INCREMENTAL CHANGE

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SPM 70-30-00 INSPECTION METHODS

DISCLAIMER

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HIGHLIGHTS

HIGHLIGHT REFERENCE	DESCRIPTION OF CHANGE
sk70-30-00-200-014	Technical Change: Changed Inspection Terms section.

TASK 70-30-00-200-001

1. General.

Engine parts are inspected for many different problems that can occur during their service. The inspection methods used to find and measure these problems are given in the repair and restoration manuals that apply to these parts. Usually, methods used as standards throughout the aircraft industry are not given in this section. When special methods or changes to standard commercial processes are required, or when special equipment is necessary, the procedures are included here.

2. Types of Inspection.

Subtask 70-30-00-200-011

A. The types of inspection required for maintenance and restoration operations can be divided into the following categories:

(1) Visual, including the use of special lights, dental mirrors, borescopes, magnifying glasses, etc. Refer to TASK 70-31-08-200-801, Visual Inspection Requirements of Rotating Parts.

(2) Dimensional, including the use of micrometers, vernier calipers and height gages, dial indicators, comparators, profilometers, CMMs, and special purpose gages. Refer to TASK 70-31-00-220-001, Dimensional Inspection, and TASK 70-31-01-220-002, Use Limits for Standard Measuring Instruments.

(3) Magnetic Particle. Refer to TASK 70-32-01-240-001, Magnetic-Particle Method.

(4) Fluorescent-Penetrant. Refer to TASK 70-32-02-230-001, Fluorescent-Penetrant Inspection, TASK 70-32-03-230-002, Spot-Fluorescent-Penetrant Inspection.

(5) Radiographic, including the use of gamma- or X-rays to find internal defects. Refer to TASK 70-32-05-260-001, Radiographic Inspection, or nondestructive testing manuals, GEK 28468, GEK 9294, or GEK 72502.

(6) Ultrasonic, to find and measure defects below the surface by their reflection or their effect on ultrasonic vibrations. Refer to:

TASK 70-32-06-270-001, Ultrasonic Inspection,

TASK 70-32-09-270-002, Immersion Ultrasonic Inspection of Engine Run Hardware,
TASK 70-32-13-270-003, Ultrasonic Inspection of the CF6 Stage 3-9 High Pressure Compressor Rotor Spool (Module Level) with Automatic Scanning Fixture and Tool Kits GE-FQAP-357 and -364, or
Nondestructive Testing Manuals GEK 28468 or GEK 9294.

(7) Eddy current, to find and measure defects on and below the surface by their effect on an electrical field generated by a calibrated coil instrument. Refer to:
TASK 70-32-07-250-001, High Speed and Slow Speed Eddy Current Inspection of Circular Holes in Inconel or Titanium Engine Parts,
TASK 70-32-08-250-002, 2 MHz Manual Eddy Current Inspection of Bores in Titanium Alloy Rotating Engine Hardware,
TASK 70-32-10-250-003, 2 MHz Manual Eddy Current Inspection of Bores in Rotating Engine Hardware Using Systems Under Computer, Numeric, or Robotic Control,
TASK 70-32-12-250-005, Eddy Current Inspection of Bores in Inconel Rotating Engine Hardware,
TASK 70-32-14-250-006, Eddy Current Inspection of the CF6 Stage 3-9 High Pressure Compressor Rotor Spool (Module Level) with Automatic Scanning Fixture and Tool Kits GE-FQAP-357 and -354.

3. Reference Publications.

Subtask 70-30-00-200-012

A. CF6-6 Engine: Nondestructive Testing Manual, GEK 28468; GE Aviation Operations Center (AOC). (Refer to the List of Suppliers in Step 4 of 70-80-00.)
B. CF6-50 Engine: Nondestructive Testing Manual, GEK 9294; GE Aviation Operations Center (AOC). (Refer to the List of Suppliers in Step 4 of 70-80-00.)
C. CF6-80 Engine: Nondestructive Testing Manual, GEK 72502; GE Aviation Operations Center (AOC). (Refer to the List of Suppliers in Step 4 of 70-80-00.)

4. Marking of Parts.

Subtask 70-30-00-200-013

A. When it is necessary to mark an engine part, use only approved marking methods and materials. Refer to TASK 70-16-00-350-001, Marking Practices.

5. Inspection Terms.

Subtask 70-30-00-200-014

A. The terms are used to describe conditions in the table that follows.

Term	Definition	Associated Terms
Bi-monthly	Every two months/60 days	
Bi-weekly	Every two weeks/14 days	
Blister	A raised portion of a surface caused by separation of the outer layers of the parent material or of a coating applied to it.	Bubble Flaking Oxide formation Peeling Scale Slag inclusion (weld)
Bond	(1) The adhesion of one surface to another, with or without the use of an adhesive as a bonding agent. The sticking together of two or more surfaces with or without glue. See ASTM D 907. (2) To join together with an adhesive and/or by fusing the resins of impregnated materials.	Adhesion
Bonded Structure	The structure resulting when a combination of parts is assembled and intimately attached to each other by applying a structural adhesive to the faying surfaces, followed by the curing of the adhesives by pressure, heat, or both.	Bonded part
Bondline	The layer of adhesive that attaches two adherends. See ASTM D 907.	Glue line
Bondline Cracks	Cracking in the adhesive layer as a result of strain.	Delaminate
Bond Strength	The unit load applied in tension, compression, flexure, peel, impact, or sheer required to break an adhesively bonded assembly. The failure will occur either within the adhesive or at the adhesive-adherent interface.	Bond adhesion
Brinelling	Indentation of the surface by concentrated loads or impact.	Peening Hammering
Brittle	A change in the elasticity or resilience of the parent material, usually caused by aging, extreme cold, chemical action, or cold-working.	Cold worked hard such as Packing Pre-formed (O-Ring)

Buckle	A large-scale deformation of the original contour of a part, usually caused by pressure or impact from a foreign object, structural stresses, excessive localized heating, high-pressure differentials, or any combinations of these.	Ballooning Bend Bulge Crease Curl Dent (not to be confused with small-area defect in heavy material) Depression Distortion Elongation Fold Indentation Kink Protrusion (hollow) Rupture (result of excessive buckling) Uneven Warpage Wrinkle
Burn	A rapid, destructive, oxidizing action, usually caused by higher temperature than the parent material can withstand. Change in color appearance often indicates this condition.	Burn out (missing piece) Erosion Corrosion Guttered Heat-check Heat deterioration Hole (burn) Overheated Oxidation
Burnishing	Smoothing of a metal surface by mechanical action, but without a loss of material. Generally found on plain bearing surface. Surface discoloration is sometimes visible around the outer edges. Normal burnishing from operational service is not detrimental if the coverage approximates the carrying load and there is not evidence of burns.	Rub Wear
Burr	A rough edge or a sharp protrusion on the edge or surface of the parent material.	
Chafing	See "Gall" or "Scratch".	
Chatter marks	Waves or ripples on a machined surface, in the direction of the cut, caused by a loose or dull cutting tool, or a tool that is not rigidly supported.	
Chip	A breaking away of the edge of the parent material, usually caused by heavy impact from a foreign object.	Break Nick (similar to "Chip" but no parent material is removed). Notched spalling (usually a broken-away flat surface).
Cold shut	A casting defect resulting from metal flowing into an area from 2 directions, thereby forming a discontinuity at the meeting line.	Seam
Corrosion	A mass of small pits which cumulatively create a large, shallow cavity (usually rough in the surface of the parent material).	Pit
Crack	A parting, separation, or discontinuity in the parent material.	Break Cold shut (castings) Crater (castings) Fatigue damage Fissure
Crack (fabri-cations)	A parting of parent metal, or of the metal in a welded zone. Parent metal crack limits include all cracks in the parent metal beyond the heat-affected zone, as measured 1/8 inch from the weld fusion line. Weld cracks limits include all cracks in the heat-affected zone.	Fracture Indication Lap (forgings) Rupture Seam Separation Slit Tear
Crazing	A mesh of minute hairline cracks found in glazed or baked-on coated surfaces, generally caused by temperature change or by deformation of parent metal. Cracks do not penetrate into parent metal.	
Creep	Gradual continuous distortion or plastic flow	

	under constant stress.	
Deformation	Any alteration or change of shape, dimension, or configuration resulting from stress or damage.	Bend Creep Distortion
Delamination	Separation of the layers of material in a laminate, either locally or covering a wide area. Delamination can occur in the cure or in the subsequent life of the material. See ASTM D 907 and ISO 472.	Separation Split along Bondline Splintering
Deposits	A layer of sediment which can appear to change the contour of the object, but with no actual damage/deformation to the parent material.	Particle build up
Dent	A completely smooth surface depression caused by pressure or impact from a smooth, rounded foreign object. The parent material is displaced, but is not separated.	Peen
Deviation	Any condition that causes a part to differ from the manufacturer's blueprint.	Damage Defect Flaw Imperfection Irregularity
Disbond	An area within a bonded interface between two adherents in which an adhesion failure or separation has occurred. Disbonds may occur at any time during the life of the structure and may arise from a wide variety of causes.	Debond Area of separation between two laminae Nonadhered region
Discontinuity	An interruption in the normal physical structure or configuration of a part.	Crack Seam Cold shut Lap
Distortion	Any twisting, bending or permanent strain that results in misalignment or change of shape.	Bend Deformation
Erosion	Gradual wearing away of a surface caused by a fluid (gas or liquid) flowing over the surface. Wear is generally caused by fine particles of foreign material entrained in hot engine gases flowing at a high velocity.	
Fatigue	The progressive fracture of a material under cyclic stress loading.	Crystallization Fretting Flaking
Flaking	See "Spalling".	
Fray	To separate the threads at the end of a piece of composite fabric or cloth.	Unraveled Wear Threadbare Tattered Ragged
Fretting	Wearing away by low-amplitude rubbing against another metal (generally associated with press fit or close fitting parts).	Wear Footprints Galling
Galling	A defect caused by the movement of 2 surfaces in contact with each other. In most cases, an accumu-lation of foreign material is deposited on the parent material.	Pickup
Gouge	A wide, rough scratch or group of scratches, usually with one or more sharply incised corners, and frequently accompanied by deformation or removal of parent material.	
Groove	A long, narrow, continuous depression caused by pressure of a moving surface in contact with the parent material.	If depression is shallow and smooth, see "Wear"; if depression is sharp, see "Scratch".
High spots	Local distortions.	Blister Buckle Bubble Out-of-round
High metal	Displaced metal adjacent to a defect such as a scratch, nick or gouge, which is raised above the surrounding surface.	Burr
Hot Gas Corrosion (Sulfida-tion)	The corrosion of unprotected metal (with no coating) that has been exposed to hot gases.	This kind of corrosion differs from that normally found on

	When first exposed, the surface becomes rough and appears to be pitted and pock-marked. Also, there is a noticeable difference in the colors of the exposed and unexposed surfaces. Further exposure of surface to hot gases causes it to blister and, in time, flake off in layers.	surfaces attacked only by salt in the atmosphere. In hot gas corrosion, the hot gases convert sulphur to sulfide in the presence of salt. The metal is attacked by the resulting deposits.
Imbalance	The state of being out-of balance. Unequal distribution of weight about the axis of rotation, which usually results in vibration.	
Inclusion	Foreign material embedded in metal during solidification, or formed by subsequent reaction of the solid metal.	
Indication	The visible evidence that a material defect exists, even though the defect itself may not be visible to the naked eye.	
Looseness	Abnormal movement of a part, or insufficient securing of a part.	Backed out Excessive play Excessive back-lash Insufficient torque Shaky Sloppy Unbottomed Unpinned Unwired
Metal Splatter	The accidental splash of molten material that adheres to a surface when cooled.	Weld splatter Braze splatter
Misalignment	A mismatching or malformation of any part which either prevents perfect assembly or results in faulty operation and/or ultimate failure.	Eccentric Out-of-round Out-of-square Mismatched Unmatched
Nick	A surface impression with sharp corners or bottom, usually caused by pressure or impact from a sharp-edged object. The parent material is displaced, but usually none is separated.	Chip Dent Notch
No apparent depth	Term used to describe surface defects that can be seen but not felt with fingernail or scriberpoint.	
Noise	An abnormal sound involving moving parts, usually an increase in volume or a change of pitch.	Bumps (sound) Chatters Clicks Grates (usually gears) Grinds Hums Rattles Rubs Scrapes (sound) Screeches Thumps Whistles
Obstruction	Prevention of free flow of fluid (air, oil, fuel, water) because of foreign material in the flow-path or malformation of the part.	Clogged Contaminated Plugged Restricted
Oil-canning (snapping action)	Snapping or popping displacement of sheet metal when restrained at its edges like a diaphragm, wall, or bottom of an oil can.	Buckling
Parent metal	All material in a single part except the weld, braze filler, or heat-affected zone (within 1/8 inch [3.2 mm] of the fusion line).	
Pickup	Transfer of one material into or onto the surface of another in contact with it, usually as a result of friction-heating.	Burr Gall Embedment Inclusion Pile-up Protrusion Metallization
Pinched	Distortion of one or more surfaces of the parent material, caused by pressure.	Bound Compressed Flattened

		Seized Smashed (without separation into pieces) Squashed Squeezed
Pinholes	Very small pits or holes caused by the evolution of gas from a metal during solidification or after chemical treatment.	Porosity Pits
Pit	A minute depression or cavity having no sharp, high-stress corners in the surface of the material. Pits are usually caused by chemical reaction (rusting, chemical corrosion).	Corrosion Crater Electrolytic Cavity Inclusion Perforation Pinholes Pock-marked
Porosity	Areas containing numerous pits or pinholes	Pit Pinholes
Rub	A surface depression or displacement caused by 2 surfaces moving while in contact with each other.	If impression is shallow and smooth, see "Wear". If impression is sharp, see "Scratch".
Scale	A layer of metallic oxides formed by chemical action of oxygen on the exposed surface of the metal, usually while hot.	Burn
Scoring	See "Scratch".	
Scratch	A long, narrow, sharp-cornered impression caused by the movement of a sharp object across the surface of the parent material.	Abrasion Chafe Furrow Groove Score
Seizure	A welding or binding of faces which prevent further movement.	Bound up Frozen Tight Wedged Welded (without external heating)
Semi-monthly	Twice a month at equally spaced intervals	
Semi-weekly	Twice a week at equally spaced intervals	
Sheet-metal dent	A smooth, large-area depression in the parent material.	Buckle
Spalling	Cracking off or flaking off of small particles of metal from the surface, usually in thin layers or localized spots.	Flaking Fretting Galling
Tear	A crack-like separation caused by too much tensile shear force, usually the result of abusive machining or metal-removal.	
Unbalance	The act of putting a balanced component out-of-balance. Usually "Imbalance" is meant.	
Varnish film	A hard surface-film of partially carbonized hydro-carbon, such as oil, which is built up when the part is heated to or above the breakdown point of the fluid.	Banded Discolored Oxidized Stained
Wear	Relatively slow removal of parent material in the process of operation (not always visible to the naked eye).	Abrasion Attrition Brinnelled Chafed Chattering Erosion Fraying Fretting Friction Galling Glazing Groove Interference Oxidation Roughness Rubbed Scarfed Scuffed Uneven Weak
Watermarks	A faint residue on a surface which does not	

effect form or function of a component.