

FITTING.

T-FITTING

The process of profile matching two or more machined components which can be further bonded permanently or left unbonded in the close vicinity of each other.

: T fitting is done in the following stages

Filing:- The process of removing material from the surface of a job usually to roughen the edges or spec polish job upto specifications.

Drilling:- Holes are drilled near along the line that should be cut. for faster machining.

hack sawing :- The metal is cut using a hack saw which is a hand held multipoint cutting tool.

Filing :- The job is filed upto the specifications without any projecting residue metal.

Profile matching :- The two parts are matched.

GRINDING

Grinding is a metal removing operation by a multi point cutting tool. It is used primarily to achieve finishing of the job. The grinding wheel consists of abrasive material like Al_2O_3 .

Surface grinding:-

Surface grinding is a process where the surface a job is grinded. The surface consists of a flat bed which is used to hold the job by magnets. The grinding wheel moves to & fro

3) Cylindrical grinding:-

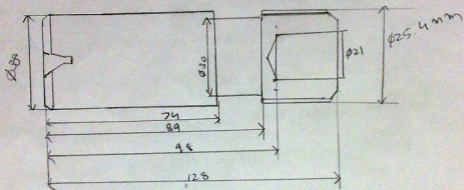
It is used to for surfacing the cylindrical surfaces. The job is mount to a rotating axis and the grinding wheel is brought to contact with it

4) Tool and Cutter Grinding machine.

It is used for the sharpening the tools which are used in machining process.

LATHE

Lathe machine is a single point cutting machine used for machining cylindrical jobs - It consists of a stationary tool fed to a rotating job. It can be used for performing various operations like turning, facing, grooving, knurling etc



Procedure:- Firstly the job is turned to a cylinder then the front part is turned to 25.4 mm diameter, then it is grooved according to the specification. The holes are drilled on both sides and one side is Bored to an inner diameter of 21 mm. Then the ends are Chamfered.

Threading: The threading pre-done, is a double start.

Thread with a pitch of 2mm and lead of 4mm.

Threading can be done by offsetting the tool using compound slide or offsetting the job.

When the half nut lever is engaged. The gear which give an 180° net rotation that is whose half the no. of teeth is an odd no is selected and the chuck is rotated so that the

position 3 from 1. Thus offsetting the job by 180° . Then threading is done again and it falls in the middle of the existing threads.

MILLING

Milling is a machining operation of metal removal by a multipoint cutting tool. In milling the tool is held stationary and rotated and the job is fed to the tool.

Face milling :- Milling in which the surface of the job is ~~parallel~~ ^{perpendicular} to the axis of the mill is called face milling.

Peripheral milling :- Milling in which the surface of the job is parallel to the axis of the mill is called peripheral milling.

End milling :- It is a combination of face milling and peripheral milling.

Procedure for machining of a gear.

A gear is a device used for transmission of power and vary the torque output from a source.

In milling a gear is machined using a module cutter. The module cutter is connected to a ~~telescope~~ telescopic holder. The cylindrical ~~job~~ job is held by a mandrel.

The depth of cut is $(2.25 \times M)$ when M is the module. The angle between each tooth is $360/Z$ (Z is no of teeth)

CNC MILLING / TURNING

G-Codes

- G00 Positioning
- G01 Linear Interpolation
- G02 Circular interpolation CW
- G03 Circular interpolation CCW
- G04 Dwell
- G10 Offset Value Setting
- G20 INCH mode
- G21 Metric mode
- G22 Stored Stroke check ON
- G23 Stored Stroke check OFF
- G25 SPINDLE SPEED DETECT OFF
- G26 SPINDLE SPEED DETECT ON
- G27 REFERENCE POINT RETURN CHECK
- G28 REFERENCE POINT RETURN
- G30 2nd (3,4) reference points
- G31 SKIP CUTTER
- G33 Threaded cutter
- G34 Variable lead thread cutting
- G36 AUTO TOOL OFFSET X AXIS
- G37 AUTO TOOL OFFSET Z AXIS
- G40 TOOL NOSE RADIUS COMPENSATION CANCEL
- G41 TOOL NOSE RADIUS COMPENSATION LEFT SIDE
- G42 TOOL NOSE RADIUS COMPENSATION RIGHT SIDE
- G65 MACRO CALL
- G68 DOUBLE TORRETT MIRROR ON
- G69 DOUBLE TORRETT MIRROR OFF
- G70 FINISHING CYCLE
- G71 ROUGH CUTTING (TURNING)
- G72 ROUGH CUTTING (FACING)
- G73 ROUGH CUTTING (PROFILE)
- G74 GROOVING (FACING)
- G75 GROOVING (TURNING)
- G76 Thread CUTTING CYCLE (MULTI)
- G77 TURNING CYCLE
- G78 THREAD CUTTING CYCLE
- G79 FACING CYCLE
- G80 DRILL CYCLE CANCEL
- G83 FACE DRILL CYCLE
- G90 ABSOLUTE
- G91 INCREMENTAL
- G92 CO-ORDINATE SYSTEM SETTING
- G93 MAXIMUM SPINDLE SPEED SETTING
- G94 PER MINUTE FEED
- G95 PER REVOLUTION FEED
- G96 CONSTANT SURFACE SPEED
- G97 REVOLUTION PER MINUTE
- G98 INITIAL LEVEL
- G99 REFERENCE POINT LEVEL

M-CODES

- M00 PROGRAM STOP
- M01 OPTION STOP
- M02 END OF PROGRAM
- M03 SPINDLE ROTATION CW
- M04 SPINDLE ROTATION CCW
- M05 SPINDLE STOP
- M07 COOLANT ON
- M09 COOLANT OFF
- M10 CHUCK DECLAMP
- M11 CHUCK CLAMP
- M16 CHUCK ID SELECTION
- M18 CHUCK OD SELECTION
- M19 SPINDLE ORIENTATION
- M20 SPINDLE ORIENTATION CANCEL
- M30 END OF MAIN PROGRAM
- M32 TAIL STOCK QUILL FORWARD
- M33 TAIL STOCK QUILL RETRACT
- M34 PARTS CATCHER FORWARD
- M35 PARTS CATCHER RETRACT
- M41 SPINDLE GEAR LOW
- M42 SPINDLE GEAR HIGH
- M46 AUTO DOOR OPEN
- M47 - AUTO DOOR CLOSE
- M50 SPINDLE LOCK
- M51 SPINDLE UNLOCK.
- M78 STEADY REST OPEN
- M79 STEADY REST HOLD
- M82 TAIL STOCK BODY FORWARD / ~~CLAMP~~
- M83 TAIL STOCK BODY RETRACT / CLAMP
- M84 TOUCH PROBE ARM FORWARD
- M85 TOUCH PROBE ARM RETRACT
- M98 SUB PROGRAM CALL
- M99 SUB PROGRAM END

CNC MILLING

Computer Numerical controlled MILLING is an automated machine which usually uses FANUC controlled

M05; → SPINDLE STOP
M09; → COOLANT OFF
G28; → reference point return.

Program

O1234; -

G28 G91 Z0; homing;

G00 G40 G54 G80 G90 X-10 Y0;

M03 S450; - spindle revolution

G00 Z5; → safety height

M07 → location

#501 = 0.2 → first depth.

N012 = #501 550; -plung feed

#501 = #501 + 0.2;

G00 G40 X⁶⁰ Y0;

G01 X60 Y10;

G01 X0 Y10;

G01 X0 Y20;

G01 X60 Y20;

G01 X60 Y30;

G01 X0 Y30;

G01 X0 Y40;

G01 X60 Y40;

G01 X60 Y50;

G01 X0 Y50;

G01 X60 Y60;

G01 X60 Y60