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FUNDAMENTAL MANUFACTURING PROCESSES

Threading

SCENE 1.
TH07A, SME2578, 03:12:27:00-03:12:37:00
screw thread
TH07B, SME4389, 21:05:04:00-21:05:16:00
zoom out, lead screw turning
TH07C, SME3330, 08:04:48:00-08:05:58:00
screws used in assembly operation
TH07D, SME3928, 23:04:09:00-23:04:27:00
mechanical fasteners tightening composite assembly together, alternate shot

NARRATION (VO):

THE HELICAL THREAD OR SCREW FORM, AS USED IN MANUFACTURING, HAS TWO PRIMARY FUNCTIONS:

TO TRANSMIT POWER AND MOTION, AS WITH A LEAD SCREW THAT MOVES A MACHINE TABLE.

AND TO ATTACH AND SECURE PARTS TOGETHER, AS IN THREADED FASTENERS SUCH AS NUTS, SCREWS, AND BOLTS.

SCENE 2.
TH08A, SME2575, 01:15:22:00-01:15:30:00
pile of fasteners
TH08B, SME2520, 04:01:28:00-04:01:44:00
zoom out, watch works
TH08C, SME4385, 16:24:20:00-16:24:35:00
zoom out, mackinac bridge
TH08D, SME4385, 16:14:22:00-16:14:36:00
zoom out, mackinac bridge, alternate shot

NARRATION (VO):

MOST THREAD-MAKING IS PERFORMED BY FASTENER MANUFACTURERS. THESE FASTENERS CAN RANGE IN SIZE FROM TINY WRISTWATCH SCREWS, TO IMMENSE NUTS AND BOLTS THAT SUPPORT BRIDGES.

SCENE 3.
TH09A, zoom in, still of external threads
TH09B, zoom out, still of internal threads
TH09C, ANI: bolt edge
TH09D, ANI: bolt edge, crest lines
TH09E, ANI: bolt edge, groove lines too
TH09F, CGS: Outer Crest
TH09G, CGS: Inner Groove
TH09H, ANI: nut edge
TH09I, ANI: nut edge, crest lines
TH09J, ANI: nut edge, groove lines too
TH09K, CGS: Inner Crest
TH09L, CGS: Outer Groove
TH09M, alternate, still, external threads

NARRATION (VO):

THE TWO FUNDAMENTAL TYPES OF THREADS ARE

THE EXTERNAL THREAD...,

AND THE INTERNAL THREAD.

THE EXTERNAL THREAD FORM HAS OUTER CRESTS AND INNER GROOVES TO MATCH AN INTERNAL THREAD'S INNER CREST AND OUTER GROOVES.

SCENE 4.
TH10A, SME3331, 12:20:40:00-12:20:55:00
tightening threaded fasteners manually and

NARRATION (VO):

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with wrench
TH10B, SME3423, 17:15:40:00-17:15:52:00
bolts being tightened, alternate shot
TH10C, SME3423, 17:14:03:00-17:14:11:00
c.u. bolt being tightened, alternate shot
TH10D, SME4390, 23:04:27:00-23:04:39:00
zoom out, gas line hookup
TH10E, SME4413, 07:01:18:00-07:01:30:00
zoom out, gas line hookup

MOST THREADS ARE RIGHT-HANDED, AND ADVANCE WHEN ROTATED CLOCKWISE. LEFT-HANDED THREADS ARE ALSO MANUFACTURED FOR SPECIFIC APPLICATIONS, SUCH AS GAS-LINE CONNECTIONS.

SCENE 5.
TH11A, SME2575, 01:02:15:00-01:02:41:00
zoom out, threaded fastener production
TH11B, CGS: Major Diameter
Minimum Diameter
Thread Pitch
Thread Pitch Diameter

NARRATION (VO):

BOTH STANDARD AND METRIC THREADS ARE DEFINED BY SEVERAL DIMENSIONS. THOSE DIMENSIONS INCLUDE:

THE THREAD'S MAJOR DIAMETER...,

THE THREAD'S MINIMUM DIAMETER...,

THE THREAD PITCH...,

AND THE THREAD PITCH DIAMETER.

SCENE 6.
TH12A, CGS: Major Diameter
TH12B, ANI: bolt
TH12C, ANI: bolt, major diameter lines
TH12D, ANI: bolt, arrow and lines
TH12E, ANI: nut
TH12F, ANI: nut, major diameter lines
TH12G, ANI: nut, arrow and lines

NARRATION (VO):

THE THREAD'S MAJOR DIAMETER IS THE OUTSIDE CREST DIAMETER ON AN EXTERNAL THREAD...,

OR THE BASE OR ROOT DIAMETER ON AN INTERNAL THREAD.

SCENE 7.
TH13A, CGS: Minimum/Minor Diameter
TH13B, ANI: bolt
TH13C, ANI: bolt, minor diameter lines
TH13D, ANI: bolt, arrow and lines
TH13E, ANI: nut
TH13F, ANI: nut, minor diameter lines
TH13G, ANI: nut, arrow and lines

NARRATION (VO):

THE THREAD'S MINIMUM OR MINOR DIAMETER, IS THE SCREW DIAMETER AT THE BASE OF THE THREAD FOR AN EXTERNAL THREAD...,

AND THE THREAD CREST DIAMETER ON AN INTERNAL THREAD.

SCENE 8.
TH14A, CGS: Thread Pitch
TH14B, ANI: bolt edge

NARRATION (VO):

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TH14C, ANI: bolt edge, thread pitch lines
TH14D, ANI: bolt edge, arrow and lines
TH14E, ANI: bolt
TH14F, ANI: bolt, thread pitch lines
TH14G, ANI: bolt, arrow and lines
TH14H, ANI: bolt, arrow, lines, text

THE THREAD'S PITCH IS THE DISTANCE BETWEEN TWO ADJACENT THREAD CRESTS. THREADS PER INCH IS THE NUMBER OF ADJACENT THREAD CRESTS IN ONE INCH.

SCENE 9.
TH15A, CGS: Thread Pitch Diameter
TH15B, ANI: nut edge
TH15C, ANI: nut edge with pitch diameter
TH15D, ANI: bolt/nut
TH15E, ANI: bolt/nut with pitch diameter

NARRATION (VO):

THE THREAD PITCH DIAMETER IS AN IMAGINARY DIAMETER THROUGH THE THREADS WHERE THE WIDTH OF THE GROOVE AND THREAD ARE EQUAL. BECAUSE IT IS THE DIMENSION FROM WHICH ALL OTHER THREAD MEASUREMENTS ARE MADE, THE THREAD PITCH DIAMETER IS THE MOST IMPORTANT DIMENSION ON A SCREW THREAD.

SCENE 10.
TH16A, CGS: Percent of Thread
TH16B, ANI: 70% & 100% screw threads
TH16C, ANI: c.u. 100% thread
TH16D, ANI: c.u. 70% thread

NARRATION (VO):

ANOTHER THREAD FEATURE IS THE PERCENT OF THREAD, OR THE ACTUAL MINIMUM DIAMETER OF THE THREAD. FOR EXAMPLE, A THREAD CUT TO FULL DEPTH IS A 100% THREAD. MOST THREADS ARE CUT TO LESS THAN 100% TO RETAIN STRENGTH, AVOID CRACKING, AND SIMPLIFY THE CUTTING OPERATION.

SCENE 11.
TH17A, ANI: bolt edge
TH17B, ANI: bolt edge, thread angle
TH17C, ANI: bolt edge, thread angle/arrow
TH17D, ANI: thread angle/arrow/60° text
TH17E, SME4389, 21:02:19:00-21:02:29:00 lead screw moving table
TH17F, SME4389, 21:01:48:00-21:02:01:00 zoom out leadscrew, square configuration

NARRATION (VO):

THE MOST WIDELY USED FASTENER THREAD ANGLE IS 60 DEGREES. BUT THERE ARE MANY THREAD CONFIGURATIONS TO FILL VARIOUS DESIGN NEEDS. ONE EXAMPLE WOULD BE THREADS USED FOR POWER TRANSMISSION.

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THESE THREADS ARE CLOSER TO A SQUARE CONFIGURATION, ALLOWING THE THREAD TO TRANSMIT GREATER THRUST.

SCENE 12.
TH18A, CGS: Screw Lead
TH18B, SME2633, 01:09:09:00-01:09:25:00
c.u. fastener being driven

NARRATION (VO):

THE SCREW LEAD IS THE DISTANCE A FASTENER TRAVELS IN ONE REVOLUTION AND VARIES WITH THE FASTENER'S USE. MOST FASTENERS ARE SINGLE-LEAD, MEANING ONE FASTENER REVOLUTION ADVANCES THE FASTENER ONE THREAD PITCH.

SCENE 13.
SCENE DELETED

SCENE 14.
TH20A, SME2575, 01:18:23:00-01:18:42:00
tilt, fasteners piling up in bins
TH20B, ANI: split screen, coarse & fine thread shape
TH20C, CGS: Coarse
TH20D, CGS: Fine

NARRATION (VO):

THE SHAPE OF A THREAD IS DEFINED BY TYPE AND END USE. THE TWO BROADEST THREAD SHAPE DESIGNATIONS ARE COARSE AND FINE.

SCENE 15.
TH21A, SME2633, 02:05:35:00-02:05:54:00
pan, fine thread shape
TH21B, SME3928, 23:19:37:00-23:20:04:00
assemble using fine threaded bolts
TH21C, SME3331, 12:06:19:00-12:06:29:00
assemble using fine threaded bolts

NARRATION (VO):

FINE-THREAD FASTENERS HAVE MORE THREADS PER UNIT LENGTH THAN COARSE THREADS, AND GENERALLY HAVE MORE HOLDING POWER. FINE-THREAD FASTENERS ARE ALSO MORE RESISTANT TO VIBRATION.

SCENE 16.
TH22A, SME2633, 02:06:08:00-02:06:19:00
pan, coarse thread shape
TH22B, SME3330, 08:06:50:00-08:07:15:00
cone-point screws being used in assembly operation

NARRATION (VO):

COARSE-THREAD FASTENERS RESIST THREAD STRIPPING, AND CAN BE MADE FASTER AND CHEAPER. MOST AUTOMATIC ASSEMBLY USES

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SCENE 17.
TH23A, SME4390, 22:28:12:00-22:28:49:00
various gaging of threaded fastener
TH23B, CGS: Thread Tolerance
The Amount a Thread Dimension is Allowed to Vary
TH23C, CGS: Thread Allowance
The Amount of Play Allowed Between External & Internal Threads
TH23D, SME2575, 01:12:23:00-01:12:49:00
tilt, fasteners piling up in bins, alternate shot

COARSE FASTENERS.

NARRATION (VO):

THREADED FASTENERS ALSO HAVE SPECIFICATIONS FOR TOLERANCES, WHICH INDICATE THE AMOUNT A THREAD DIMENSION IS ALLOWED TO VARY..., AND ALLOWANCES, WHICH IS THE AMOUNT OF SPACE OR PLAY ALLOWED BETWEEN THE EXTERNAL AND INTERNAL THREADS.

--- FADE TO BLACK ---