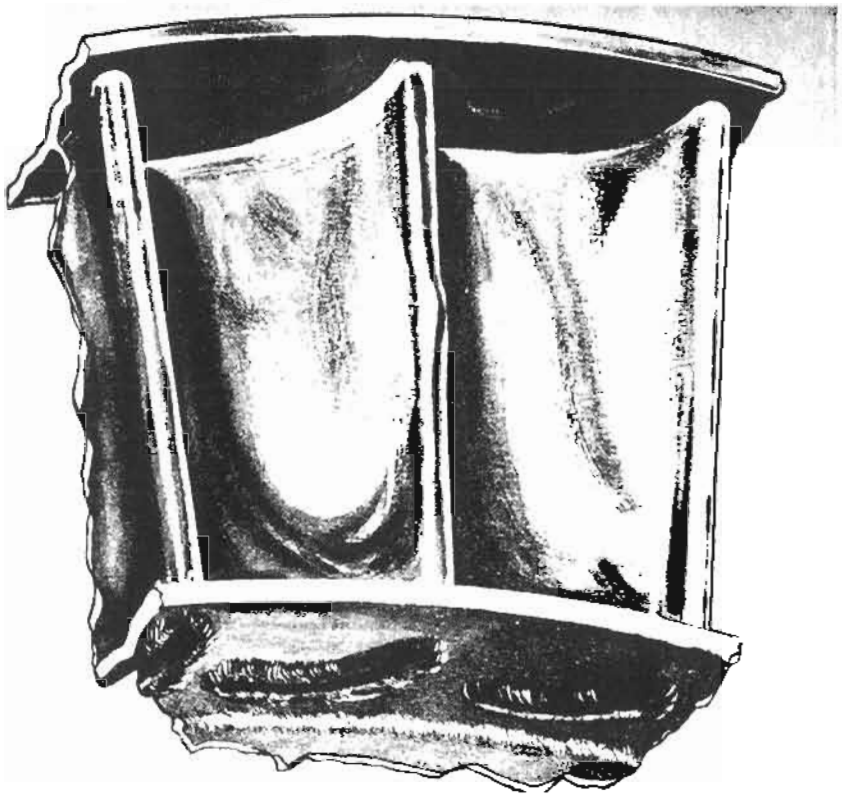
SMOOTH, ROUNDED FURROW OR FURROWS OF WEAR, USUALLY WIDER THAN SCORING, WITH ROUNDED CORNERS AND SMOOTH ON THE GROOVE BOTTOM. EXAMPLE: A BALL BEARING WEARING INTO A RACE WOULD CAUSE A GROOVED CONDITION



HOT-SPOT

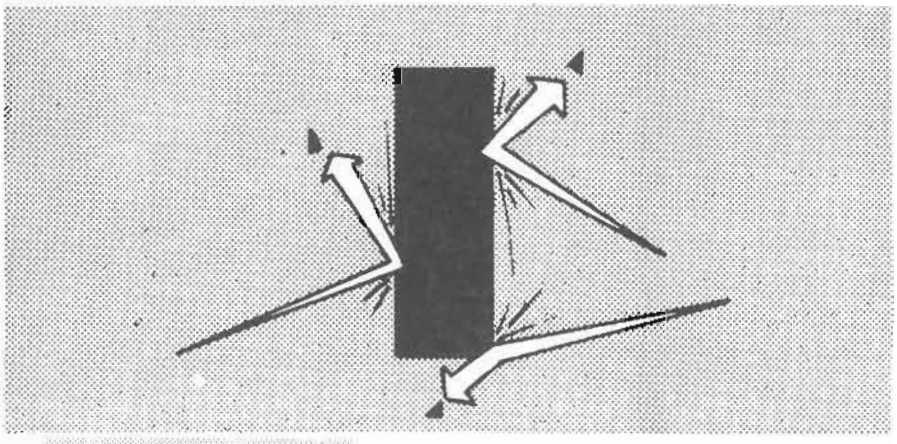
SUBJECTED TO
EXCESSIVE
TEMPERATURE
USUALLY EVIDENCED
BY CHANGE IN
COLOR AND
APPEARANCE OF PART

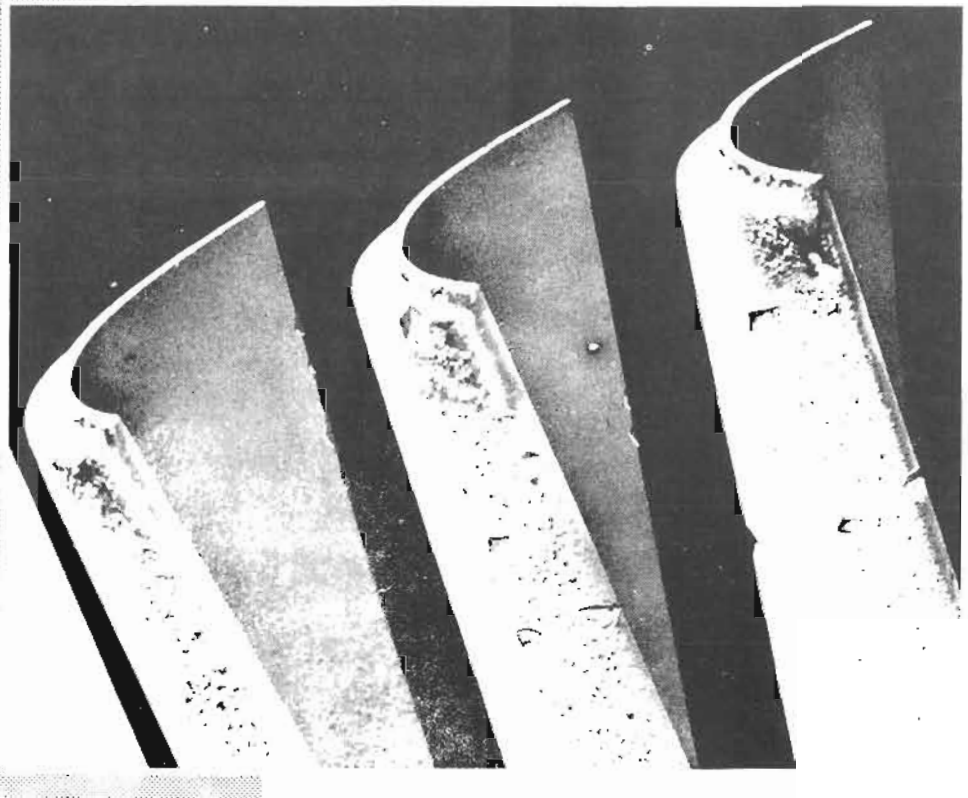


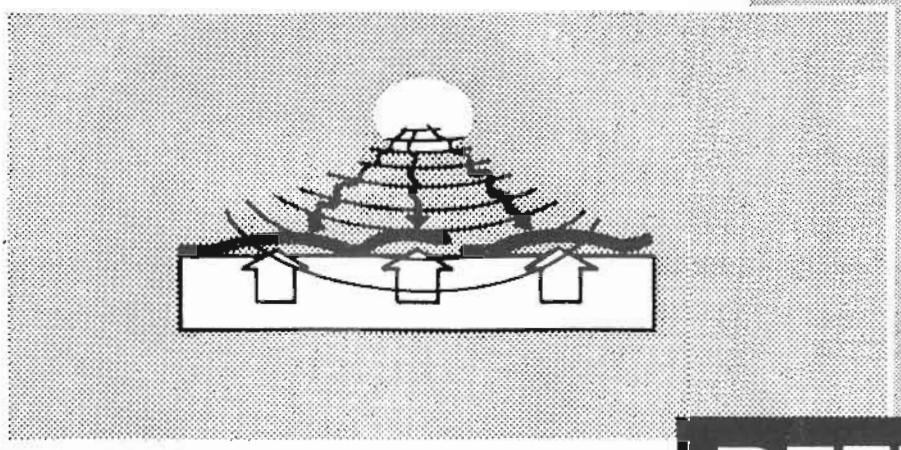


NICKED

A SHARP SURFACE INDENTION CAUSED BY IMPACT OF A FOREIGN OBJECT. PARENT MATERIAL IS DISPLACED, SELDOM SEPARATED

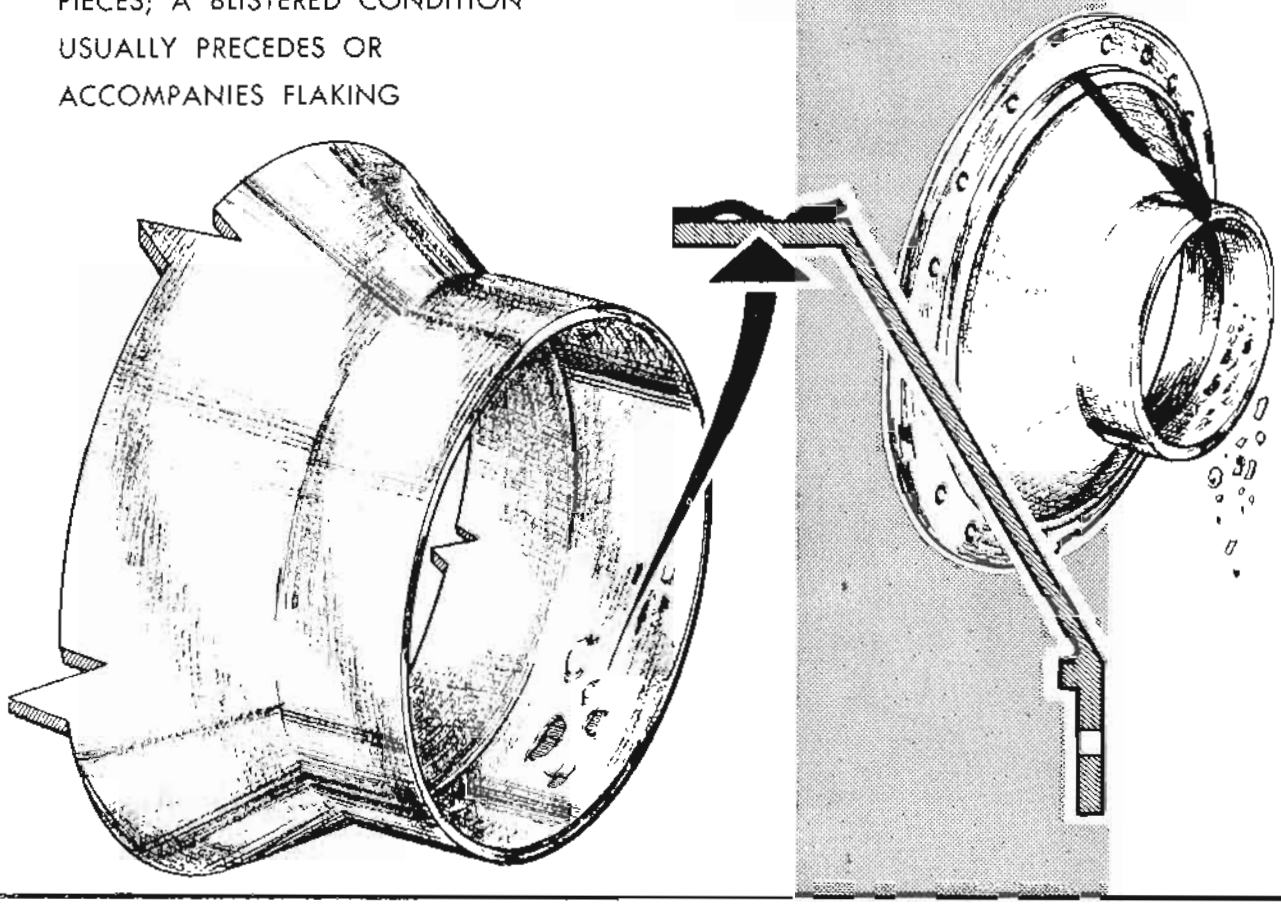




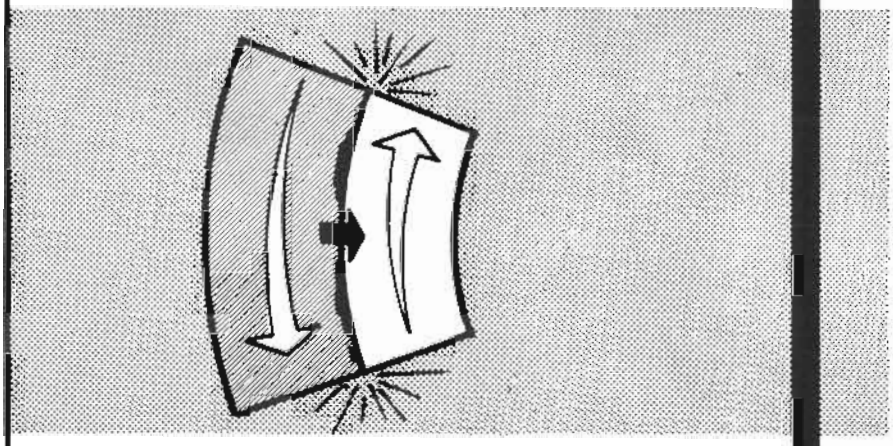


PEELED

A BREAKING AWAY OF SURFACE FINISHES SUCH AS COATING, PLATINGS, ETC; PEELING WOULD BE FLAKING OF VERY LARGE PIECES; A BLISTERED CONDITION USUALLY PRECEDES OR ACCOMPANIES FLAKING

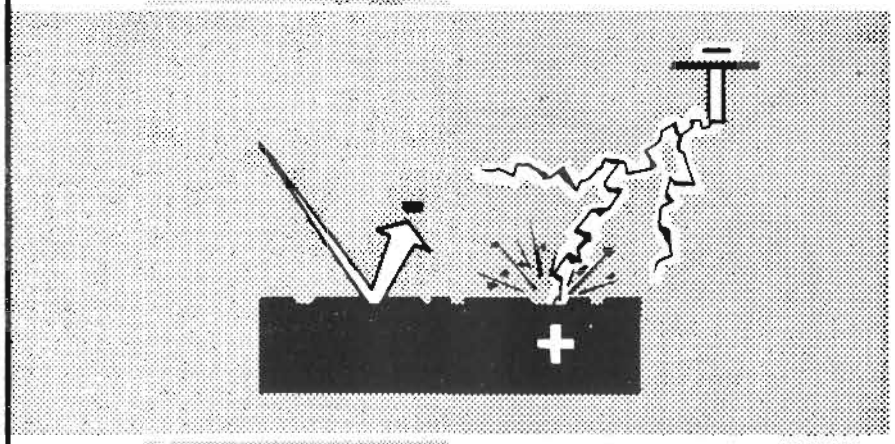


PICK-UP

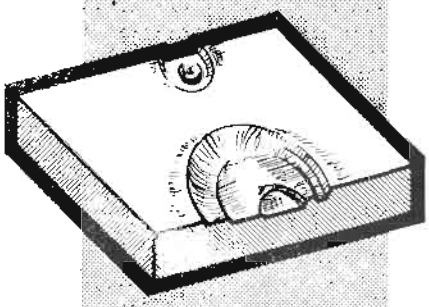


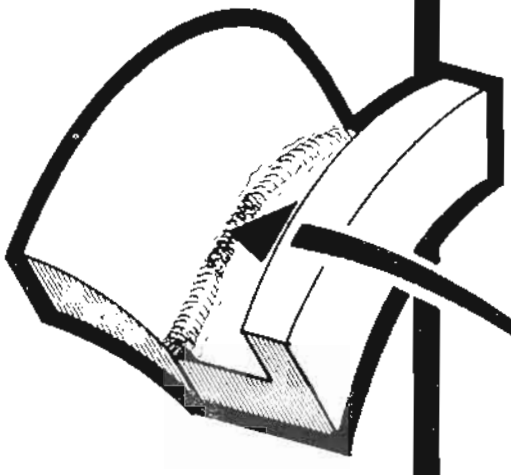
TRANSFER OF METAL FROM ONE SURFACE TO ANOTHER. USUAL CAUSE IS THE RUBBING OF TWO SURFACES WITHOUT SUFFICIENT LUBRICATION

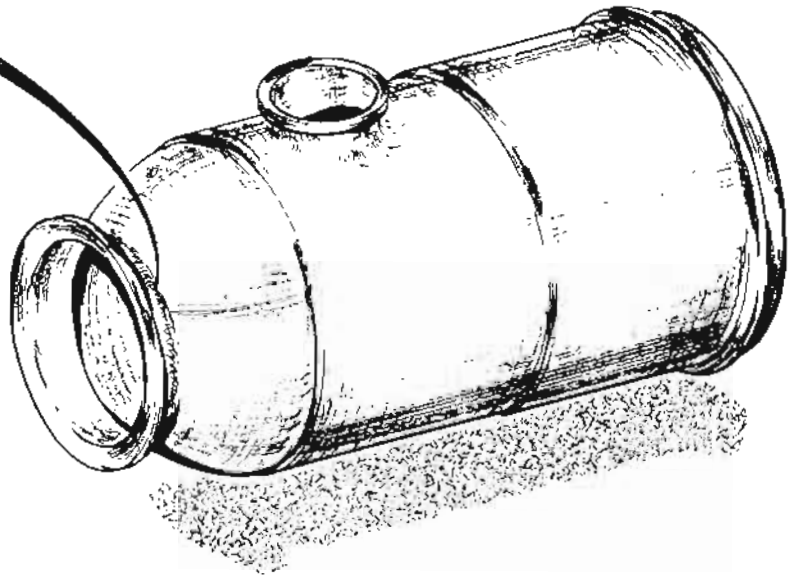
PITTED



SMALL IRREGULAR SHAPED CAVITIES IN THE SURFACE OF THE PARENT MATERIAL USUALLY CAUSED BY CORROSION, CHIPPING, OR HEAVY ELECTRICAL DISCHARGE

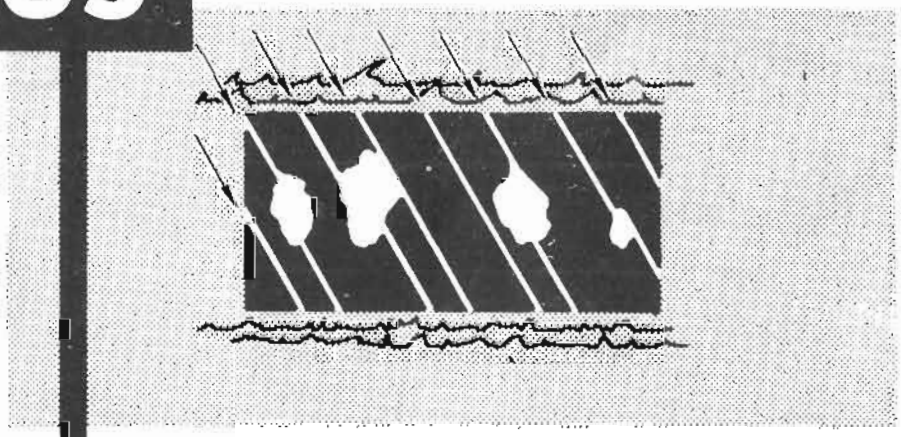






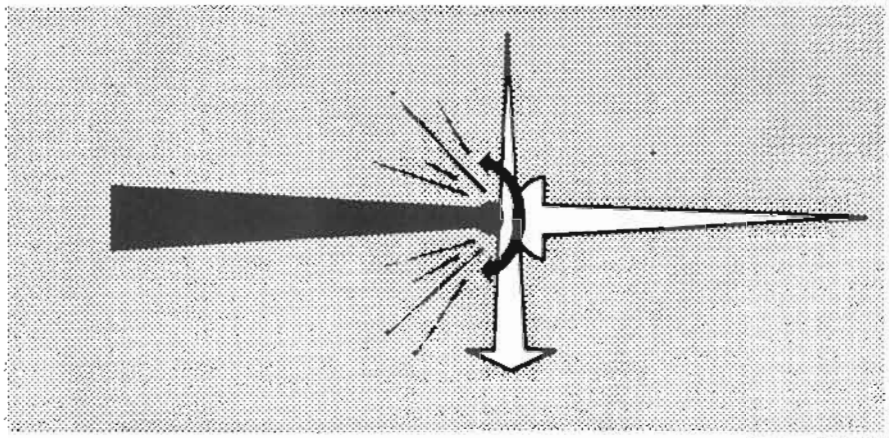
VOIDS LOCATED INTERNALLY, IN THE SURFACE OR COMPLETELY THROUGH A MATERIAL. USUALLY APPLIED TO CAST MATERIAL OR TO WELDS

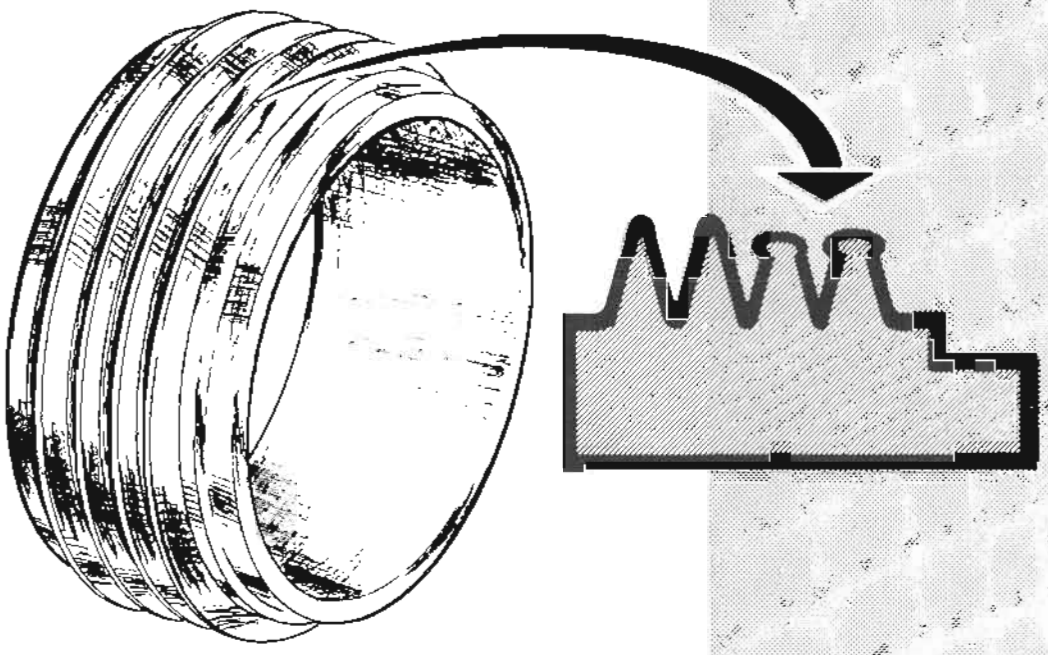
POROUS



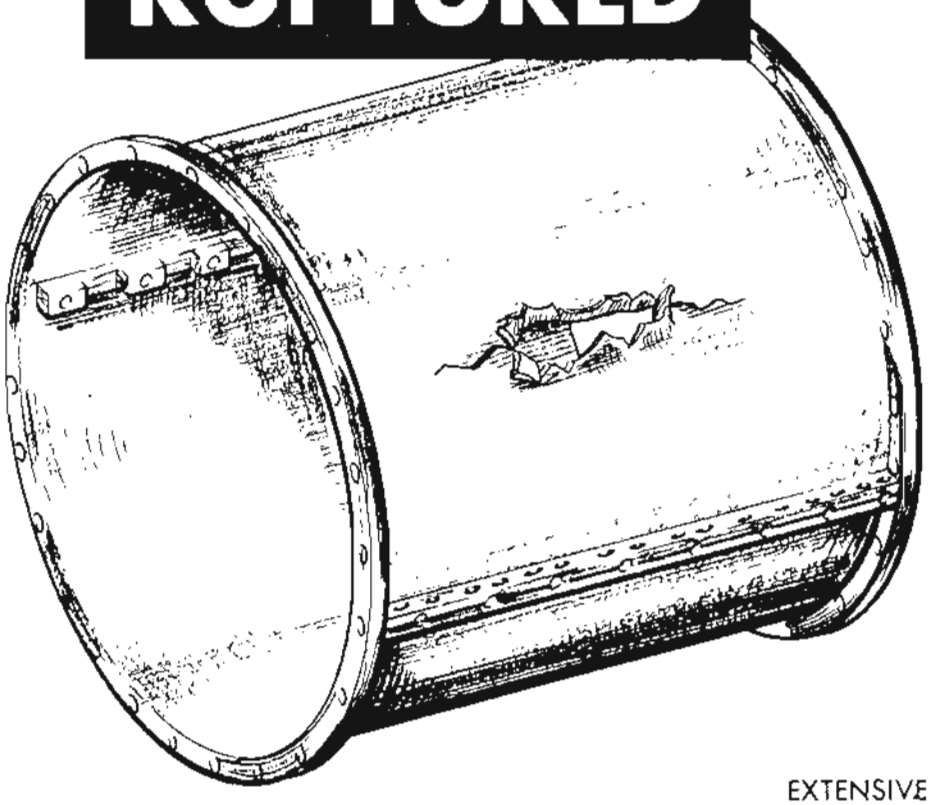
ROLLED-OVER

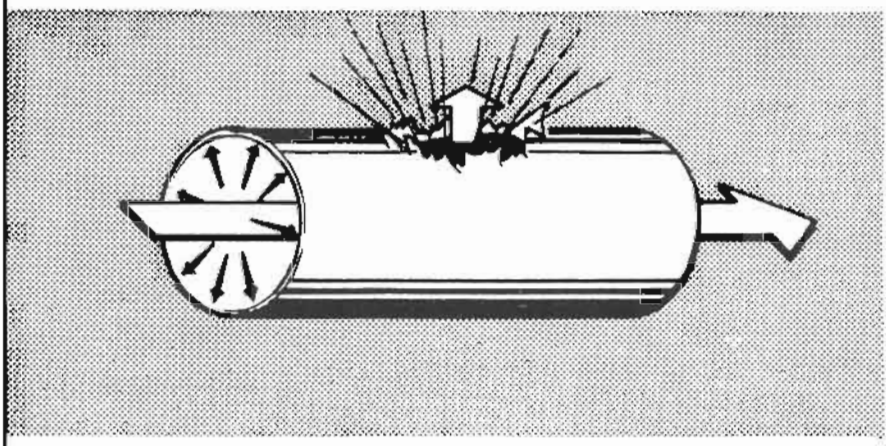
LIPPING OR ROUNDING OF A METAL EDGE



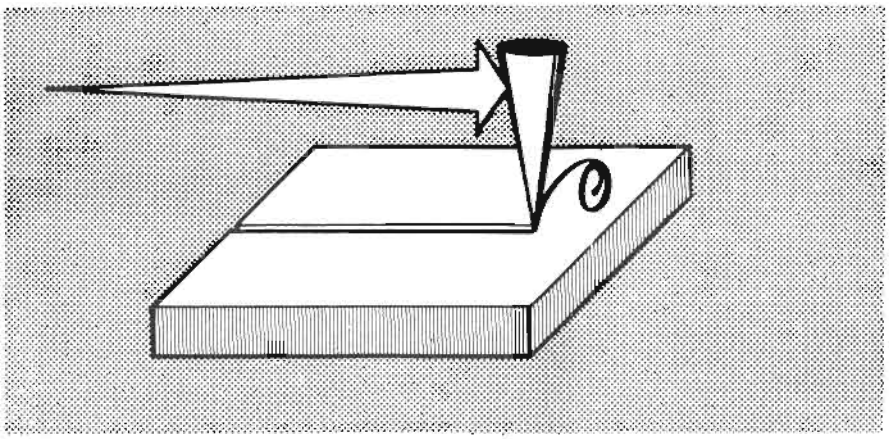


RUPTURED



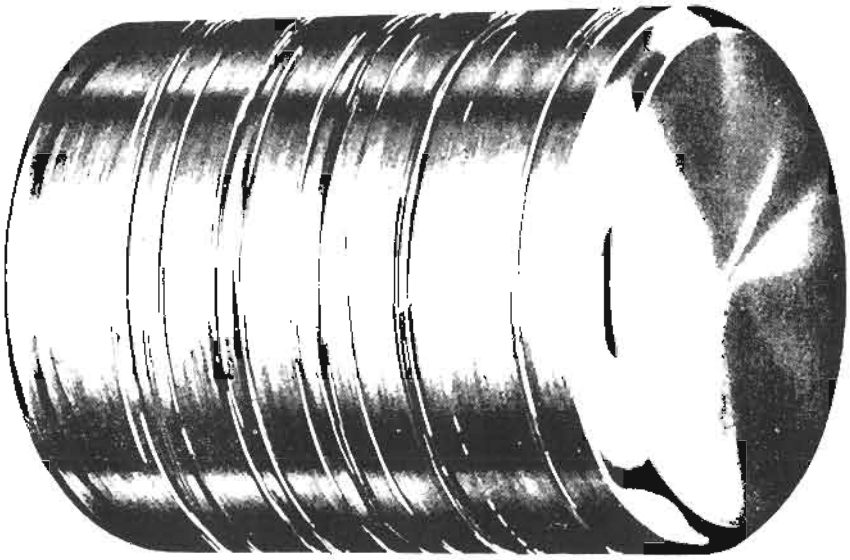


EXTENSIVE BREAKING APART OF MATERIAL USUALLY CAUSED BY HIGH STRESSES, DIFFERENTIAL PRESSURE, LOCALLY APPLIED FORCE OR ANY COMBINATION OF THESE. EXAMPLES: BURST BELLOWS, BLOWN CASING, ETC.

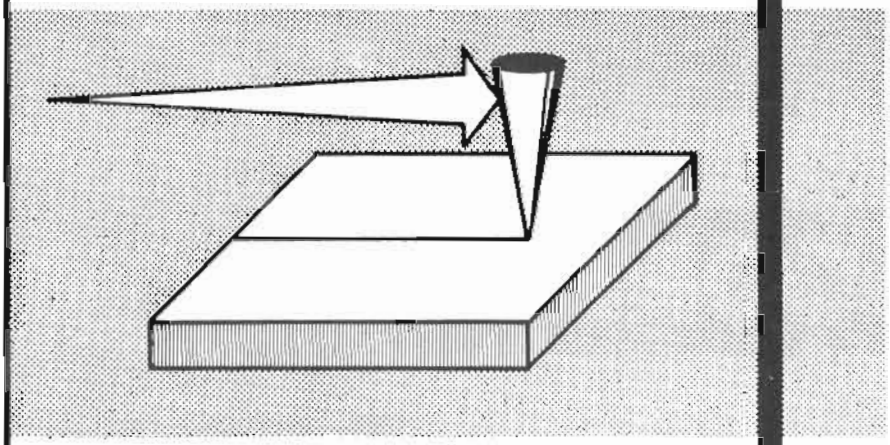


DEEP SCRATCH OR SCRATCHES MADE DURING PART OPERATION BY SHARP EDGES OF FOREIGN PARTICLES

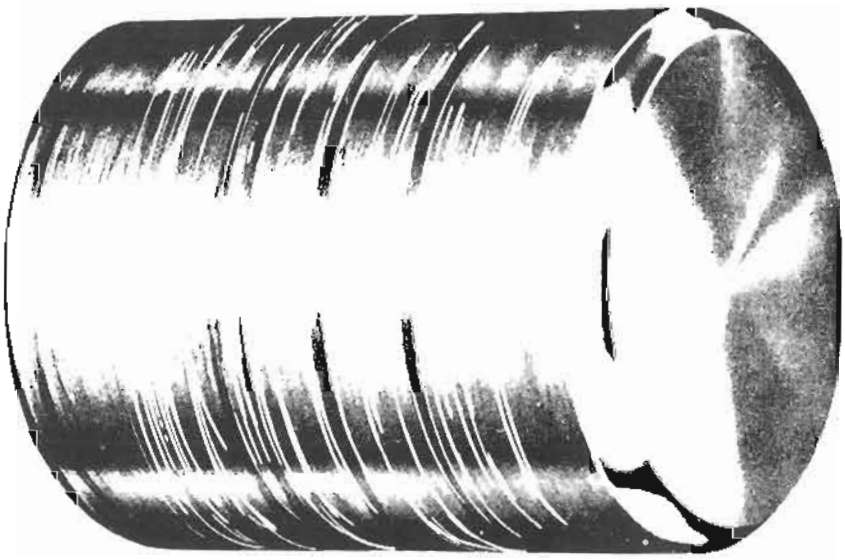
SCORED



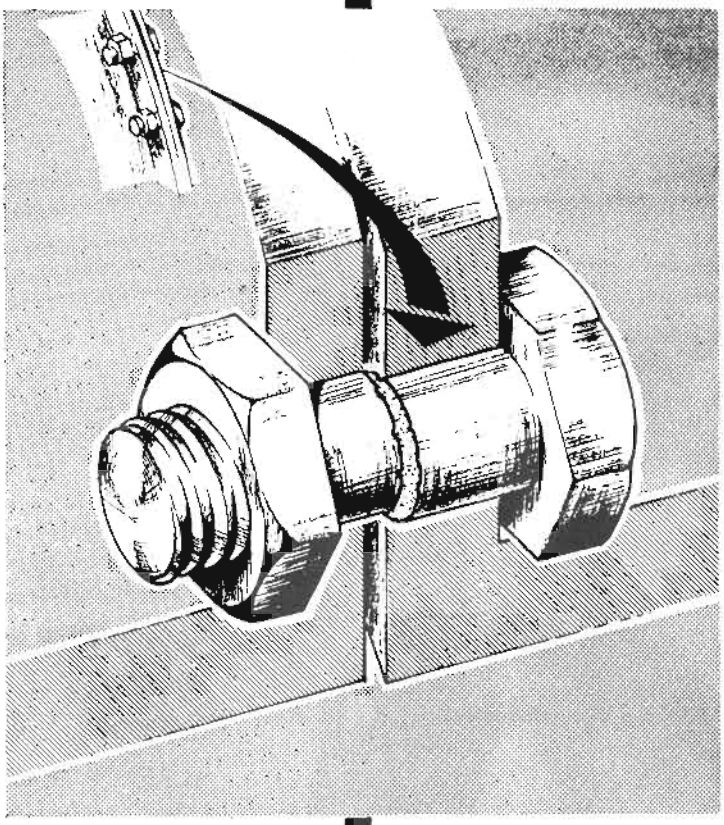
SCRATCHED



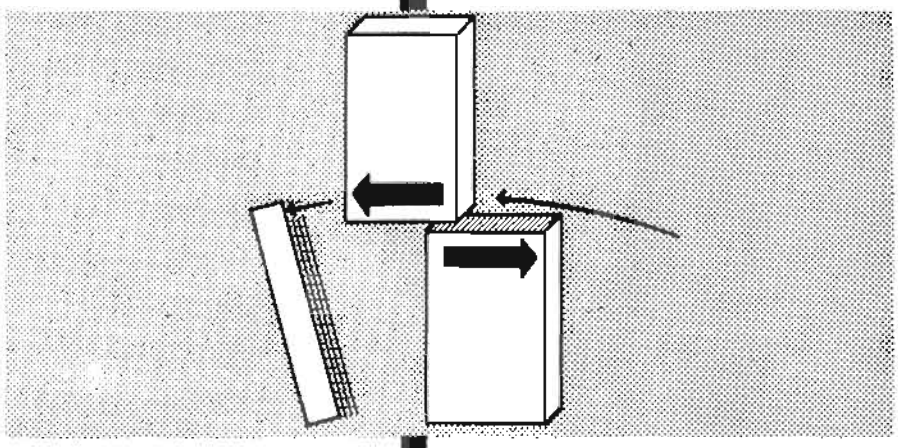
LIGHT NARROW, SHALLOW MARK OR MARKS CAUSED BY MOVEMENT OF A SHARP OBJECT OR PARTICLE ACROSS A SURFACE. MATERIAL IS DISPLACED, NOT REMOVED

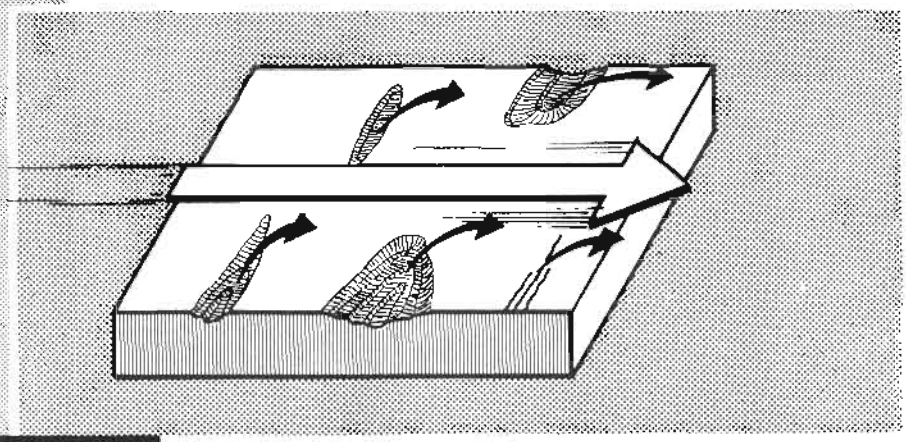


SHEARED

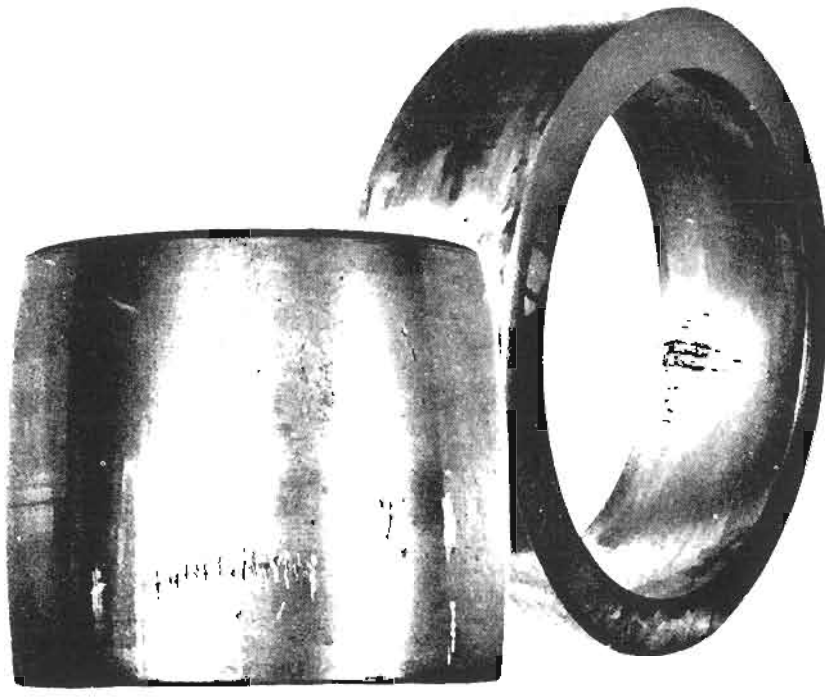


DIVIDING A BODY BY CUTTING ACTION, i.e., DIVISION OF A BODY SO AS TO CAUSE ITS PARTS TO SLIDE RELATIVE TO EACH OTHER IN A DIRECTION PARALLEL TO THEIR PLANE OF CONTACT



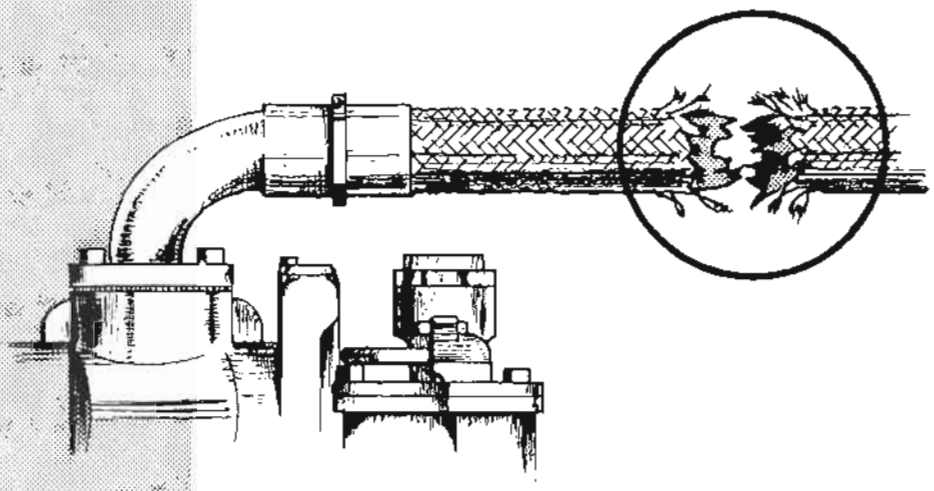


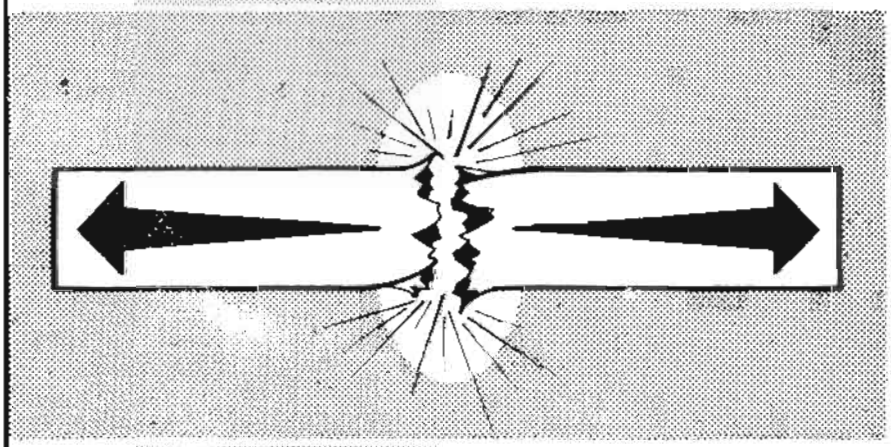
SPALLED



SHARPLY ROUGHENED AREA CHARACTERIZED BY PROGRESSIVE CHIPPING-AWAY OF SURFACE MATERIAL. (NOT TO BE CONFUSED WITH FLAKING). USUAL CAUSES ARE SURFACE CRACKS, INCLUSIONS OR ANY SIMILAR SURFACE INJURY CAUSING A PROGRESSIVE BREAKING AWAY OF THE SURFACE UNDER LOAD

TORN





SEPARATION
BY
PULLING
APART