

FUNDAMENTAL MANUFACTURING PROCESSES

Threading

SCENE 1.

TH90A, CGS: Thread Quality & Verification
white text, centered on background
FMP BKG, motion background

SCENE 2.

TH91A, **SME4141**, **12:41:02:00-12:41:18:00**
zoom in, threading operation
TH91B, **SME3330**, **08:06:50:00-08:07:15:00**
zoom out, cone-point screws being used in
assembly operation
TH91C, **SME4390**, **23:00:36:00-23:00:44:00**
zoom out, auto seat belt bolt
TH91D, **SME4016**, **00:50:38:00-00:50:55:00**
space shuttle taking off
TH91E, still, medical screws
TH91F, **SME3936**, **01:03:56:00-01:04:10:00**
spaceship one landing

NARRATION (VO) :

THE CONTROL AND QUALITY OF THREADING
OPERATIONS CAN BE PARTICULARLY
IMPORTANT, COMPARED WITH OTHER METAL-
WORKING OPERATIONS. THREADED PARTS HAVE
COMMONLY BEEN USED FOR CRITICAL SAFETY-
RELATED PURPOSES, SUCH AS BOLTS FOR
SECURING AUTOMOTIVE SEATBELTS, OR FOR
FASTENERS USED IN AEROSPACE,
AND MEDICAL APPLICATIONS.

SCENE 3.

TH92A, **SME4384**, **15:37:52:00-15:38:22:00**
production of large bolt
TH92B, **SME4384**, **15:08:52:00-15:09:10:00**
go-no-go gages used on large bolt

NARRATION (VO) :

BECAUSE THREADED PARTS ARE EXPECTED TO
CARRY HIGH LOADS AND FASTEN ASSEMBLIES
TOGETHER SECURELY AND RELIABLY, THEY
MUST NOT BE WEAKENED BY VARIATIONS IN
THE THREADMAKING PROCESS. CRITICAL
THREAD DIMENSIONS MUST ALSO MEET
SPECIFIC TOLERANCES.

SCENE 4.

continue previous shot
TH93A, **SME4253**, **10:18:38:00-10:18:53:00**
zoom out, go/no-go gages used on fastener
TH93B, **SME4141**, **12:41:55:00-12:42:20:00**
zoom out, go/no-go gage used on tiny
fastener
TH93C, **SME4141**, **12:49:02:00-12:49:39:00**

NARRATION (VO) :

THE DIMENSIONS OF THREADS CAN BE
INSPECTED WITH DIFFERENT LEVELS OF
VERIFICATION. IF A THREADED FASTENER IS

zoom out, go/no-go gage being used

ONLY REQUIRED TO ASSEMBLE OTHER PARTS TOGETHER WITHOUT SPECIFIC LOAD-CARRYING REQUIREMENTS, A BASIC "GO/NO-GO" GAGE MAY BE ADEQUATE FOR CHECKING ITS THREADS. HOWEVER, THESE GAGES ONLY CHECK WHETHER THE THREADS EXCEED THEIR MAXIMUM ALLOWABLE DIMENSIONS; THEY CANNOT CLEARLY VERIFY WHETHER THREAD DIMENSIONS MEET THEIR MINIMUM SIZE TOLERANCE, OR WHETHER THE THREAD PITCH DIAMETER AND THREAD SHAPE ARE CORRECT.

SCENE 5.

TH94A, SME4262, 19:05:18:00-19:05:30:00

zoom out, screw-pitch gage being used

TH94B, SME4253, 10:10:52:00-10:11:08:00

critical thread dimensions checked

TH94C, SME4262, 19:07:06:00-19:07:25:00

zoom out, threaded fastener checked for roundness

NARRATION (VO) :

FOR THREADED PARTS HAVING SPECIFIC STRENGTH REQUIREMENTS IN SERVICE, A MORE COMPLETE INSPECTION OF CRITICAL THREAD DIMENSIONS IS REQUIRED. ALL MAXIMUM AND MINIMUM DIAMETERS AND THREAD ANGLES ARE CHECKED AND CHARTED. THIS MAKES PROCESS VARIATIONS DUE TO TOOL WEAR VISIBLE OVER TIME. AT THE HIGHEST LEVEL OF INSPECTION, CHARACTERISTICS SUCH AS ROUNDNESS AND TAPER ARE MONITORED, REQUIRING EVEN MORE SOPHISTICATED THREAD INSPECTION GAGES.

SCENE 6.

TH95A, SME4079, 15:34:00:00-15:34:30:00

zoom out, fatigue testing of thread

NARRATION (VO) :

MECHANICAL TESTING, WHICH IS ALSO KNOWN AS DESTRUCTIVE TESTING, IS USED TO

GATHER SPECIFIC PERFORMANCE OR PROPERTY VALUES OF MATERIALS FOR DESIGN PURPOSES AND QUALITY CONTROL. THIS IS DONE BY FORCING MATERIALS TO FAIL USING VARIOUS TESTING LOAD APPLICATIONS.

SCENE 7.

TH96A, SME4384, 15:07:46:00-15:08:19:00

ultrasonic testing of bolt, edit at multiple points

**TH96B, CGS: Magnetic Particle Inspection
Ultrasonic Testing**

NARRATION (VO) :

NON-DESTRUCTIVE TESTING IS OFTEN UTILIZED TO LOCATE FLAWS IN THREADED PARTS. TWO COMMONLY USED NON-DESTRUCTIVE TESTS ARE:

MAGNETIC PARTICLE INSPECTION...,

AND ULTRASONIC TESTING.

SCENE 8.

TH97A, CGS: Magnetic Particle Inspection

TH97B, SME4384, 15:03:23:00-15:04:17:00

multiple bolts inspected under black light

NARRATION (VO) :

MAGNETIC PARTICLE INSPECTION IS USED TO LOCATE SURFACE AND NEAR-SURFACE FLAWS IN PARTS PRODUCED FROM FERROMAGNETIC MATERIALS SUCH AS IRON, STEEL AND NICKEL AND COBALT ALLOYS.

SCENE 9.

TH98A, SME4384, 15:01:06:00-15:01:28:00

zoom in, magnetic particle inspection

TH98B, SME4384, 15:01:33:00-15:02:18:00

zoom out, magnetic particle inspection, alternate shot

TH98C, SME4384, 15:03:02:00-15:03:18:00

zoom out, bolt inspected under black light

NARRATION (VO) :

THE PARTS BEING INSPECTED ARE MAGNETIZED AND FINE MAGNETIC PARTICLES ARE APPLIED TO THE SURFACE, TYPICALLY WHILE SUSPENDED IN A LIQUID MEDIUM. THESE PARTICLES ARE OFTEN COATED WITH A FLUORESCENT MATERIAL FOR INSPECTION USING AN ULTRAVIOLET OR BLACK LIGHT. DISCONTINUITIES PERPENDICULAR TO THE

MAGNETIC FIELD CAUSE A LEAKAGE FIELD TO FORM AT AND ABOVE THE SURFACE OF THE PART AND HOLD THE PARTICLES THERE SO THAT THE DISCONTINUITY CAN BE VISUALLY EXAMINED.

SCENE 10.

TH99A, CGS: Ultrasonic Testing

TH99B, SME4384, 15:08:24:00-15:08:43:00

zoom in, ultrasonic testing of bolt

TH99C, SME4384, 15:07:08:00-15:07:28:00

zoom in, ultrasonic testing of bolt

NARRATION (VO) :

ULTRASONIC TESTING INVOLVES THE USE OF HIGH-FREQUENCY SOUND-WAVES, INTRODUCED BY A TRANSDUCER INTO THE PART BEING INSPECTED TO DETECT FLAWS, MEASURE THICKNESS, OR EVALUATE PROPERTIES. THE ENERGY OF THE ULTRASONIC WAVES IS REFLECTED BACK TO THE TRANSDUCER BY ANY DISCONTINUITIES, INDICATING THEIR PRESENCE AND LOCATION.

--- FADE TO BLACK ---