A110
Sinumerik Operate

Setup Milling

Module Description:

In this module a simple milling machine with the axes X1, Y1 and Z1, the rotary axes A1, C1 and the main spindle SP1 is to be setup for milling. The individual commissioning steps are to be checked from time to time to show the result of the parameterization.
The preparation of the tool list, the cycle selections, the block search and various basic settings are also part of the training scope. There will be a detailed description of the selections to be made for JOG-TSM.

Module Objective:

By means of this module you will learn and get to know the meaning of the Machine and Setting data to be used as well as the various means available in order to configure the machine to suit the particular requirements.
The functions will be parameterized in several blocks and subsequently tested to check correct working.

Content:

Sinumerik

- Menu and Technology settings
- Manufacturer Cycles
- Setup for Milling
- Cycle settings
- Tool List Setup
- Basic Settings
- JOG-TSM
- Block Search
- Simulation

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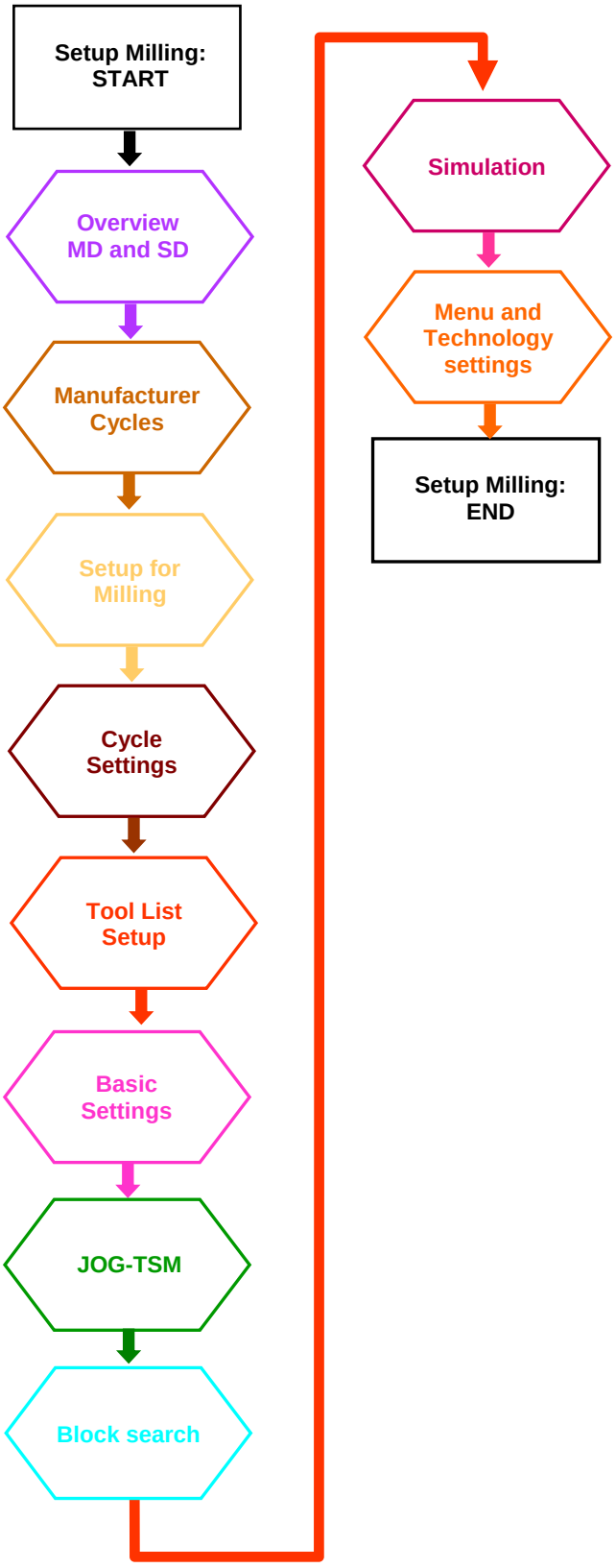

Setup Milling: START
Overview MD and SD
Manufacturer Cycles
Setup for Milling
Cycle Settings
Tool List Setup
Basic Settings
JOG-TSM
Block search
Simulation
Menu and Technology settings
Setup Milling: END

Notes

Overview Machine data and setting data

Basic settings Machine data/setting data

MD	Identifier	Default	Settings Milling	Description
10260	$MN_CONVERT_SCALING_SYSTEM	0	1	Enable basic system conversion
10602	$MN_FRAME_GEOAX_CHANGE_MODE	0	1	Frames when changing geometry axes
10714	$MN_M_NO_FCT_EOP	-1	32	M function for spindle active after reset
10715	$MN_M_NO_FCT_CYCLE[0]	-1	6	M function to be replaced by a subroutine
10716	$MN_M_NO_FCT_CYCLE_NAME[0]	" "	L6	Subroutine name for M function replacement
10722	$MN_AXCHANGE_MASK	0H	4H	Bit 2 = 1: Parameters for axis replacement behavior
11410	$MN_SUPPRESS_ALARM_MASK	108000H	108003H	Bit 0: 15110: REORG not possible Bit 1: 10763 The path component of the block in the contour plane is zero Bit 15: 5000 Communication order cannot be executed Bit 20: 2900 Reboot is delayed
11450	$MN_SEARCH_RUN_MODE	0H	7H	Bit 0 = 1: Machining is stopped with the loading of the last action block after search run Bit 1 = 1: Automatic ASUP start after output of the action blocks Bit 2 = 1: The output of the auxiliary functions in the action blocks is suppressed
17530	$MN_TOOL_DATA_CHANGE_COUNTER	1FH	1FH	Mark tool data change for HMI
18080	$MN_MM_TOOL_MANAGEMENT_MASK	0H	BH	Bit 0 = 1: Memory for TM-specific data is provided Bit 1 = 1: Memory for monitoring data (WZMO) is provided Bit 3 = 1: Memory to consider adjacent location is provided
19320	$ON_TECHNO_FUNCTION_MASK	0H	Bit 4 = 1	Bit 4 = 1: Tool management with magazine data enabled
20110	$MC_RESET_MODE_MASK	1H	4041H	Bit 0 = 1: G codes acc. to $MC_GCODE_RESET_VALUE Bit 6 = 1: Current setting for active tool length offset is retained after reset/end-of-part-program Bit 14= 1: The current setting of the basic frame is retained
20128	$MC_COLLECT_TOOL_CHANGE	1	0	No tool change commands after search run
20130	$MC_CUTTING_EDGE_RESET_VALUE	0	1	Tool and cutting edge remain activated
20150	$MC_G_CODE_RESET_VALUE	[15] = 1 [21] = 1 [41] = 1 [51] = 1 [52] = 1	[15] = 3 [21] = 2 [41] = 1 [51] = 1 [52] = 1	Group 16: Feedrate override 3 = CFIN Group 22: Tool offset type 2 = CUT2DF Group 42 Toolholder 1 = TCOABS (for swivel) Group 52: Frame rotation in relation to workpiece 1 = PAROTOF (2 = PAROT, for swivel) Group 53: Frame rotation in relation to tool 1 = TOROTOF (for swivel)
20152	$MC_G_CODE_RESET_MODE	[5] = 0 [7] = 0 [12] = 0 [21] = 0	[5] = 1 [7] = 1 [12] = 0 [21] = 0	Group 6: Plane selection remains active after Reset Group 8: Zero point offset remains active after Reset Group 13: Work piece dimensioning inch/metric default after reset Group 22: Tool correction type default after reset
20202	$MC_WAB_MAXNUM_DUMMY_BLOCKS	5	10	maximum number of blocks w/o traversing movement with SAR
20240	$MC_CUTCOM_MAXNUM_CHECK_BLOCKS	4	4	Blocks for look-ahead contour calculation with TRC
20250	$MC_CUTCOM_MAXNUM_DUMMY_BLOCKS	3	5	maximum number of blocks without traversing motion in TRC

Notes

Basic settings Machine data/setting data

MD	Identifier	Default	Settings Milling	Description
20310	$MC_TOOL_MANAGEMENT_MASK	0H	80400BH	Bit 0 = 1: Tool management active Bit 1 = 1: Tool monitoring function active Bit 3 = 1: Consider adjacent location active Bit 14 = 1: automatic tool change during RESET and Start Bit 23 = 1: On offset selection no synchronization with HL
20320	$MC_TOOL_TIME_MONITOR_MASK	0H	1H	Bit 0 = 1: Time monitoring for tool in tool holder 1
20734	$MC_EXTERN_FUNCTION_MASK	0H	8H	Function mask for external language Bit 3 = 1: Errors in ISO scanner are not output, the block is transferred to the Siemens translator.
22550	$MC_TOOL_CHANGE_MODE	0	1	Tool change with M function
22560	$MC_TOOL_CHANGE_M_CODE	6	206	M function for tool change
24006	$MC_CHSFRAME_RESET_MASK	1H	Bit 0 = 1 Bit 5 = 0	Bit 0 = 1: System frame for actual value setting and scratching is active after reset. Bit 5 = 0: System frame for cycles is deleted on reset
24007	$MC_CHSFRAME_RESET_CLEAR_MASK	0H	Bit 0 = 0 Bit 5 = 1	Bit 0 = 0: System frame for actual value setting and scratching is active after reset. Bit 5 = 1: System frame for cycles is deleted on reset
24008	$MC_CHSFRAME_POWERON_MASK	0H	0H	Reset channel system frames after power on
24030	$MC_FRAME_ACS_SET	0	1	Adjustment of SZS coordinate system - without cycle frames - with progr. offset
27860	$MC_PROCESSTIMER_MODE	0H	73H	Bit 0 = 1: Measurement of total operating time is active for all part programs Bit 1 = 1: Measurement of current program runtime is active Bit 4 = 1: Measurement also with active dry run feed Bit 5 = 1: Measurement also with program test Bit 6 = 1: $AC_CYCLE_TIME is not deleted on start by ASUP and PROG_EVENT
27880	$MC_PART_COUNTER	0H	901H	Bit 0 = 1: Counter $AC_REQUIRED_PARTS is activated Bit 8 = 1: Counter $AC_ACTUAL_PARTS is active Bit 11 = 1: Increment $AC_ACTUAL_PARTS with GOTOS
28000	$MC_MM_REORG_LOG_FILE_MEM	50	75	Memory space for REORG (DRAM)
28010	$MC_MM_NUM_REORG_LUD_MODULES	8	20	Number of blocks for local user variables in REORG (DRAM)
28082	$MC_MM_SYSTEM_FRAME_MASK	21H	21H	Bit 0 = 1: System frame for setting actual value and scratching Bit 5 = 1: System frame for cycles
28083	$MC_MM_SYSTEM_DATAFRAME_MASK	F9FH	F9FH	Bit mask for configuring channel-specific system frames in the data storage
28450	$MC_MM_TOOL_DATA_CHG_BUFF_SIZE	400	400	Buffer for tool data changes (DRAM)
35040	$MA_SPIND_ACTIV_AFTER_RESET	0	2	Own spindle RESET
42440	$SC_FRAME_OFFSET_INCR_PROG	1	0	Zero offsets in frames
42442	$SC_TOOL_OFFSET_INCR_PROG	1	0	Tool length offsets
42528	$SC_CUTCOM_DECEL_LIMIT	0	1	Feed lowering on circles with tool radius compensation
42940	$SC_TOOL_LENGTH_CONST	0	0	Change of tool length components with change of active plane
42950	$SC_TOOL_LENGTH_TYPE	0	0	Assignment of tool length compensation independent of tool type

Notes

Basic settings Technology data

MD	Identifier	Default	Settings Milling	Description
51024	$MNS_BLOCK_SEARCH_MODE_MASK_JS	1H		Bit mask for available search modes (ShopMill/ShopTurn) Bit 0: Block search with calculation without approach Bit 1: Block search with calculation with approach Bit 3: Skip EXTCALL programs Bit 5: Block search with test run
51028	$MNS_BLOCK_SEARCH_MODE_MASK	33H		Bit mask for available block search modes Bit 0: Block search with calculation without approach Bit 1: Block search with calculation with approach Bit 3: Skip EXTCALL programs Bit 4: Block search without calculation Bit 5: Block search with test run
51038	$MNS_SET_ACT_VALUE	1		Set actual value selection 0 = Set actual value is not offered. 1 = If a user frame (settable work offset e.g. G54) is active, it will be used. In G500 Set actual values is not offered (system frame is no longer used).
51039	$MNS_PROGRAM_CONTROL_MODE_MASK	1H		Options for machine - program influence: Bit 0: Program test function available
51040	$MNS_SWITCH_TO_MACHINE_MASK	0H		Automatic operating area switchover to machine Bit 0: When selecting a program in the program manager, the operating area does not automatically switch over to Machine. Bit 1: When switching the type of operation via the MCP, the operating area is not automatically switched over to Machine. Bit 2: Do not switch automatically in Programs during program selection. Bit 3: No auto. Start of block search on selection / execution under Programs.
51226	$MNS_FUNCTION_MASK_SIM	0H		Function mask Simulation Bit 0: No automatic start on simulation selection Bit 1: Deactivate simulation Bit 6: Enable handwheel as simulation override Bit 7: Interpretation of handwheel values as absolute values
51228	$MNS_FUNCTION_MASK_TECH	0H		Function mask Cross-technology Bit 0: G code programming without multi-channel data Bit 1: Enable print function of editor
52000	$MCS_DISP_COORDINATE_SYSTEM	0	0	0: Vertical milling machine
52005	$MCS_DISP_PLANE_MILL	0	0	0: Plane selection on the operator panel 17: always G17 18: always G18 19: always G19
52200	$MCS_TECHNOLOGY	0	2	Technology 0: no specific configuration 1: turning 2: milling
52201	$MCS_TECHNOLOGY_EXTENSION	0	0	Extended technology 0: no specific configuration 1: turning: extended technology Turning has not yet been implemented for Milling 2: milling

Notes

Basic settings Technology data

MD	Identifier	Default	Settings Milling	Description
52206	$MCS_AXIS_USAGE	0	0	Meaning of the axes 0 = no special meaning; 1 = tool spindle (driven tool); 2 = C axis of the tool spindle (driven tool); 3 = main spindle (turning); 4 = C axis of the main spindle (turning); 5 = counterspindle (turning); 6 = C axis of the counterspindle (turning); 7 = linear axis of the counterspindle (turning); tailstock (turning); 9 = steady rest (turning); 10 = B axis (turning), 12 = B axis of the counter spindle (turning), 13 = Traverse travel X of the counter spindle (turning)
52207	$MCS_AXIS_USAGE_ATTRIB	0H	[0] = 0H -X [1] = 0H -Y [2] = 0H -Z [3] = 0H -SP1 [4] = 81H -A [5] = 44H -C	Axis attributes Bit 0: Rotates around the 1st geometry axis (applies to rotary axes) Bit 1: Rotates around the 2nd geometry axis (applies to rotary axes) Bit 2: Rotates around the 3rd geometry axis (applies to rotary axes) Bit 3: Positive direction of rotation is counterclockwise (applies to rotary axes) Bit 4: Displayed direction of rotation for M3 is counterclockwise (applies to spindles) Bit 5: Direction of rotation M3 corresponds to rotary axis minus (applies to spindles) This bit must be set analog to PLC bit DBnn.DBX17.6! (nn = 31 + machine data index) Bit 6: Show rotary axis as offset target for measruning Bit 7: Offer rotation axis in position pattern Bit 8: reserved Bit 9: Spindle is not SPOS-capable
52210	$MCS_FUNCTION_MASK_DISP	3H	13H	Function mask Display Bit 0: Measuring system for programs always in the base system Bit 1: Face view when turning in the school coordinate system Bit 2: Hide “T,S,M” softkey in JOG area Bit 3: Generate automatic end-of-program in MDI Bit 4: Show follow-on tool in T,F,S window Bit 5: Hide softkey “Actual machine values“ Bit 6: Hide tool radius/diameter in T,F,S window Bit 7: Hide tool lenght in T,F,S window Bit 8: Hide tool icon in T,F,S window
52212	$MCS_FUNCTION_MASK_TECH	0H	Bit 3 = 1	Function mask Cross-technology Bit 0: Enable Swivel Bit 1: No optimized travel along software limit switches Bit 2: Approach logic for step drill (ShopTurn) Bit 3: Call block search cycle for ShopMill/ShopTurn Bit 4: Approach logic through cycle (ShopTurn) Bit 5: Call block search cycle for SERUPRO Bit 6: Work offset value ZV cannot be entered as an absolute value (ShopTurn) Bit 7: Detect the expiry of tool lives (ShopMill/ShopTurn) Bit 8: Manual machine (ShopMill/ShopTurn) Bit 9: Selection/deselection of work offset via softkey Bit 10: reserved Bit 11: Switch off layer check for drilling and milling tools (ShopTurn)

Notes

Basic settings Technology data

MD	Identifier	Default	Settings Milling	Description
52214	$MCS_FUNCTION_MASK_MILL	0H		Function mask Milling Bit 0: Enable cylinder surface transformation (ShopMill) Bit 3: Enable inside/rear machining Bit 4: Enable spindle clamping (C axis) Bit 5: Enable spindle control of tool spindle via surface Bit 6: Enable spindle control of turning spindle via surface
52216	$MCS_FUNCTION_MASK_DRILL	0H		Function mask Drilling Bit 0: CYCLE84 Unhide input fields Technology Bit 1: CYCLE840 Unhide input fields Technology
52229	$MCS_ENABLE_QUICK_M_CODES	0H		Enable fast M functions Bit 0: Coolant OFF Bit 1: Coolant 1 ON Bit 2: Coolant 2 ON Bit 3: Coolant 1 and 2 ON
52230	$MCS_M_CODE_ALL_COOLANTS_OFF	9		M code for all coolants OFF
52231	$MCS_M_CODE_COOLANT_1_ON	8		M code for coolant 1 ON
52232	$MCS_M_CODE_COOLANT_2_ON	7		M code for coolant 2 ON
52233	$MCS_M_CODE_COOLANT_1_AND_2_ON	-1		M code for coolant 1 + 2 ON
52240	$MCS_NAME_TOOL_CHANGE_PROG	" "	"M6"	Tool change program for G code steps
52270	$MCS_TM_FUNCTION_MASK	0H		Function mask Tool management Bit 0: Create tool on magazine location not allowed. Bit 1: Load/unload disable, if machine is in reset. Bit 2: Load/unload disable on Emergency stop. Bit 3: Load/unload tool to/from spindle is disabled. Bit 4: Loading is executed directly in the spindle. Bit 7: Create tool using the tool number. Bit 8: Fade out Relocate tool. Bit 9: Fade out Position magazine. Bit 10: Reactivate tool using Position magazine. Bit 11: Reactivate tool in all monitoring modes. Bit 12: Fade out Reactivate tool.
52271	$MCS_TM_MAG_PLACE_DISTANCE	70		Distance between individual magazine locations. Is used for graphical display of magazine and tools in tool management.
52274	$MCS_TM_LOAD_STATION	0		Number of load station = 0: If a query window is on the surface or if only one loading station is available there will be no pop-up window = 1: fixed loading station 1 = 2: fixed loading station 2
52281	$MCS_TOOL_MCODE_FUNC_ON	-1		ShopMill only: M code for tool-specific function ON
52282	$MCS_TOOL_MCODE_FUNC_OFF	-1		M code for tool-specific function OFF If both M commands of a function equal -1, the corresponding field will not be displayed
53230	$MAS_SIM_START_POSITION	0	X=0 Y=0 Z=300	Axis position at start of simulation Only adjust with geometry axes

Notes

Basic settings Technology data

MD	Identifier	Default	Settings Milling	Description
54215	$SNS_TM_FUNCTION_MASK_SET	0H	Bit 0 = 1	Function mask Tool management Bit 0: Diameter display for rotary tools. Bit 1: Default direction of rotation for all turning tools Bit 2: Create tool without suggesting name. Bit 3: Input disable for tool name and tool type in the case of loaded tools. Bit 4: Input disable for loaded tools unless the channel is not in reset. Bit 5: Accrue tool wear entries additively. Bit 6: Entry of tool ID in numerical format. Bit 7: Hide tool monitoring parameters. Bit 8: Diameter display for transverse axis geometry. Bit 9: Diameter display for transverse axis wear. Bit 10: Enable loading/relocation of tool in buffer locations Bit 11: Creation of new tool in gripper locations is disabled Bit 12: Do not unload measuring tools if ”Unload all” function is executed.
55200	$SCS_MAX_INPUT_FEED_PER_REV	1		Feedrate input upper limit for mm/rev
55201	$SCS_MAX_INPUT_FEED_PER_TIME	10000		Feedrate input upper limit for mm/min
55202	$SCS_MAX_INPUT_FEED_PER_TOOTH	1		Feedrate input upper limit for mm/tooth
55212	$SCS_FUNCTION_MASK_TECH_SET	6H	7H	Function mask Cross-technology Bit 0: Tool preselection active (ShopMill only) Bit 1: Calculate thread depth from thread pitch Bit 2: Refer to Table for thread diameter and depth
55214	$SCS_FUNCTION_MASK_MILL_SET	5H		Function mask Milling Bit 0: Default setting - milling cycles with synchronous operation Bit 2: Depth calculation in milling cycles without parameter SC
55216	$SCS_FUNCTION_MASK_DRILL_SET	18H		Function mask Drilling Bit 1: Boring CYCLE86: consider rotation of the tool plane when positioning the spindle Bit 2: Boring CYCLE86: consider swiveled table kinematics when positioning the spindle (tool carrier) Bit 3: Tapping CYCLE84: monitoring machine data 31050 and 31060 of the spindle Bit 4: Tapping CYCLE840: monitoring machine data 31050 and 31060 of the spindle
55220	$SCS_FUNCTION_MASK_MILL_TOL_SET	0H		Function mask High Speed Settings CYCLE832 Bit 0: Unhide technology fields CYCLE832 Bit 1: Orientation tolerance (OTOL) as a tolerance factor, enter it directly
55221	$SCS_FUNCTION_MASK_SWIVEL_SET	CH		Function mask Swivel CYCLE800 Bit 0: Display input field "No swivel" Bit 1: Retraction variant Z, Z XY or fixed position = 0: Retract Z or retract Z XY = 1: Retract to fixed position 1 or 2 Bit 2: Allow selection "Deselection" of the swivel data block Bit 3: Show active swivel plane under Swivel in JOG Bit 4: Optimized positioning in basic position (pole position) of the kinematics The settings of the Swivel function mask affect all swivel data records.

Notes

Setup Milling

Pre-requisite:

Sinumerik Operate is already installed, PLC commissioning has been carried out, the tool management set-up has been completed.

Options:

In order for the required function to be achieved on your machine, the following software options must be available:

- "ShopMill/ShopTurn"
  Order Nr. 6FC5800-0AP17-0YB0
- "Residual material detection and machining"
  Order Nr. 6FC5800-0AP13-0YB0
- "Simultaneous recording (real-time simulation)"
  Order Nr. 6FC5800-0AP22-0YB0
- "3D simulation 1 (finished part)"
  Order Nr. 6FC5800-0AP25-0YB0

Configuration of the axes and spindle

Machine axis name

MD10000 $MN_AXCONF_MACHAX_NAME_TAB	Machine axis name
Default: X1, Y1, Z1, A1, B1, C1	Change to:

Description:

MD10000[0] =X1
MD10000[1] =Y1
MD10000[2] =Z1
MD10000[3] =A1 → SP1
MD10000[4] =B1 → A1
MD10000[5] =C1

Assignment of geometry axis to channel axis

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB	Assignment of geometry axis to channel axis
Default: 1, 2, 3	Change to:

Description:

MD20050[0] = 1
MD20050[1] = 2
MD20050[2] = 3

Geometry axis name in channel

MD20060 $MC_AXCONF_GEOAX_NAME_TAB	Geometry axis name in channel
Default: X, Y, Z	Change to:

Description:

MD20060[0] = X
MD20060[1] = Y
MD20060[2] = Z

Machine axis number valid in channel

MD20070 $MC_AXCONF_MACHAX_USED	Machine axis number valid in channel
Default: 1, 2, 3, 0, 0, 0	Change to:

Description:

MD20070[0] =1
MD20070[1] =2
MD20070[2] =3
MD20070[3] =0 → 4
MD20070[4] =0 → 5
MD20070[5] =0 → 6

Channel axis name in channel

MD20080 $MC_AXCONF_CHANAX_NAME_TAB	Channel axis name in channel
Default: X, Y, Z, A, B, C	Change to:

Description:

MD20080[0] =X
MD20080[1] =Y
MD20080[2] =Z
MD20080[3] =A → SP1
MD20080[4] =B → A
MD20080[5] =C

Notes

Modulo conversion for rotary axis / spindle

MD30310 $MA_ROT_IS_MODULO	Modulo conversion for rotary axis / spindle
Default: 0	Change to:

Description:

AX4: SP1
MD30310 =0 → 1 Modulo-transformation for rotary axis

AX5: A1
MD30310 =0 → 1 Modulo-transformation for rotary axis

AX6: C1
MD30310 =0 → 1 Modulo-transformation for rotary axis

Modulo 360 degrees displayed for rotary axis or spindle

MD30320 $MA_DISPLAY_IS_MODULO	Modulo 360 degrees displayed for rotary axis or spindle
Default: 0	Change to:

Description:

AX4: SP1
MD30320 =0 → 1 Actual value display Modulo

AX5: A1
MD30320 =0 → 1 Actual value display Modulo

AX6: C1
MD30320 =0 → 1 Actual value display Modulo

Rotary axis / spindle

MD30300 $MA_IS_ROT_ACHSE	Rotary axis / spindle
Default: 0	Change to:

Description:

AX4: SP1
MD30300 =0 → 1 axis is a rotary axis

AX5: A1
MD30300 =0 → 1 axis is a rotary axis

AX6: C1
MD30300 =0 → 1 axis is a rotary axis

Assignment of spindle to machine axis

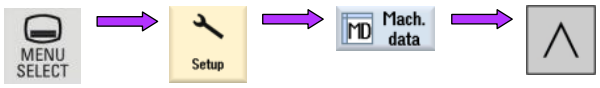
MD35000 $MA_SPIND_ASSIGN_TO_MACHAX	Assignment of spindle to machine axis
Default: 0	Change to:

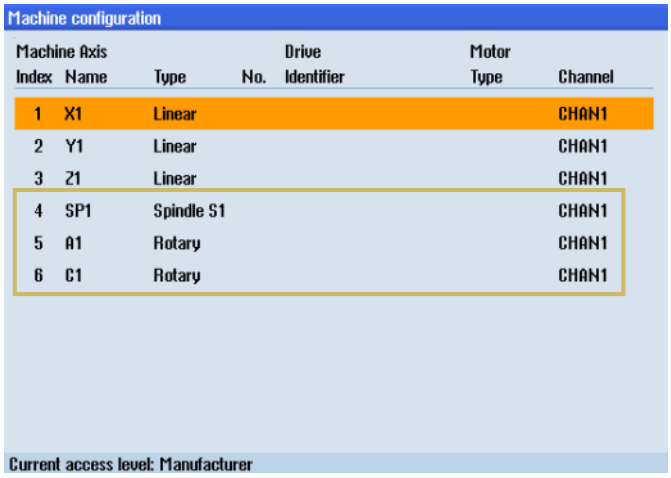
Description:

Definition of the spindle. The spindle is defined if the spindle number is entered into this MD.

AX4: SP1
MD35000 =0 → 1 Assignment of spindle to the machine axis (spindle S1)

Check of the set axes and spindles:





Notes

Manufacturer cycles

For the individual matching the following cycles are included in the standard cycle package:

CUST_800.SPF	Manufacturer's cycle for matching to the functions swivelling plane and tool swivelling (CYCLE800).
CUST_832.SPF	Manufacturer's cycle for matching to the function High Speed Settings CYCLE832).
CUST_CLAMP.SPF	Manufacturer's cycle for matching to the function multiple workpiece clamping
PROG_EVENT.SPF	Standard cycle for the support of the functionality of: ● Block search when milling or turning is activated ● Block search and swivelling plane ● Block search and tool indexing

Note:

The cycle PROG_EVENT.SPF is a standard Siemens cycle and should not be changed by the manufacturer. For the manufacturer cycles CYCPE1MA.SPF or CYCPE_MA.SPF, the corresponding jump-out markers are prepared at the beginning and at the end of PROG_EVENT.SPF.

At the beginning of the cycle PROG_EVENT

- CYCPE1MA in the directory CMA

At the end of the cycle PROG_EVENT

- CYCPE_MA.SPF in the directory CMA

For these cycles templates are not available. If the CYCPE1MA.SPF and CYCPE_MA.SPF manufacturer cycles are loaded in the NC, the program branches from PROG_EVENT to the manufacturer cycles as appropriate.

Copying the Manufacturer cycles

1. Select the Setup mode for "Commissioning"

2. Press the Softkey "System data".

3. Open the directory NC-data / Cycles / Standard cycles and select the required cycle.

4. Press the Softkey "Copy" and open the directory NC-data / Cycles / Manufacturer's cycles.

5. Press the Softkey "Paste".
   Now this cycle is available for individual matching

Note:

Only the cycles intended for the machine matching commencing with CUST_.*.SPF can be copied into the manufacturer or user directory when using the access level "Manufacturer". The cycle "PROG_EVENT.SPF is a standard cycle that can neither be copied nor altered. It is listed here only to indicate the scope for manufacturer-specific matching.

Setting-up for milling

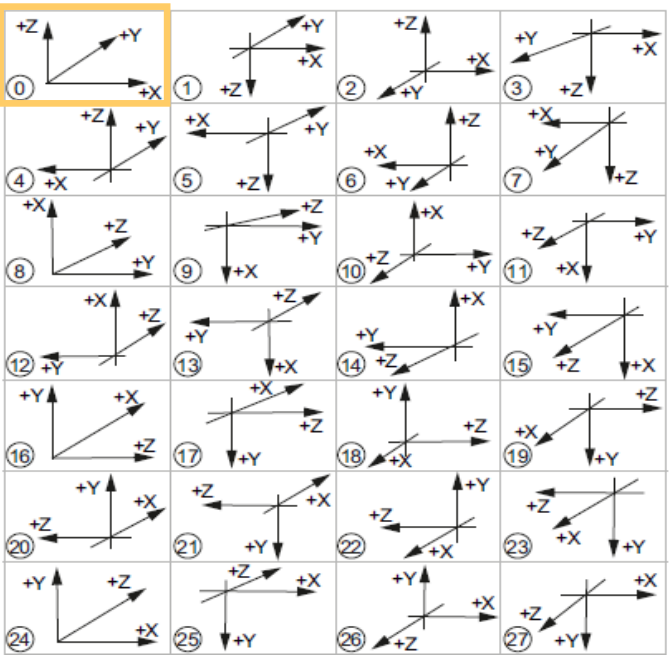
Matching of the co-ordinate systems to the user interface

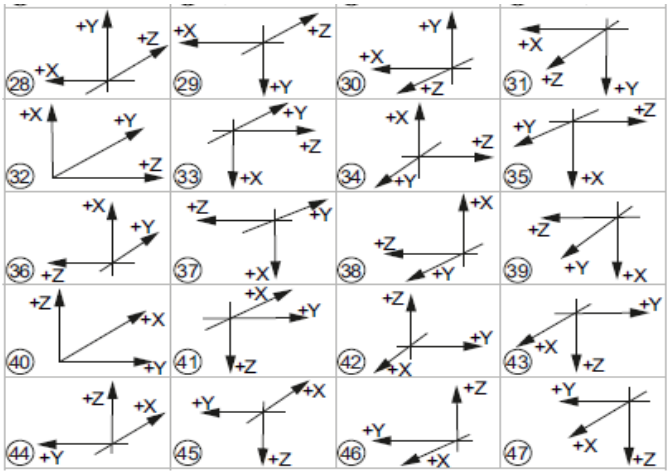
Coordinate system position

MD52000 $MCS_DISP_COORDINATE_SYSTEM	Coordinate system position
Default: 0	Change to: No change

Notes

Selection table of the possible co-ordinate systems





Description:

This MD is used to match the co-ordinate system of the user interface to the co-ordinate system of the machine. In the user interface all help images, the animated graphics, the simulation as well as the input fields with circular direction indication.
The co-ordinate system can take on any of the shown positions.
The typical selection for vertical milling machine is 0 = Presetting

Plane selection Milling

MD52005 $MCS_DISP_PLANE_MILL	Plane selection Milling
Default: 0	Change to: No change

MD52005 = 0

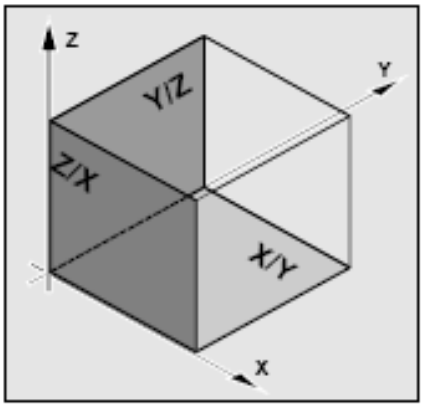
Typical vertical function = G17

Description:

0: Plane selection in the user interface
This setting makes sense only if the machining plane on the machine can be switched, e.g. by the use of angular milling heads.

17: always G17
18: always G18
19: always G19

The machining planes are specified as shown:

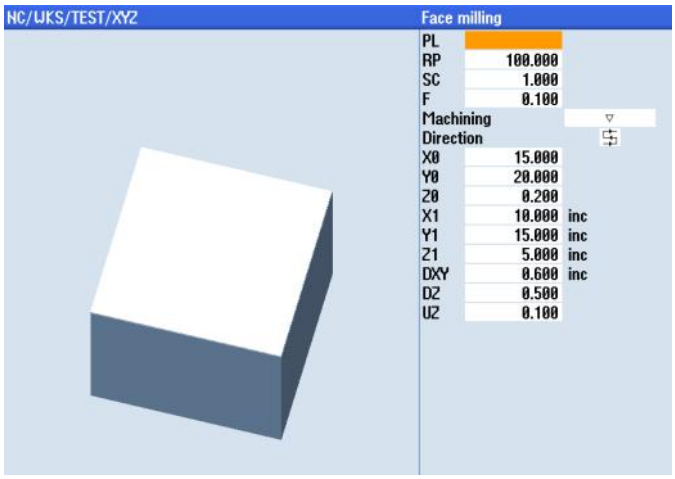


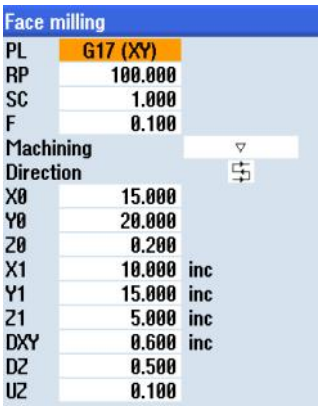
Plane	Tool axis
X/Y	Z G17
Z/X	Y G18
Y/Z	X G19

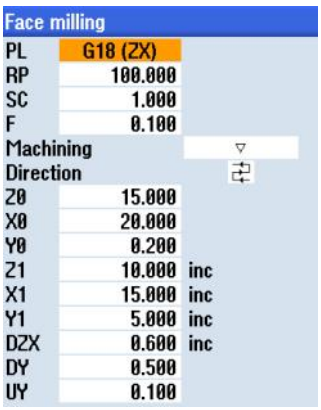
Notes

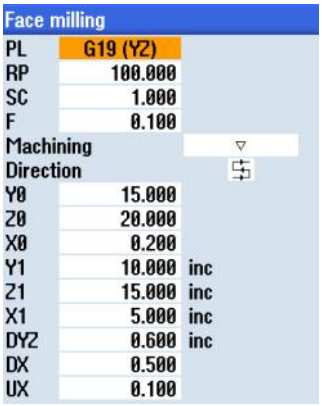
Continuation MD52005

Example planar milling:









Plane selection by means of the toggle key:
G17 (XY), G18 (ZX), G19 (YZ) or no plane

Technology

MD52200 $MCS_TECHNOLOGY	Technology
Default: 0	Change to: 2

Description:

0: No specific configuration
1: Turning
2: Milling
Please also note MD 52201
$MCS_TECHNOLOGY_EXTENSION.

Selection of 2 specifies milling as the main technology This means, the Softkeys for drilling and milling will be shown along the lower edge of the screen.

Extended technology

MD52201 $MCS_TECHNOLOGY_EXTENSION	Extended technology
Default: 0	Change to: No change

MD52201 presently not applicable:

Meaning of the axes in the channel

MD52206[x] $MCS_AXIS_USAGE	Meaning of the axes in the channel
Default: 0, 0, 0, 0, 0, 0	Change to: No change

MD52206[0] =0
MD52206[1] =0
MD52206[2] =0
MD52206[3] =0
MD52206[4] =0
MD52206[5] =0

Description:

No matching specification of the machine datum is required for the sample machine being described here.

Note:

If high-speed extension spindles are used, a 2 must be entered into the respective machine datum of the extension spindle. An extension spindle is not included in the axis configuration used here.

Notes

Axis attributes

MD52207[x] $MCS_AXIS_USAGE_ATTRIB	Axis attributes
Default: 0, 0, 0, 0, 0, 0	Change to: No change

Description:

Bit 0: Rotates around the 1st geometry axis (applies to rotary axes)

Bit 1: Rotates around the 2nd geometry axis (applies to rotary axes)

Bit 2: Rotates around the 3rd geometry axis (applies to rotary axes)

Bit 6: Show rotary axis as offset target for measuring

Bit 7: Offer rotation axis in position pattern

Note:

The Bits 3, 4 and 5 have no meaning in conjunction with ShopMill.

Description:

In case of machines with rotary axes it is possible - in conjunction with the function:
"work piece measuring - edge alignment" - to determine the angular correction

For this the following settings are necessary for the rotary axes:

MD52207[4] axis A = 0 → 81H
MD52207[5] axis C = 0 → 44H
Bit 2 = 1: rotates around the 3rd geometry axis
Bit 6 = 1: Show rotary axis as correction destination for measuring

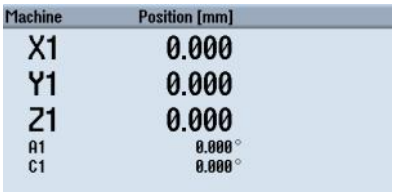
Example: Measuring zero-point work piece - align edge

Number of actual values with large font

MD52010 $MCS_DISP_NUM_AXIS_BIG_FONT	Number of actual values with large font
Default: 3	Change to: No change

Description:

Number of actual values with large font, Max. value 31.



Only display spindles in actual values window when in axis mode

MD51023 $MNS_ACT_VALUE_SPIND_MODE	Only display spindles in actual values window when in axis mode
Default: 1	Change to: No change

Description:

The display of the spindles in the actual value windows can be influenced by means of this. If the datum is set to 1 the spindles will be shown in the actual value window only while they are in the axis mode. The axes are displayed below the geometry and auxiliary axes. Axes that are not in the axis mode are shown as gaps.
If set to 0 the spindles will be displayed at all times.

Notes

Function mask display

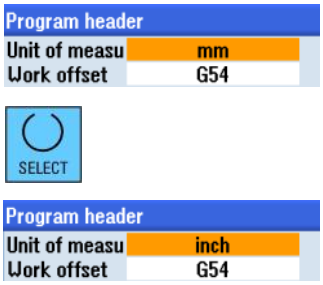
MD52210 $MCS_FUNCTION_MASK_DISP	Function mask display
Default: 3H	Change to: No change

MD52210 Bit 0 = 1
MD52210 Bit 1 = 1

Description:

Bit 0: Meas. sys. for programs always in the base system
Bit 1: Face view when turning in the school co-ordinate system
Bit 2: Hide "T,S,M" softkey in Jog area
Bit 3: Generate automatic end-of-program in MDI (with Softkey "Delete blocks")
Bit 4: Show follow-on tool in T,F,S window

Bit 0: This function is presently not yet available. In a ShopMill program it is always possible to select "mm dimensions" or "inch dimensions" in the program header.



Bit 1: Takes no effect in the Milling technology.

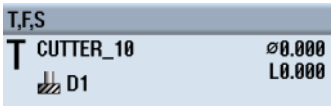
Bit 2=0: The Softkey "T,S,M" is shown in the mode JOG . This setting is in line with the basic setting of ShopMill.

Bit 2=1: The Softkey "T,S,M" is hidden in the mode JOG.

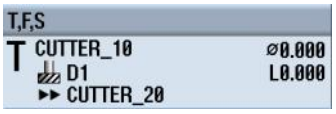
Bit 3=0: Under MDA the command End-of-program will not be generated automatically after "Block delete".

Bit 3=1: Under MDA the M-command entered in MD 10714 $M_NO_FCT_EOP will automatically be generated as end-of-program command after "block delete". In this example configuration it is M32.

Bit 4=0: The follow-up tool is not shown in the T;F;S-window



Bit 4 = 1 The follow-up tool is shown in the T;F;S-window. This setting makes sense only in conjunction with tool prepare on a machine featuring a double gripper.



Note: Also see the setting of SD 55210 $SCS_FUNCTION_MASK_TECH_SET, Bit 0 "Tool pre-selection activated"

Notes

Function mask Cross-technology

MD52212 $MCS_FUNCTION_MASK_ TECH	Function mask Cross-technology
Default: 0H	Change to: 8H

MD52212 Bit 3 = 0 → 1
MD52212 Bit 5 = 0

Bit 0 and 1 are meaningful for swivelling

Description:

Bit 0: Enable swivel
Bit 1: No optimized travel along software limit switches
Bit 2: Approach logic for step drill (ShopTurn)
Bit 3: Call block search cycle for ShopMill/ShopTurn
Bit 4: Approach logic through cycle (ShopTurn)
Bit 5: Call block search cycle for SERUPRO
Bit 6: Work offset value ZV cannot be entered (ShopTurn)

Bit 0 and Bit 1 make sense only in conjunction with swivelling. A more detailed description will be found in Module "A111 swivelling".

Bit 2: This Bit is not relevant in the technology Milling . In the ShopMill cycles the longest cutting edge is taken into account when retracting (retraction to the safety level).

Bit 3 = 0

The ShopMill cycle E_S_ASUP is not carried out after block search.

Bit 3 = 1

The ShopMill cycle E_S_ASUP will be carried out after block search. Details regarding this setting are contained in the section "Block search"

Bit 5 = 0
Block search cycle for SERUPRO will not be called up.

The setting = 0 is necessary for single-channel ShopMill machines.

Bit 5 = 1
The standard cycle CYCLE207 will be called up after Block search with SERUPRO.

The setting of Bit 3 is not effective in this case. The E_S_ASUP will not be called up.

This setting must be used only for multi-channel machines.

Cycle Settings-Drilling

MD52216 $MCS_FUNCTION_MASK_ DRILL	Function mask Drilling
Default: 0H	Change to: No change

Description:

Bit 0 = 0 Hide input fields Technology
1 Show input fields Technology

CYCLE84 (without compensating chuck)

Bit 1 = 0 Hide input fields Technology
1 Show input fields Technology

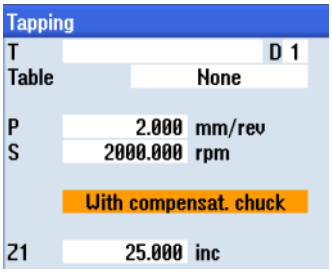
CYCLE840 (with compensating chuck) valid only for ShopMill.

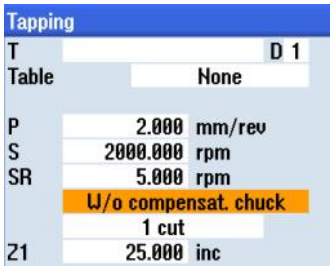
Notes

Continued MD52216

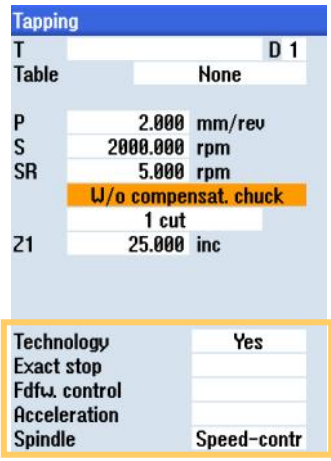
Bit 0 = 0
Technology fields will not be shown in either case:
"with compensating chuck"

Bit 1 = 0
"without compensating chuck

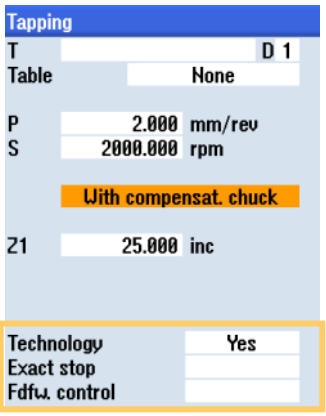




MD52216 Bit 0 = 1
Technology fields will be shown with the selection "without compensating chuck (Cycle84)



MD52216 Bit 1 = 1
Technology fields will be shown with the selection "with compensating chuck (Cycle840)



Function mask Cross-technology

SD55212 $SCS_FUNCTION_MASK_TECH_SET	Function mask Cross-technology
Default: 6H	Change to: 7H

SD55212 Bit 0 = 0 → 1
SD55212 Bit 1 = 1
SD55212 Bit 2 = 1

Description:

Bit 0: Tool pre-selection activated
Bit 1: Evaluate thread depth from metric pitch
Bit 2: Transfer thread diameter and thread depth from table

Bit 0: Tool pre-selection activated
Directly after the exchange has been completed, the tool will be prepared
The generation of the follow-up tool occurs only with Jobshop cycles

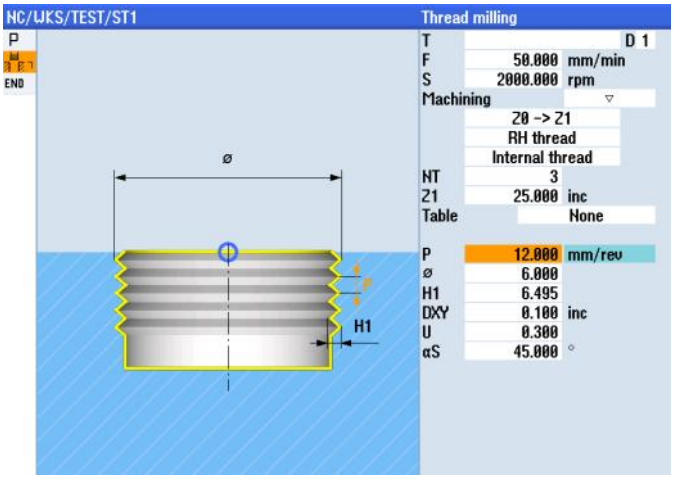
Bit 1: Automatic evaluation of the thread depth for metric threads

Bit 2: Transfer thread diameter and thread depth from table.

Bit 1 = 0 The thread depth will not be evaluated automatically

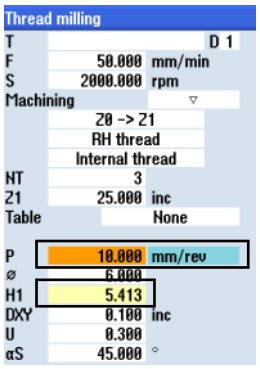
The value for the thread depth "H1" must be entered manually from a table.

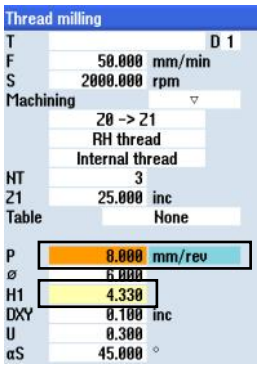
Bit 1 = 1 The thread depth will be evaluated from the metric thread pitch.



Notes

SD55212 Continued

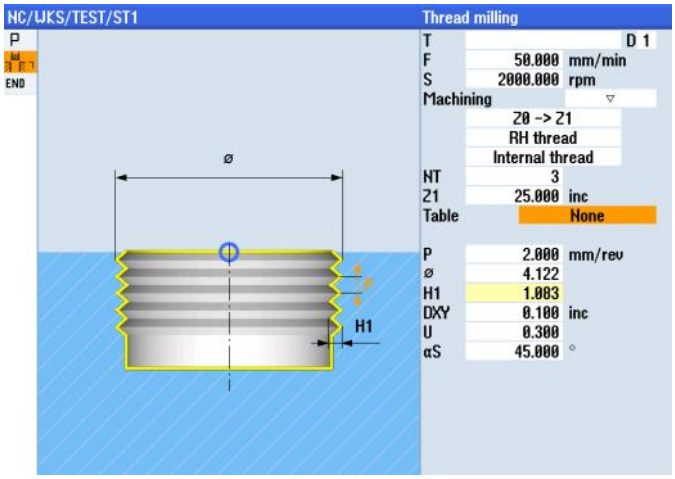


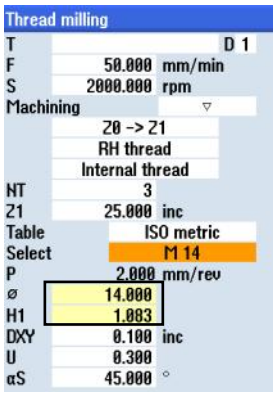


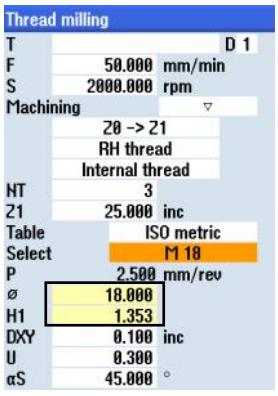
Only if in the table the column "without" is selected and for P the unit "mm/rev" will the thread depth "H1" in the yellow-backed fields be calculated automatically. These automatically obtained values can be overwritten by the operator. If the thread pitch is entered again, the thread depth will be calculated once more automatically.

Different factors are stored for the internal and external threads:
- Internal threads: 0,5413
- External threads: 0,6134

Bit 2 = 1 Thread diameter and depth from a table







As soon as the line ”Table ISO metric" is selected, the table is activated for the various threads.

The yellow-backed fields for nominal diameters and thread depth H1 will be filled in with tabular values depending on the chosen thread.

Notes

Cycle Settings-Milling

SD55214 $SCS_FUNCTION_MASK_ MILL_SET	Function mask Milling
Default: 5H	Change to: No change

Description:

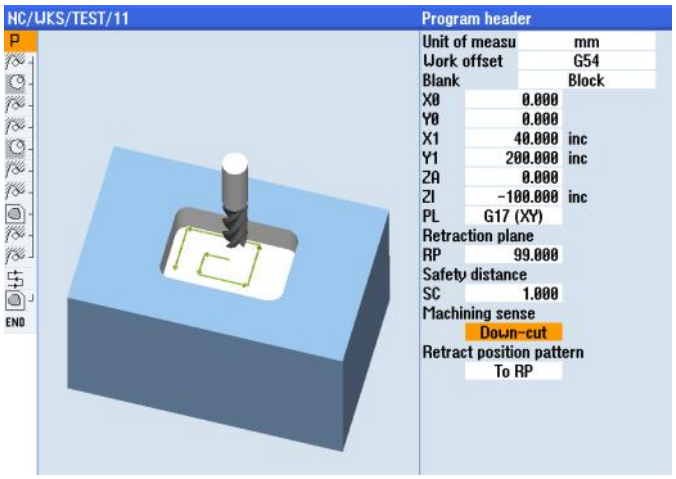
Bit 0: Default setting for milling with synchronous operation

Bit 1: not assigned

Bit 2: Depth calculation in milling cycles without parameter SC

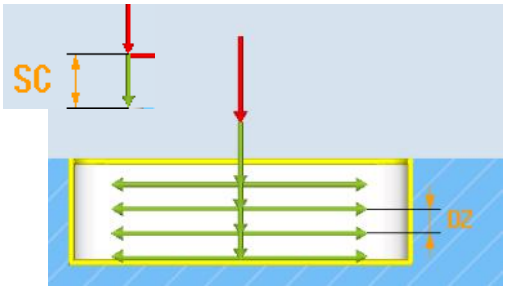
Bit 0 The machining sense (Up-cut/down-cut) can be fixed or selectable via the “toggle” key.

Bit 0 = 1



Bit 2 = 0
The subdivision of cuts in direction of infeed is calculated including the safety gap SC for the path from Z0+SC to Z1

Bit 2 = 1
The subdivision of cuts in direction of infeed is obtained without the safety gap SC for the path from Z0 to Z1



Note:
The safety gap is specified in the program header.

Function mask Drilling

SD55216 $SCS_FUNCTION_MASK_ DRILL_SET	Function mask Drilling
Default: 18H	Change to: No change

SD55216 Bit 3 = 1
SD55216 Bit 4 = 1

Notes

SD55216 Continued

Description:

Bit 0: Tapping CYCLE84: Reversal of spindle rotation direction in the cycle

Bit 1: Boring CYCLE86: Taking into account the rotation of the work piece plane when positioning the spindle

Bit 2: Boring CYCLE86: Taking into account the indexed table kinematics (tool carrier) when positioning the spindle

Bit 3: Tapping CYCLE84: (without compensating chuck). Monitoring the machine data 31050[x] and 31060[x] of the spindle

Bit 4: Tapping CYCLE840: (with compensating chuck). Monitoring the machine data 31050[x] and 31060[x] of the spindle

Bit 5: Tapping CYCLE84: Evaluation of the point of braking in case of G33

The denominator of the gearbox is contained in MD31050[x] while MD31060[x] contains the numerator. Together the two provide the gear ratio for the spindle. This is required for monitoring the feed obtained from the speed x the pitch.

Description:

Bit 0: Reversal of the spindle direction of rotation when tapping
This setting is no longer required as from SW 2.6 SP1, since it has been superseded by the NCK.-function.

Bit 1 = 1: Taking into account the rotation of the tool plane (CYCLE 86)
In the boring cycle,CYCLE86 the spindle is positioned on the parameter SPOS when reaching the boring depth. If SPOS=0 the tool cutting edge points in the positive direction of the 1st axis of the plane (G17 towards X+)

If the setting is varied by using Bit 1 = 1, a rotation about the tool axis (e.g. ROT Z180) will be taken into account for the spindle positioning.

Bit 2 = 1: Taking into account indexed table kinematics (CYCLE 86)
See description Bit1
With the selection of Bit 2 = 1 an indexed kinematics will be taken into account when positioning the spindle.

Description:

Bit3 = 1: Tapping CYCLE84: Monitoring the machine data 31050 $MA_DRIVE_AX_RATIO_DENOM (divider of gearbox ratio) and 31060 $MA_DRIVE_AX_RATIO_NUMERA (numerator of gearbox ratio) of the spindle for the boring axis

The monitoring is activated only if MD35590 $MA_PARAMSET_CHANGE_ENABLE = 2
This setting permits a parameter block change by the PLC-interface or by the command SCPARA (servo parameter block programming).
If the monitoring is activated the alarm 61127 [Channel %1:] Block %2 (gear ratio of the tapping axis incorrectly defined) will be set:

Bit 4 = 1: Similar to Bit3, however, for the cycle CYCLE840

Bit 5: Calculation of the commencing of braking for G33 CYCLE840)
This function is not available at present.

Cycle Settings

Upper limit feedrate/rev

SD55200 $SCS_MAX_INP_FEED_PER_REV	Upper limit feedrate/rev
Default: 1 mm/U	Change to: No change

Description:

Upper limit for the selection of the federate/rev

Upper limit feedrate/min

SD55201 $SCS_MAX_INP_FEED_PER_TIME	Upper limit feedrate/min
Default: 10000 mm/min	Change to: No change

Description:

Upper limit for the input of the feedrate in mm/min

Notes

Upper limit feedrate/tooth

SD55202 $SCS_MAX_INP_FEED_PER_TOOTH	Upper limit feedrate/tooth
Default: 1 mm	Change to: No change

Description:

Upper limit for the selection of the feedrate/tooth

Setting up the tool list

These settings are applicable only to JobShop programs

Enable fast M functions

MD52229 $MCS_ENABLE_QUICK_M_CODES	Enable fast M functions
Default: 0H	Change to: No change

Description:

Bit 0: Coolant OFF

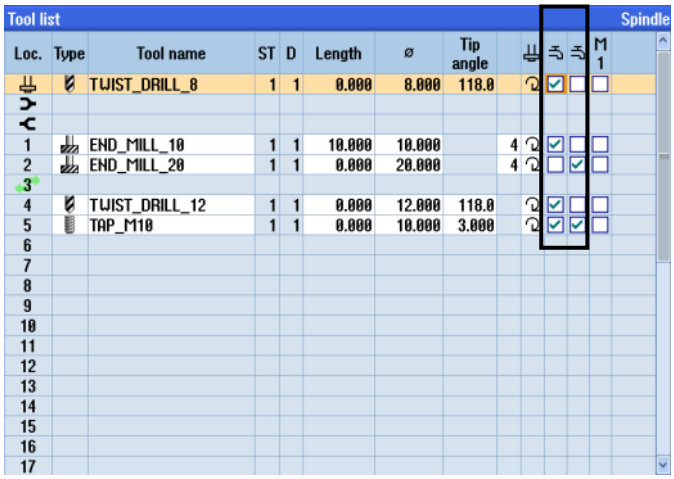
Bit 1: Coolant 1 ON

Bit 2: Coolant 2 ON

Bit 3: Coolant 1 and 2 ON

This MD is used to declare the commands used for the coolant control (see MD52230 - MD52233) as being fast M-commands (M=QU…). In case of fast commands the program progress continues without waiting for the acknowledgement of the M-command by the PLC.

In the tool list there are input fields for coolant 1 and coolant 2 for each tool. The select key can be used to toggle the function "coolant ON/OFF". The respective M-functions are put out if the tool is changed by means of the part-program, The M-commands will not be put out if the tool is exchanged by means of the T,S,M mask.



M code for all coolants OFF

MD52230 $MCS_M_CODE_ALL_COOLANTS_OFF	M code for all coolants OFF
Default: 9	Change to: No change

Description:

M-Code for all coolant OFF

M code for coolant 1 ON

MD52231 $MCS_M_CODE_COOLANT_1_ON	M code for coolant 1 ON
Default: 8	Change to: No change

Description:

M-Code for coolant 1 ON

Notes

M code for coolant 2 ON

MD52232 $MCS_M_CODE_COOLANT_2_ON	M code for coolant 2 ON
Default: 7	Change to: No change

Description:

M-Code for coolant 2 ON

M code for both coolants ON

MD52233 $MCS_M_CODE_COOLANT_1_AND_2_ON	M code for both coolants ON
Default: -1	Change to: No change

Description:

M-Code for Coolant 1 + 2 ON

Already defined: M8 = Coolant 1 ON
M7 = Coolant 2 ON

If in the JobShop tool list both coolants (coolant 1 and coolant 2) have been selected, the following M-command is generated:

-1: M-command for coolant 1 on (setting of MD52231) and M-command for coolant 2 on (setting of MD52232)

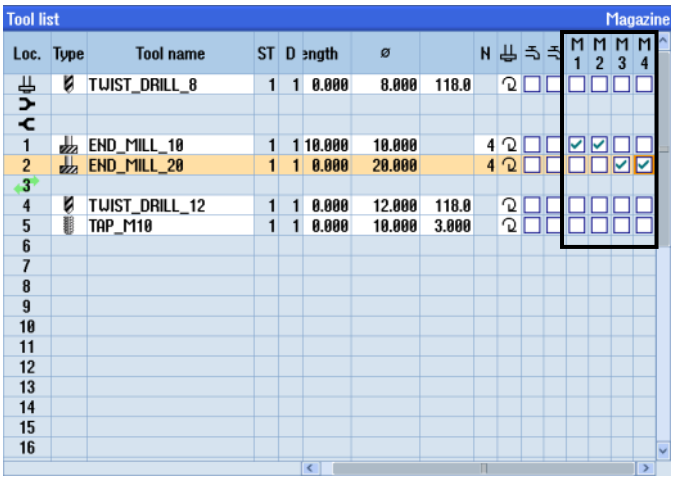
>0: the M-command selected in this MD.
A separate M-command for both coolants is to be used if the M-commands for coolant 1 and coolant 2 are grouped in one M-commands group, however both coolants are to be activated after a block search.

M code for tool-specific function ON

MD52281[x] $MCS_TOL_MCODE_FUNC_ON	M code for tool-specific function ON
Default: -1	Change to: No change

Description:

In MD52281[0] - [3] ON and
in MD52282[0] - [3] OFF up to 4 additional columns for tool-specific functions can be activated in the tool list. These can then be selected in the columns M1- M4 (see Screenshot "Tool list" on the following page).



Description:

M-Code for tool-specific function ON
The value -1 means that the M-function will not be put out. If both M-commands of a function = -1, the associated field in the surface will not be shown.

Notes

M code for tool specific function OFF

MD52282[x] $MCS_TOOL_MCODE_FUNC_OFF	M code for tool-specific function OFF
Default: -1	Change to: No change

Description:

M-Code for tool-specific function ON
The value -1 means that the M-function will not be put out. If both M-commands of a function = -1, the associated field in the surface will not be shown.

Function mask Tool management

MD52270 $MCS_TM_FUNKTION_MASK	Function mask Tool management
Default: 0H	Change to: 4H

Description:

Bit 0: Create tool on a magazine location not permitted.
Tools can only be created outside the magazine.

Bit 1: Loading/unloading is not possible while the machine is not in Reset.
Tools can only be loaded or unloaded if the respective channel is at rest.

Bit 2: Loading/unloading locked during emergency OFF
Tools can only be loaded or unloaded if the Emergency OFF is not activated.

Bit 3: Loading/unloading tools to/from spindle disabled.
Tools cannot be loaded to or unloaded from the spindle.

Bit 4: Loading takes place in the spindle directly.
The tools are only loaded exclusively in the spindle.

Bit 5: reserved

Bit 6: reserved

Bit 7: Create tool by means of the T-number.
The T-number of the tool must be entered when a new tool is created.

Bit 8: Hide 'Re-locate tool'
The function 'Re-locate tool' is suppressed on the user interface.

Bit 9: Hide 'Magazine positioning'
The function 'magazine positioning' is suppressed on the user interface.

Bit 10: Re-activation of tool using magazine positioning
Before re-activation the tool is located on the loading position.

Bit 11: Re-activating the tool in all monitoring modes.
When re-activating a tool, all monitoring modes for this tool released in the NC will also be re-activated; i.e. also those monitoring modes that are not selected for the respective tool, but which are dormant in the background.

Bit 12: Hide 'Tool re-activation'
The function "Tool re-activating" is suppressed on the user interface.

Notes:

This MD must be matched to the circumstances of the machine. By hiding those functions on the user interface that are not applicable to the machine, the PLC can be spared unnecessary actions to prevent operation errors.

Bit 7: Create tool using the T-number
This function is intended for machines with tool management but without magazine configuration. The default setting must not be changed.

Notes

Load station Tool management

MD52274 $MCS_TM_TOOL_LOAD_STATION	Load station Tool management
Default: 0	Change to: No change

MD52274 = 0 → max. 16

Description:

If only one loading station is configured: The setting = 0

= 0: There will be no pop-up window.

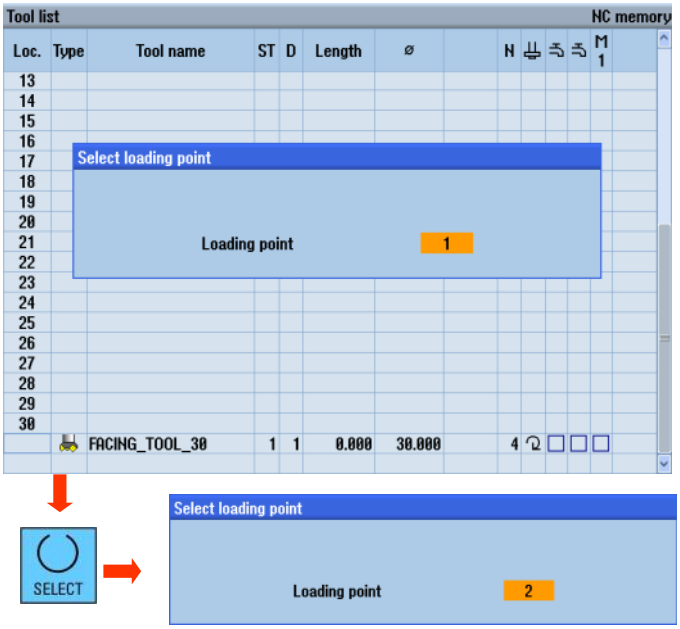
If more than 1 loading station is configured, you can select between

= 0: A query window appears on the surface to select the loading point.

= 1: fixed loading station 1, the window does not appear

= 2: fixed loading station 2, the window does not appear

The following screenshots show a configuration with two loading stations and the setting MD52274 = 0.



Acknowledge the selection made with OK

Function mask Tool management

SD54215 $SNS_TM_FUNCTION_MASK_SET	Function mask Tool management
Default: 0H	Change to: 1H

Bit 0 = 0 → 1 Diameter readout for rotating tools

Description:

Bit 0: Diameter readout for rotating tools
It is not the radius value, but the diameter value that is shown for rotating tools.

Bit 1: Default direction of rotation for all turning tools is M4
When turning tools are created, the direction of rotation is preset to M4.

Bit 2: Creating tools without assigning a name
When creating a new tool the input field for the tool name remains empty.

Bit 3: Input interlock for tool name and tool type for loaded tools
Tool name and tool type cannot be changed for loaded tools.

Bit 5: Evaluation of tool wear inputs additively
The input of wear data will be added to any existing wear values.

Bit 6: Numeric input of the tool identification
No name will be assigned to a new tool being created.
Only numerical characters are permitted .

Bit 7: Hiding the tool monitoring parameter
The tool monitoring parameter will not be shown on the user interface.

Notes

Continued SD54215

Description:

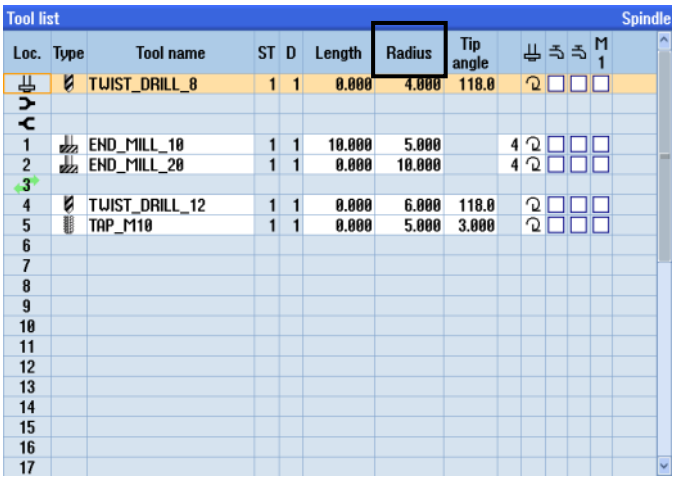
Bit 8: Diameter readout for transverse axis - geometry
The geometry value of the transverse axis is shown as a diameter value.

Bit 9: Diameter readout for transverse axis - wear
The wear value of the transverse axis is shown as diameter value.

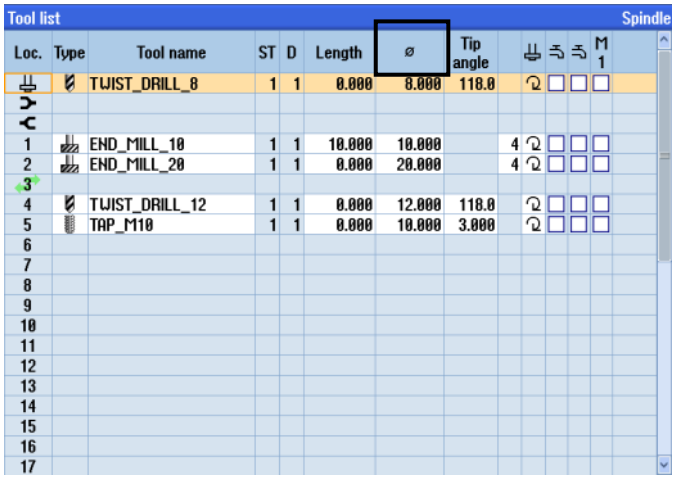
Bit 10: Release of Tool loading / Tool re-location to buffer station
The magazine number can be entered in the loading dialog. This permits access to the buffer station using the magazine number 9998.

Bit 11: The creation of new tools in the gripper locations is blocked.

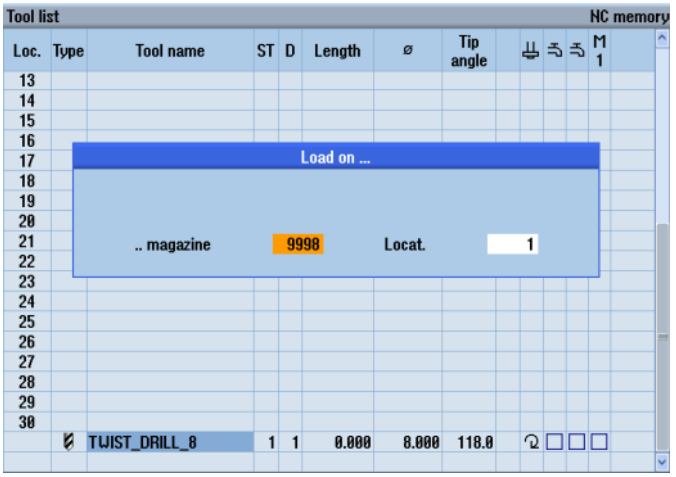
Bit 0 = 0 permanent radius readout for all tools



Bit 0 = 1 Diameter readout for rotating tools



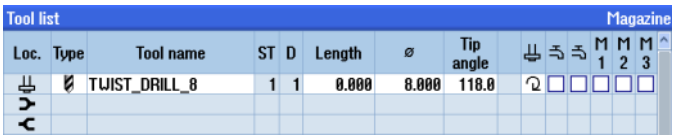
Bit10 = 1 Release of Tool relocation to buffer station



Notes

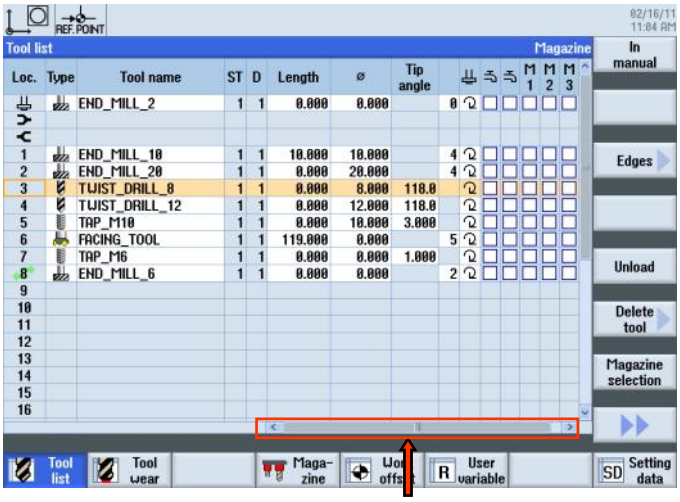
Continued SD54215

The locations 1 = spindle, 2 = gripper 1 and 3 = gripper 2 can be loaded directly by means of the magazine number 9998.
In the tool list these are the uppermost three lines without numbering.
In the shown example the "TWIST_DRILL_8" is loaded in the spindle.

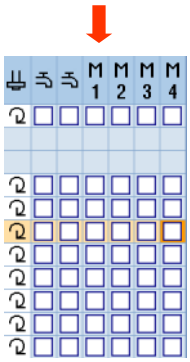


Checking the tool management

Marked tools can be unloaded. As soon as the cursor is moved to a free magazine location the Softkey "New tool" appears for the creation of a new tool.



By horizontal scrolling the fields for all tool-specific M-functions M1 … M4 appear.



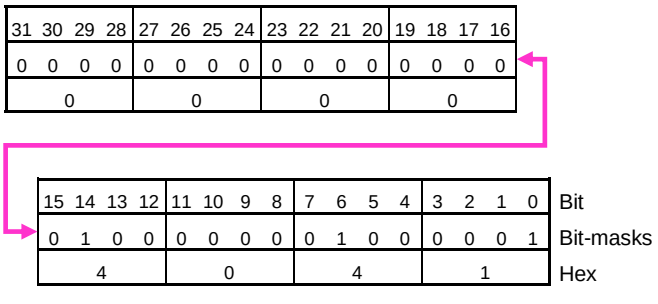
The various types of tools are shown in the selection list.

Basic settings

Reset-defiant settings

Definition of basic control settings after reset/PP end

MD20110 $MC_RESET_MODE_MASK	Definition of basic control settings after reset/PP end
Default: 1H	Change to: 4041H



Notes

Continued MD20110
Bit 0 = 1
Bit 6 = 0 → 1
Bit 14 = 0 → 1

Description:

Determination of the basic control settings after booting and reset/End-of-part-program with respect to the G-codes (especially the current plane and selectable zero-point offset), tool length and transformation by the setting of the following bits:
Bit 0: Reset mode
Bit 1: Suppression of aux. function output on tool selection
Bit 2: Selection of the reset response after power ON; e.g. the tool offset
Bit 3: Selection of the reset response after the end of the test mode in respect of active tool offsets.
Bit 4: Reserved
Bit 5: Reserved
Bit 6: Reset response "Active tool length offset"
Bit 7: Reset response "Active kinematics transformation"
Bit 8: Reset response "Coupled-motion axes"
Bit 9: Reset response "Tangential correction"
Bit 10: Reset response "Synchronous spindle"
Bit 11: Reset response "Rotational feed"
Bit 12: Reset response "Geo-axis replacement"
Bit 13: Reset response "Master value coupling"
Bit 14: Reset response "Initial frames"
Bit 15: Reset response "Electronic gearbox"

Description:

Bit 16: Reset response "Master spindle"
Bit 17: Reset response "Master tool holder"
Bit 18: Reset response "Reference axis for G96/G961/G962"
Bit 19: Reserved "variable SW limit switches disabled"

The Bits 4 to 11, 16 and 17 are only evaluated if Bit 0 = 1

Meaning of the individual Bits:

Bit 0 (LSB) = 0:
Initial setting after booting:
- G-Codes as per $MC_GCODE_RESET_VALUES
- Tool length offset not active
- Transformation not active
- no coupled axes groupings active
- no tangential correction active
- no axial rotational feed active
- path rotational feed with master spindle (Default)

Initial setting after Reset or after end-of-part-program :
The current settings will be retained.
With the next part-program Start the following Initial settings will become active:

- G-Codes as per $MC_GCODE_RESET_VALUES
- Tool length offset not active
- Transformation not active
- No coupled-motion groupings active
- No tangential offsets active
- No master value couplings active
- No axial rotational feedrate active
- Path rotational feedrate with master spindle (Default)

Bit 0 (LSB) = 1:
Initial setting after booting:
- G-Codes as per $MC_GCODE_RESET_VALUES
- Tool length offset active as per $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE and $MC_SUMCORR_RESET_VALUE
- Transformation active per $MC_TRAFO_RESET_VALUE
- Geo axis replacement as per $MC_GEOAX_CHANGE_RESET
- No coupled-motion groupings active
- No tangential correction active

Initial setting after reset or after end-of-part-program:
Depending on the setting of $MC_GCODE_RESET_MODE the current settings for the G-groups will be retained or set to the initial values stored in $MC_GCODE_RESET_VALUES.

Description:

Initial setting after Reset or after end-of-part program:
Depending on $MC_RESET_MODE_MASK Bit 6 to 7 the current settings for
- Tool length offset
- Transformation

will either be retained or changed to the initial settings as stored in the MDs.

Depending on Bit 8 and 9 the current settings of coupled motion axes or tangentially corrected axes will either be retained or switched OFF.

Projected synchronous spindle coupling:
The coupling will be un-selected depending on the setting of $MC_COUPLE_RESET_MODE_1.

Non-projected synchronous spindle coupling:
Depending on Bit 10 the coupling will either be switched OFF or retained.
Depending on Bit 14 the initial frame will be retained or un-selected.

Note:
The setting of Bit 0 = 1 must be set for JobShop-uses, such that the settings of the Bits 4 to 11, 16 and 17 can be evaluated.

Notes

Continued MD20110

Bit 1 = 0:
Auxiliary function output (D,T,M,) to the PLC when selecting tools according to the MDs $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_TOOL_PRESEL_RESET_VALUE and $MC_TOOL_CHANGE_MODE.
T, M will not generally be put out as auxiliary functions if the magazine management is activated.
The function utilizes its own communication in order to put out T, M also - among others - to the PLC.

Bit 1 = 1:
Suppress auxiliary function output to the PLC when selecting tools.
T, M will not generally be put out as auxiliary functions if the tool and magazine management is activated.

Bit 2 = 0 :
If tool and magazine management is not active:
- No tool correction after power On is active. Active and programmed T depend on the additional settings of the machine datum (Bits 0, 6).
If the tool or the magazine management are not active:
- not relevant

Description:

Bit 2 = 1 :
If the tool and/or magazine management is not activated:
- If both Bits 0 and 6 both have the value = 1 (0x41), then the tool offsets of the last tool to be active in NCK after the first reset after Power ON will be active.
(The value of the programmed tool depends on the value of the machine datum $MC_TOOL_PRESEL_RESET_VALUE.)

Caution:

NCK is not aware of the conditions at the machine.

Not relevant, if the tool and or the magazine management is active.

Bit 3 = 0:
With or without tool management:
- End of the test mode: "Retain the current setting for the active tool length offset" (Bits 0 and 6 are set) refers to the program that was active before switching ON the test mode.

Bit 3 = 1:
On any meaning only if the tool management is active:
- End of the test mode: "Retain the current setting for the active tool length offset" (Bits 0 and 6 are set) refers to the program that was active before switching ON the test mode.
(Generally speaking the tool in the spindle is the active tool if the tool management is activated. Exception only for $MC_CUTTING_EDGE_DEFAULT = -2.)

Bit 4 = 0: Reserved
Bit 4 = 1: Reserved

Bit 5 = 0: Reserved
Bit 5 = 1: Reserved

Bit 6 = 0:
Initial setting for the active tool length offset after Reset/End-of-part program as per $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_USEKT_RESET_VALUE and $MC_SUMCORR_RESET_VALUE.
Is $MC_TOOL_CHANGE_MODE = 1, the tool specified by $MC_TOOL_PRESEL_RESET_VALUE is additionally preselected.
If the tool and/or magazine management is active, it is not the datum $MC_TOOL_RESET_VALUE that is used, instead $MC_TOOL_RESET_NAME will be used.

Description:

Bit 6 = 1:
The current setting for the active tool length offset remains in force after reset/End-of-part-program.
If the tool and/or magazine management is active, that tool will be selected which is presently loaded in the master spindle (generally = master tool holder).
If the tool in the master spindle happens to be blocked, the "blocked"-status will be ignored. .

However, it must be remembered that after the end of program or a program interruption either the last programmed value for the master spindle or master tool holder, or the value specified by $MC_SPIND_DEF_MASTER_SPIND or $MC_TOOL_MANAGEMENT_TOOLHOLDER will determine the master spindle or the master tool holder.
(The selection is made by Bit 16 or Bit 17.)

A special case is $MC_CUTTING_EDGE_DEFAULT = -2:
If a tool has been changed on the spindle, but no new correction D has been programmed, then the previous tool is still active in the NCK.
If an interruption takes place in this state, - e.g. by pressing the reset key, the correction will be specified by the lowest D-number of the tool in the master spindle.

Notes

MD20110 continued

Note:
The setting Bit 6=1 is necessary to ensure that after a reset/End-of-part-program the previously programmed tool and the previously programmed cutting edge remains activated (for instance, if the tool was changed via the T,S,M-mask) and if for example the JobShop-functions in the mode of operation JOG "Zero point work piece" or "Tool measurement" can be carried out with this tool.

Bit 7 = 0:
Initial setting for active transformation after Reset/End-of-part-program as per $MC_TRAFO_RESET_VALUE.

Bit 7 = 1:
The current setting for the active transformation remains operative after Reset/End-of-part-program.

Bit 8 = 0:
Coupled-motion groupings will be de-activated after Reset/ End-of-part-program.

Bit 8 = 1:
Coupled-motion groupings remain active after Reset/End-of-part-program.

Description:

Bit 9 = 0:
Tangential correction will be switched OFF with Reset/End-of-part-program.

Bit 9 = 1:
Tangential correction remains activated after Reset/End-of-part program.

Bit 10 = 0:
Non-projected synchronous spindle coupling will be switched OFF after Reset/End-of-part-program.

Bit 10 = 1:
on-projected synchronous spindle coupling remains activated after Reset/End-of-part-program.

Bit 11 = 0:
With Reset/End-of-part-program the setting datum $SA_ASSIGN_FEED_PER_REV_SOURCE of all non-active axes/spindles will be set to =0, i.e feed no longer takes place with rotational feedrate and the setting for path and synchronous axes will be reset to the master spindle (Default)

Bit 11 = 1:
The current setting for the rotational feedrate remains activated after a Reset/End-of-part-program. When a part program is started, the setting datum $SA_ASSIGN_FEED_PER_REV_SOURCE will be reset to 0 for all non-active axes/spindles, i.e. feed no longer takes place with rotational feedrate and the setting for path and synchronous axes will be reset to the master spindle (Default).

Bit 12 = 0:
If the machine datum $MC_GEOAX_CHANGE_RESET is set, a changed geometry axis attribution will be cancelled with reset or with end-of-part program. The initial setting specified in the machine data for the geometry axis attribution is activated.

Bit 12 = 1:
A changed geometry axis attribution remains activated after a Reset/End-of-part-program.

Bit 13 = 0:
Master value couplings are cancelled with Reset/End-of-part-program.

Bit 13 = 1:
Master value couplings remain active after Reset/End-of-part-program.

Description:

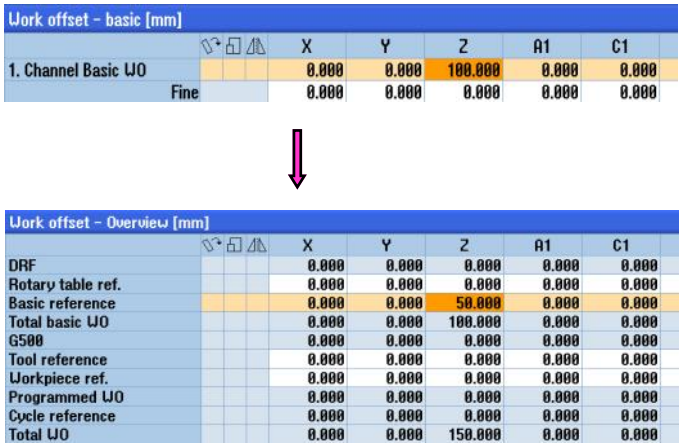
Bit 14 = 0:
The basic frame is cancelled

Bit 14 = 1:
The current setting for the basic frame is retained.

Note:
The setting Bit 14 = 1 is necessary to retain the channel-specific basic work offset (WO), which was activated with G500, after a Reset/End-of-part-program.
After activation of the basic WO (JOG-T,S,M-mask - Work offset - basic reference) the values in the Work offset base are transferred to the Total basic WO and then from there to be transferred for activation also to the Total WO.

Notes

Continued MD20110



Work offset - basic [mm]

	X	Y	Z	A1	C1
1. Channel Basic WO	0.000	0.000	100.000	0.000	0.000
Fine	0.000	0.000	0.000	0.000	0.000

Work offset - Overview [mm]

	X	Y	Z	A1	C1
DRF	0.000	0.000	0.000	0.000	0.000
Rotary table ref.	0.000	0.000	0.000	0.000	0.000
Basic reference	0.000	0.000	50.000	0.000	0.000
Total basic WO	0.000	0.000	100.000	0.000	0.000
G500	0.000	0.000	0.000	0.000	0.000
Tool reference	0.000	0.000	0.000	0.000	0.000
Workpiece ref.	0.000	0.000	0.000	0.000	0.000
Programmed WO	0.000	0.000	0.000	0.000	0.000
Cycle reference	0.000	0.000	0.000	0.000	0.000
Total WO	0.000	0.000	150.000	0.000	0.000

Bit 15 = 0:
Active electronic gearboxes remain activated after Reset/End-of-part-program.

Bit 15 = 1:
Active electronic gearboxes are cancelled with Reset/End-of-part-program.

Bit 16 = 0:
Initial setting for the master spindle as per $MC_SPIND_DEF_MASTER_SPIND.

Bit 16 = 1:
The current setting of the master spindle (SETMS) is retained. This Bit in case of $MC_TOOL_MANAGEMENT_TOOLHOLDER = 0 has also an effect on the response of Bit 6.

Note:
The setting of Bit 16 is not applicable to ShopMill.

Description:

Bit 17 = 0:
Initial setting for the master tool holder as per $MC_TOOL_MANAGEMENT_TOOLHOLDER.

Bit 17 = 1:
The current setting for the master tool holder (SETMTH) is retained. (Bit17 is of importance only if the tool or magazine management is active and if $MC_TOOL_MANAGEMENT_TOOLHOLDER > 0. Otherwise Bit 16 applies to the setting for the master spindle if the tool or magazine management is active. This Bit also has an effect on Bit 6.

Bit 18 = 0:
Reference axis for G96/G961/G962 as per MD 20100: $MC_DIAMETER_AX_DEF.
If SCC is used for an own spindle reset Bit 18 = 1 is recommended (see also MD 20112: $MC_START_MODE_MASK, Bit 18).

Bit 18 = 1:
The reference axis for G96/G961/G962 is retained.

Bit 19: Reserved!

The previously described settings in MD20110 correspond to the further MD-settings in:

MD20120 $MC_TOOL_RESET_VALUE
MD20130 $MC_CUTTING_EDGE_RESET_VALUE
MD20150 $MC_GCODE_RESET_VALUES
MD20152 $MC_GCODE_RESET_MODE
MD20140 $MC_TRAFO_RESET_VALUE
MD20112 $MC_START_MODE_MASK
MD20121 $MC_TOOL_PRESEL_RESET_VALUE
MD20118 $MC_GEOAX_CHANGE_RESET

Notes

Tool edge with length compensation during runup (reset/end of part program)

MD20130 $MC_CUTTING_EDGE_ RESET_VALUE	Tool edge with length com-pens. during runup (reset/end of pp)
Default: 0	Change to: 1

MD20130 = 0 → 1

Description:

Specification of the cutting edge, which depending on MD20110 $MC_RESET_MODE_MASK and after part program Start depending on MD20112 $MC_START_MODE_MASK is used to select the tool length offset after booting and after Reset /End-of-part-program.

With active tool management and with Bit 0 and Bit 6 set in MD20110 $MC_RESET_MODE_MASK at selection, the last offset of the tool active at power OFF (as a rule the tool in the spindle) is effective after booting.

Corresponds to:
MD20110 $MC_RESET_MODE_MASK
MD20112 $MC_START_MODE_MASK

Note:

This setting is necessary to ensure that after a reset/End-of-part-program the previously programmed tool and the previously programmed cutting edge remains activated (for instance, if the tool was changed via the T,S,M-mask) and if for example the JobShop-functions in the mode of operation JOG "Zero point work piece" or "Tool measurement" can be carried out with this tool.

Initial setting of G groups

MD20150 $MC_GCODE_RESET_ VALUES	Initial setting of G groups
Default:	Change to: No change

MD20150[15] = 1 → 3 (CFIN)
MD20150[21] = 1 → 2 (CUT2DF)
MD20150[41] = 1 (TCOABS)
MD20150[51] = 1 (PAROTOF)
MD20150[52] = 1 (TOROTOF)

Description:

Specification of the G-Codes, which after booting and Reset/ End-of-part program are activated depending on MD20110 $MC_RESET_MODE_MASK and MD20152 $MC_GCODE_RESET_MODE as well as after part program Start depending on MD20112 $MC_START_MODE_MASK.

As a default value the index of the G-codes in the respective groups must be stated.

Description:

Denomination	Group	Standard value for 840D sl
GCODE_RESET_VALUES[0]	1	2 (G1)
GCODE_RESET_VALUES[1]	2	0 (inactive)
GCODE_RESET_VALUES[2]	3	0 (inactive)
GCODE_RESET_VALUES[3]	4	1 (STARTFIFO)
GCODE_RESET_VALUES[4]	5	0 (inactive)
GCODE_RESET_VALUES[5]	6	1 (G17)
GCODE_RESET_VALUES[6]	7	1 (G40)
GCODE_RESET_VALUES[7]	8	1 (G500)
GCODE_RESET_VALUES[8]	9	0 (inactive)
GCODE_RESET_VALUES[9]	10	1 (G60)
GCODE_RESET_VALUES[10]	11	0 (inactive)
GCODE_RESET_VALUES[11]	12	1 (G601)
GCODE_RESET_VALUES[12]	13	2 (G71)
GCODE_RESET_VALUES[13]	14	1 (G90)
GCODE_RESET_VALUES[14]	15	2 (G94)
GCODE_RESET_VALUES[15]	**16**	**1 (CFC)**
GCODE_RESET_VALUES[16]	17	1 (NORM)
GCODE_RESET_VALUES[17]	18	1 (G450)
GCODE_RESET_VALUES[18]	19	1 (BNAT)
GCODE_RESET_VALUES[19]	20	1 (ENAT)
GCODE_RESET_VALUES[20]	21	1 (BRISK)

Notes

Continued MD20150

Description:

Denomination	Group	Standard value for 840D sl
GCODE_RESET_VALUES[21]	**22**	**1 (CUT2D)**
GCODE_RESET_VALUES[22]	23	1 (CDOF)
GCODE_RESET_VALUES[23]	24	1 (FFWOF)
GCODE_RESET_VALUES[24]	25	1 (ORIWKS)
GCODE_RESET_VALUES[25]	26	2 (RMI)
GCODE_RESET_VALUES[26]	27	1 (ORIC)
GCODE_RESET_VALUES[27]	28	1 (WALIMON)
GCODE_RESET_VALUES[28]	29	1 (DIAMOF)
GCODE_RESET_VALUES[29]	30	1 (COMPOF)
GCODE_RESET_VALUES[30]	31	1 (G810)
GCODE_RESET_VALUES[31]	32	1 (G820)
GCODE_RESET_VALUES[32]	33	1 (FTOCOF)
GCODE_RESET_VALUES[33]	34	1 (OSOF)
GCODE_RESET_VALUES[34]	35	1 (SPOF)
GCODE_RESET_VALUES[35]	36	1 (PDELAYON)
GCODE_RESET_VALUES[36]	37	1 (FNORM)
GCODE_RESET_VALUES[37]	38	1 (SPIF1)
GCODE_RESET_VALUES[38]	39	1 (CPRECOF)
GCODE_RESET_VALUES[39]	40	1 (CUTCONOF)
GCODE_RESET_VALUES[40]	41	1 (LFOF)
GCODE_RESET_VALUES[41]	**42**	**1 (TCOABS)**
GCODE_RESET_VALUES[42]	43	1 (G140)
GCODE_RESET_VALUES[43]	44	1 (G340)
GCODE_RESET_VALUES[44]	45	1 (SPATH)
GCODE_RESET_VALUES[45]	46	1 (LFTXT)
GCODE_RESET_VALUES[46]	47	1 (G290 SINUMERIK-mode)
GCODE_RESET_VALUES[47]	48	3 (G462)
GCODE_RESET_VALUES[48]	49	1 (CP)
GCODE_RESET_VALUES[49]	50	1 (ORIEULER)
GCODE_RESET_VALUES[50]	51	1 (ORIVECT)
GCODE_RESET_VALUES[51]	**52**	**1 (PAROTOF)**
GCODE_RESET_VALUES[52]	**53**	**1 (TOROTOF)**
GCODE_RESET_VALUES[53]	54	1 (ORIROTA)
GCODE_RESET_VALUES[54]	55	1 (RTLION)
GCODE_RESET_VALUES[55]	56	1 (TOWSTD)
GCODE_RESET_VALUES[56]	57	1 (FENDNORM)
GCODE_RESET_VALUES[57]	58	1 (RELIEVEON)
GCODE_RESET_VALUES[58]	59	1 (DYNNORM)
GCODE_RESET_VALUES[59]	60	1 (WALCS0)
GCODE_RESET_VALUES[60]	61	1 (ORISOF)
…		
...		
GCODE_RESET_VALUES[69]	70	1 (not specified)

Notes:

(exact) means that this setting is necessary in conjunction with JobShop; (variable) means that this should be seen as a suggestion and that another setting is permissible.

MD20150[15] = 3 (variable)
Group 16: Feedrate correction on internal and external curves
Value: 3 = CFIN
This setting provokes a constant feedrate on internal curves and acceleration on external curves

MD20150[21] = 2 (variable)
Group 22: Tool correction type
Value: 2 = CUT2DF
2½-D-tool correction caused by Frame
The tool correction acts relative to the current Frame (oblique plane)

MD20150[41] = 1 (exact)
Group 42: Tool carrier
Value: 1 = TCOABS
Determination of the tool length components from the current tool orientation

MD20150[51] = 1 (exact)
Group 52: Tool-related Frame rotation
Value: 1 = PAROTOF
The tool related Frame rotation is deactivated.
The work piece co-ordinate system is not aligned to the work piece.

MD20150[52] = 1 (variable)
Group 52: Tool-related Frame rotation
Value: 2 = TOROTOF
The tool related Frame rotation is de-activated.

Notes

Reset response of G groups

MD20152 $MC_GCODE_RESET_MODE	Reset response of G groups
Default: 0	Change to:

MD20152[5] = 1 (exact)
MD20152[7] = 1 (exact)
MD20152[12] = 0 (exact)
MD20152[21] = 0 (variable)

Description:

This machine datum is evaluated only if in MD20110 $MC_RESET_MODE_MASK the Bit 0 is set. For each entry in MD20150 $MN_GCODE_RESET_VALUES (that is for each G group) this MD is used to specify whether

= 0: in case of a Reset/End-of-part-program the setting as per $MC_GCODE_RESET_VALUES is used again
or
= 1: the current setting is retained after Reset/End-of-part-program

A list of the G-functional groups can be found with MD20150 MC_GCODE_RESET_VALUES.

Notes:
(exact) means that this setting is necessary in conjunction with JobShop; (variable) means that this should be seen as a suggestion and that another setting is permissible.

MD20152[5] = 1 (exact)
Group 6: Plane selection
Value: 1
A plane switch (e.g. G17 for facing) programmed in the part-program remains active after Reset/ End-of-part-program.

MD20152[7] = 1 (exact)
Group 8: Selectable zero point offset
Value: 1
A zero point offset (e.g. G54) programmed in the part program remains active after Reset/End-of-part-program. This permits for example the activation of a zero point offset in the mode-of-operation JOG_T,S,M-mask Parameter zero point offset.

Description:

MD20152[12] = 0 (exact)
Group 13: Work piece dimensioning inch/metric
Value: 0
In the user interface it is possible in the mode-of-operation JOG Basic softkey line ">" Settings per Softkey "Switching Inch" to toggle the measuring system from metric to inch and vice versa.

MD20152[21] = 0 (variable)
Group 22: Tool correction type
Value: 0
After Reset/End-of-part-program the tool correction defined in MD20150[15] is activated once more. CUT2DF in this configuration example.

Activation and impact of program runtime measurement

MD27860 $MC_PROCESSTIMER_MODE	Activation and impact of program runtime measurement
Default: 0H	Change to: 73H

MD27860 Bit 0 = 0 → 1
MD27860 Bit 1 = 0 → 1
MD27860 Bit 4 = 0 → 1
MD27860 Bit 5 = 0 → 1
MD27860 Bit 6 = 0 → 1

Description:

Under the function program runtime timers are provided as system variables. While the NCK-specific timers are always activated (for timings since the last control unit boot), the channel-specific timers must be started by means of this datum.

Meaning:

Bit 0 = 0
No timing of the total runtime for all part programs

Notes

Continued MD27860

Bit 0 = 1
The timing of the total runtime for all part programs is active ($AC_OPERATING_TIME)

Bit 1 = 0
No timing of the current program runtime

Bit 1 = 1
The measurement of the current program run-time is active ($AC_CYCLE_TIME)

Bit 2 = 0
No timing of the tool cutting time

Bit 2 = 1
Timing of the tool cutting time is active ($AC_CUTTING_TIME)

Bit 3
Reserved

Bits 4 only if Bit 0 and 1= 1:

Bit 4 = 0 No timing during active test run feed motion

Bit 4 = 1 Timing also during active test run feed motion

Description:

Bit 5 = 0 No timing during program test

Bit 5 = 1 Timing also during program test

Bit 6 only if Bit 1 = 1:

Bit 6 = 0
Delete $AC_CYCLE_TIME also after Start by ASUP and PROG_EVENTs.

Bit 6 = 1
$AC_CYCLE_TIME will not be deleted after Start by ASUP and PROG_EVENTs.

Bit 7 only if Bit 2 = 1:

Bit 7 = 0 $AC_CUTTING_TIME counts only with active tool.

Bit 7 = 1 $AC_CUTTING_TIME counts independently of tool.

Bit 8 only if Bit 1 = 1:

Bit 8 = 0
$AC_CYCLE_TIME will not be deleted in case of a jump with GOTOS to the program start.

Description:

Bit 8 = 1
$AC_CYCLE_TIME will be deleted in case of a jump with GOTOS to the program start.

Bit 9 only if Bit 0, 1 = 1:

Bit 9 = 0
$AC_OPERATING_TIME, $AC_CYCLE_TIME: No timing when Override = 0.

Bit 9 = 1
$AC_OPERATING_TIME, $AC_CYCLE_TIME: Timing also if Override = 0.

Bit 10 to 31
Reserved

Work piece counters

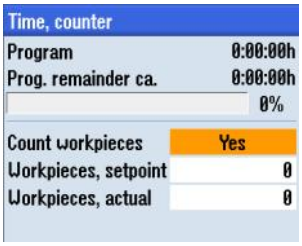
A difference is made between the following work piece counters:

- Number of the command work pieces
  System variable $AC_REQURED_PARTS
  Setting by means of Bit 0 and 1
- Total number of work pieces (actual work pieces) finished since the Start
  System variable $AC_TOTAL_PARTS
  Setting by means of Bit 4, 5 and 7
- Number of all work pieces (actual work pieces) finished since the Start
  System variable $AC_ACTUAL_PARTS
  Setting by means of Bit 8, 9 and 11
- Number of work pieces finished as per the own strategy
  System variable $AC_SPECIAL_PARTS
  Setting by means of Bit 12, 13 and 15

Notes

Continued Work piece counters

In the user interface of the mode-of-operation AUTO the mask shown alongside can be opened by selecting Time/ Counter



The following assignment applies:
- Parameter "Workpieces, setpoint": $AC_REQUIRED_PARTS
- Parameter "Workpieces, actual": $AC_ACTUAL_PARTS

Activation of workpiece counter

MD27880 $MC_PART_COUNTER	Activation of workpiece counter
Default: 0H	Change to: 901H

MD27880 Bit 0 = 0 → 1
MD27880 Bit 8 = 0 → 1
MD27880 Bit 11 = 0 → 1

Bit 0 = 1: Counter $AC_REQUIRED_PARTS is activated
Further meaning of Bit 1-3 only if Bit 0 =1 and $AC_REQUIRED_PARTS > 0:

Further meaning of Bit 1 - 3 only if Bit 0 = 1 and $AC_REQUIRED_PARTS > 0:

Bit 1 = 0: Alarm/VDI-output if $AC_ACTUAL_PARTS corresponds to $AC_REQUIRED_PARTS

Bit 1 = 1: Alarm/VDI-output if $AC_SPECIAL_PARTS corresponds to $AC_REQUIRED_PARTS

Bit 2: reserved

Bit 3: reserved

Bit 4 = 1: Counter $AC_TOTAL_PARTS is active

Further meaning of Bit 5 - 7 only if Bit 4 = 1 and $AC_TOTAL_PARTS > 0:

Bit 5 = 0: Counter $AC_TOTAL_PARTS is increased by the value 1 after a VDI-output of M02/M30.

Bit 5 = 1: Counter $AC_TOTAL_PARTS is increased by the value 1 after the output of the M-command from MD PART_COUNTER_MCODE[0]

Bit 6 : reserved

Bit 7 = 1: Counter $AC_TOTAL_PARTS is increased by the value 1 after a jump back with GOTOS

Bit 8 = 1: **Counter $AC_ACTUAL_PARTS is active**

Further meaning of Bit 9 - 11 only if Bit 8 = 1 and $AC_REQUIRED_PARTS > 0:

Bit 9 = 0: Counter $AC_ACTUAL_PARTS is increased by the value 1 after a VDI-output of M02/M30

Bit 9 = 1: Counter $AC_ACTUAL_PARTS is increased by the value 1 after the output of the M-command from MD PART_COUNTER_MCODE[1]

Bit 10: reserved

Bit 11 = 1: Counter $AC_ACTUAL_PARTS is increased by the value 1 after a jump back with GOTOS.

Bit 12 = 1: Counter $AC_SPECIAL_PARTS is active

Further meaning of Bit 13-15 only if Bit 12 =1 and $AC_REQUIRED_PARTS > 0:

Bit 13 = 0: Counter $AC_SPECIAL_PARTS is increased by the value 1 after a VDI-output of M02/M30

Bit 13 = 1: Counter $AC_SPECIAL_PARTS is increased by the value 1 after output of the M-command from MD PART_COUNTER_MCODE[2]

Bit 14: reserved

Notes

Continued MD27880

Bit 15 = 1: Counter $AC_SPECIAL_PARTS is increased by the value 1 after a jump back with GOTOS.

Application example:

MD27880 PART_COUNTER = 101H
Bit 0 = 1: Counter $AC_REQUIRED_PARTS "Work pieces Command" activate
Bit 8 = 1: Counter $AC_ACTUAL_PARTS "Work pieces Actual" activate

MD 27882[1] PART_COUNTER_MCODE = 32

Part program:

In such a JobShop-Program the program repeat can be switched ON in the automatically generated End-of-program block by means of the parameter "Repetition". In this case the command GOTOS will be generated.

In a G code part program the program repetition can be done by

- the command GOTOS or#
- ….
  GOTOS ;Repeat
  M30
- a self-defined M command
  …
  M33 ; Repeat
  M30

The number of work pieces is to be set in the mode-of-operation AUTO in the mask “Time/Counter” by the parameter “Workpieces, setpoint”.

Relevant PLC interface signals:
Activating the part program repetition is done by setting the PLC interface signal "Chan1".A_ProgJump//DB21.DBX384.0 to 1.
When the actual number of workpieces matches the number of setpoint the PLC interface signal "Chan1".E_WS_Step// DB21.DBX317.1 is set to 1.

Memory space for REORG (DRAM)

MD28000 $MC_MM_REORG_LOG_ FILE_MEM	Memory space for REORG (DRAM)
Default: 50	Change to: 75

Number of blocks for local user variables in REORG (DRAM)

MD28010 $MC_MM_NUM_REORG_ LUD_ MODULES	Number of blocks for local user variables in REORG (DRAM)
Default: 8	Change to: 20

Projecting of channel-specific system frames

MD28082 $MC_MM_SYSTEM_FRAME_ MASK	System frames (SRAM)
Default: 21H	Change to:

Bit 0 = 1 System frame for Actual value set and scratching
Bit 5 = 1 System frame for cycles

Description:

Bit-mask for the projecting of channel-specific system frames, which are evaluated in the channel.

Bit 0: System frame for actual value set and scratching
Bit 1: System frame for external zero point offset
Bit 2: System frame for TCARR and PAROT
Bit 3: System frame for TOROT and TOFRAME
Bit 4: System frame for work piece reference points
Bit 5: System frame for cycles
Bit 6: System frame for transformations
Bit 7: System frame $P_ISO1FR for ISO G51.1 mirror
Bit 8: System frame $P_ISO2FR for ISO G68 2DROT
Bit 9: System frame $P_ISO3FR for ISO G68 3DROT
Bit 10: System frame $P_ISO4FR for ISO G51 Scaling
Bit 11: System frame $P_RELFR for rel. co-ordinate systems

Note:
The system frames for actual value set and scratching (basic reference=) and for cycles are required for JobShop installations.

Notes

JOG-TSM

In the operation mode JOG the input masks for "T,S,M", "Position" and "Face milling" are available. These permit simple functions to be carried out such
- T,S,M: Tool changes, spindle functions, ZPO-selections
- Position: axes and spindles positioning
- Face milling: roughing of a corner with chamfers and/or radii.

After the data have been entered and NC-Start initiated the file MA_JOG_STEP1.MPF will be generated in the directory "Workpieces - TEMP " in the program-manager and executed.

To ensure that such functions as e. g. tool selection and spindle Start will remain activated also after reset and end-of program, respective machine data are required, which will be described below.

The settings will be described with the T,S,M-Mask; the input masks Position and Roughing do not require special settings.

Tool change

Definition of basic control settings after reset/PP end

MD20110 $MC_RESET_MODE_MASK	Definition of basic control settings after reset/PP end
Default: 1H	Change to: 4041H

MD20110 = 1H → 4041H

Bit 6 = 0 → 1

Description:

Bit 6: Reset behaviour "active tool length correction"

Bit 6 = 1:

The current setting for the active tool length correction remains active also after Reset/end-of-part program.
If the tool or magazine management is active, that tool is selected which happens to be in the master spindle (generally referred to as master-tool holder).
If the tool in the master spindle is locked, the "locked" status will be ignored.

It must be borne in mind that after end-of-program, program abort either the last programmed value for the master spindle respectively the master tool holder or else the value specified by $MC_SPIND_DEF_MASTER_SPIND respectively $MC_TOOL_MANAGEMENT_TOOLHOLDER for the master spindle respectively the master-tool holder will be used.

Activation of tool management functions

MD20310 $MC_TOOL_MANAGEMENT_MASK	Activation of tool management functions
Default: 0H	Change to: 80400BH

Bit 0 - 3 must be set as in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

Bit 0 = 0 → 1 Magazine management active
Bit 1 = 0 → 1 Monitoring functions active
Bit 3 = 0 → 1 Adjacent location treatment
Bit 14 = 0 → 1 autom. tool change during Reset and Start
Bit 23 = 0 → 1 On offset selection no synchronization with HL

Description:

Bit 14 = 1: Reset-Mode
Tool and correction selection as per the settings of MD20110 $MC_RESET_MODE_MASK and MD20112 $MC_START_MODE_MASK.

Bit 14 = 0: No Reset mode

Notes

Spindle

These settings are required to enable spindles to be started from the T,S,M mask.

M function for spindle active after reset

MD10714 $MN_M_NO_FCT_EOP	M function for spindle active after reset
Default: -1	Change to: 32

MD10714 = -1 → 32 (Suggestion M32)

Description:

With Start in the manual mode-of-operation (T,S,M-mask, position) the part-program MA_JOG_STEP1 will be generated and executed.
This part-program will be finished with the M-function in MD10714. The setting of MD35040 = 2 ensures that the spindle remains active also after the end-of-program.

Limitations see MD10715 $MN_M_NO_FCT_CYCLE

Own spindle RESET

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET	Own spindle RESET
Default: 0	Change to: 2

MD35040 = 0 → 2

Description:

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET defines the response of the spindle after channel reset NC/PLC interface signal DB21-30 DBX7.7 (Reset) and program end (M2, M30).

This MD is only active in the spindle mode open-loop control mode. In the positioning or oscillation mode, the spindle is always stopped.

Settings for the control unit:

AX4:SP1
MD35040 =0 → 2 Own spindle-RESET

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET = 0:

- Spindle stops (with M2/M30 and channel and mode group reset)
- • Program is aborted

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET= 1:

- Spindle does not stop
- • Program is aborted

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET= 2:
• Spindle does not stop at the M function configured via MD10714 $MN_M_NO_FCT_EOP (e.g. M32).
• However, the spindle stops at channel or mode group reset.

The NC/PLC interface signal DB31, ... DBX2.2 (Delete distance-to go/
Spindle reset) is always effective, independent of MD35040 $MA_SPIND_ACTIVE_AFTER_RESET.

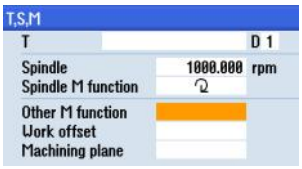
Not relevant to:
• Spindle modes other than open-loop control mode.
Corresponds to:
NC/PLC interface signal DB21-30 DBX7.7 (Reset)
NC/PLC interface signal DB31, ... DBX2.2 (Delete distance-to go/spindle reset)

Start main spindle via the T,S,M-mask

T,S,M-mask with inputs for spindle speed and direction of rotation of the main spindle S1

Enter speed and direction of rotation

and actuate NC-Start



MA_JOG_STEP1 is generated

```
NC/WKS/TEMP/MA_JOG_STEP1
PROC MA_JOG_STEP1 SBLOF¶
CYCLE210(0)¶
M3 G972 S1=1000¶
¶
M32¶
```

Notes

Continued Start main spindle via the T,S,M-mask

Description:

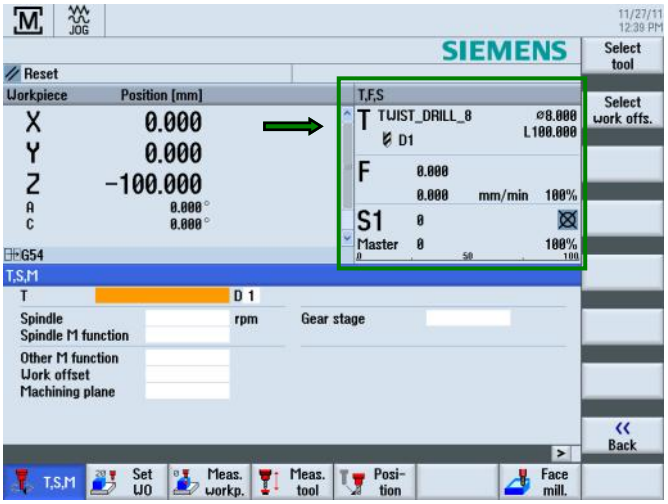
- M3 G972 S1=1000
  Starting of the spindle

Note:
In case of a ShopMill installation there will be no CUST_TECHCYC call-ups for the spindle control from the T,S,M-mask and during program execution.

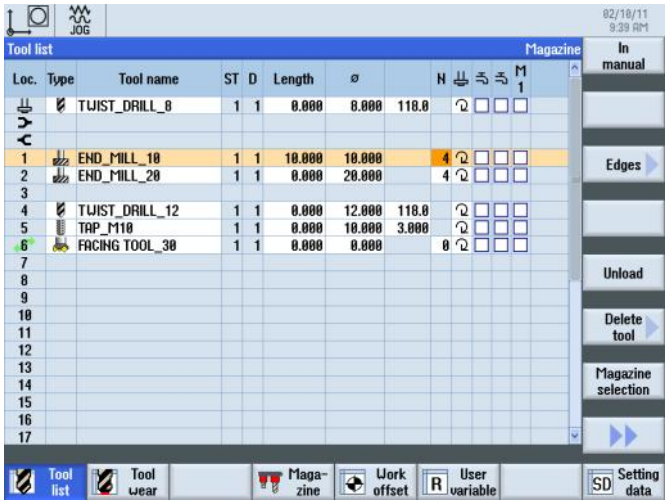
Note on spindle direction of rotation:

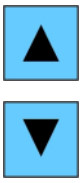
The assignment of the direction arrow for the spindle M-function M3/M4 is effected via the MD52207 $MCS_AXIS_USAGE_ATTRIB.

Monitoring the tool change



Shown in the T,F,S-field is the tool currently loaded in the spindle.

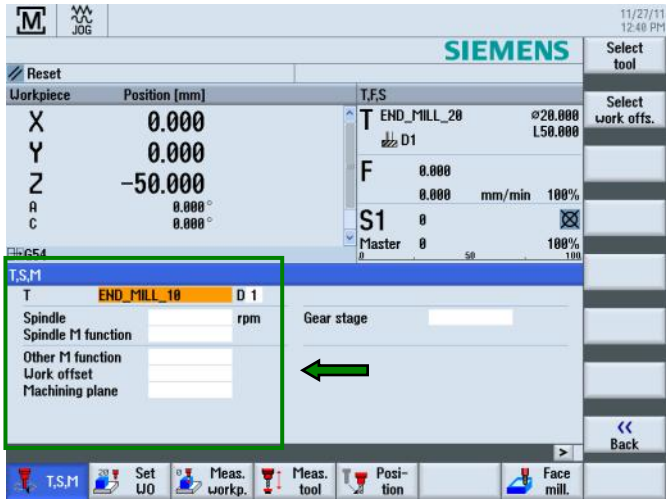




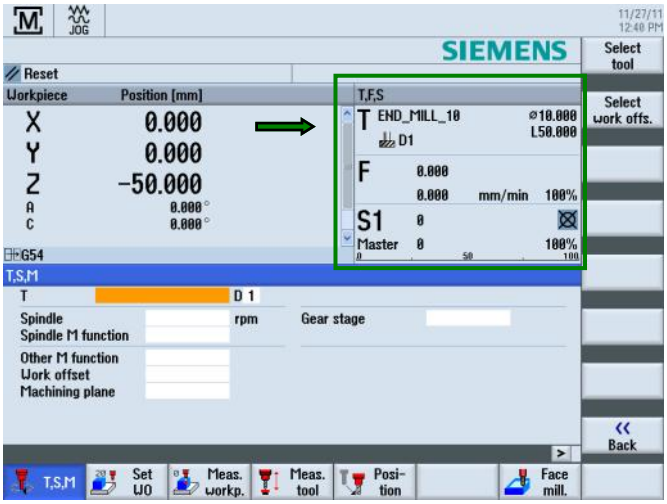
Use the cursor keys to select the required tool and thereafter transfer it by means of the Soft-Key "In manual" .

Notes

Loading the new tool



The selected tool "Finisher" is now displayed in the T,S,M mask.



The tool will be loaded into the T,F,S mask with Cycle Start. The PLC-tool change functions provided by the machine manufacturer are executed in the background for this process.

Gear step

Parameterize gear stage change

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE	Parameterize gear stage change
Default: 0H	Change to: 1H

Number of gear stages

MD35090 $MA_NUM_GEAR_STEPS	Number of gear stages
Default: 5	Change to:

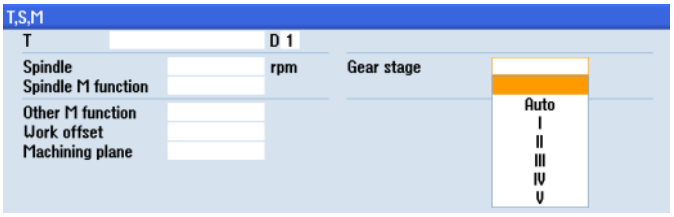
Description:

Number of prepared gear stages.

The first gear stage is always activated.

Note:

The selection field Gear stage appears only if in MD35010 for the spindle Bit 0 = 1 is set.



With NC-Start the program MA_JOG_STEP1 will be generated - in this example for the selection of the gear stage 2 = M42.

```
NC/WKS/TEMP/MA_JOG_STEP1
PROC MA_JOG_STEP1 SBLOF¶
CYCLE210(0)¶
M42 ¶
¶
M32¶
```

Notes

Inch/Metric-switching

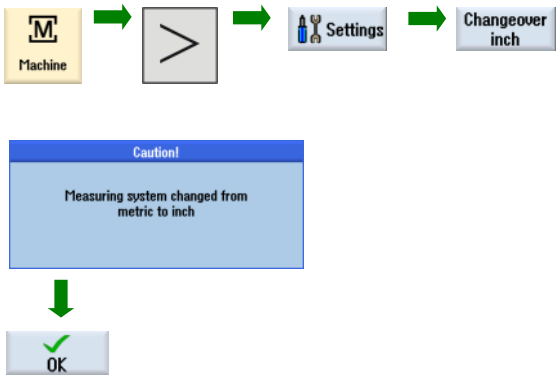
Below once again a summation of the machine data settings required for Inch/Metric-switching.

Enable basic system conversion

MD10260 $MN_CONVERT_SCALING_SYSTEM	Enable basic system conversion
Default: 0	Change to: 1

Description:

Switching the measuring systems with HMI-Softkey
0. Hide Softkey inch/metric switching
1. Display Softkey inch/metric switching
Selection of Inch/Metric-switching:



Note:

MD 20152[12] = 0 must be set for the position readouts to be converted.

Block search

Parameterization for block search

MD11450 $MN_SEARCH_RUN_MODE	Parameterization for block search
Default: 0H	Change to: 7H

Bit 0 = 0 → 1 Put out alarm 10208 to PROG_EVENT

Bit 1 = 0 → 1 automatic ASUP-Start (PROG_EVENT)

Bit 2 = 0 → 1 No collection of auxiliary functions

Function mask Cross-technology

MD52212 $MCS_FUNCTION_MASK_TECH	Function mask Cross-technology
Default: 0H	Change to: 8H

Bit 3 = 0 → 1

Description:

Bit 0: Enabled Swivel
Bit 1: No optimized travel along software limit switches
Bit 2: Approach logic for step drill (ShopTurn)
Bit 3: Call block search-cycle for ShopMill/ShopTurn
Bit 4: Approach logic through cycle (ShopTurn)
Bit 5: Call block search cycle for SERUPRO
Bit 6: Work offset value ZV cannot be entered (ShopTurn)

Note:

The setting of Bit 3=1 ensures that the tool programmed after the block search is duly changed and that the spindle rotates in the tool-assigned direction at the speed programmed in the destination block. For installations without ShopMill this Bit needs not to be set, however, the machine manufacturer must ensure that the tool and spindle functions are gathered and put out during the block search.

Notes

Tool change commands to PLC after search run

MD20128 $MC_COLLECT_TOOL_ CHANGE	Tool change commands to PLC after search run
Default: 1	Change to: 0 when ShopMill/ShopTurn

MD20128 = 1 → 0 No gathering of tools during the block search

Description:

This MD is of any meaning only with activated magazine management (MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, MD20310 $MC_TOOL_MANAGEMENT_MASK).
It specifies whether after block search with evaluation tool changing commands, tool preparation commands (generally tool changing commands) are put out to the PLC or not put out to the PLC.

1: Tool changing commands and tool preparation commands are gathered and passed on to the PLC with program Start when the search run has attained the destination block.

0: all tool and/or magazine specific commands that were gathered during the block search will not be put out to the PLC with the next program Start! That means that also programmed POSM, TCI, TCA will not be passed on to the PLC.

Note 1:

Without an active magazine management the tool change-M-code will not be gathered, if it is not assigned to an auxiliary function group. With an active magazine management this corresponds to an MD-value = 0.

Note 2:

The value = 0 is sensible for instance if after reaching the search destination the gathered tool change commands are transferred to the PLC in an ASUP-program with the aid of the commands GETSELT, GETEXET.

Simulation

Adjustment of SZS co-ordinate system (settable zero system)

MD24030 $MC_FRAME_ACS_SET	Adjustment of SZS co-ordinate system
Default: 0	Change to: 1

MD24030 = 0 → 1

Description:

0: SZS results from the WCS transformed with $P_CYCFRAME and $P_PFRAME.

1: SZS results from the WCS transformed with $P_CYCFRAME.

The position readouts show the SZS-co-ordinate system if "WCS" is selected.

Depiction of the co-ordinate systems and the Frame chain

Axis position at start of simulation

MD53230 $MAS_SIM_START_ POSITION	Axis position at start of simulation
Default: 0	Change to: 500, 500, 200 mm

AX1: X1
MD53230 = 0 → e.g. 500 mm

AX2: Y1
MD53230 = 0 → e.g. 500 mm

AX3: Z1
MD53230 = 0 → e.g. 200 mm

Description:

Axis position at the Start of the simulation.

Note:

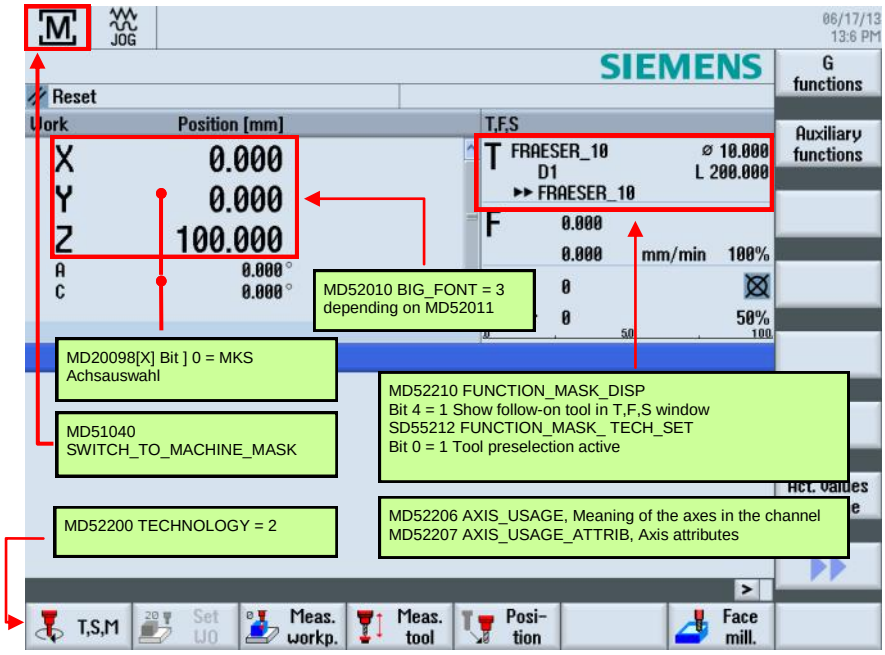
For the further axes and spindles this MD should be left on 0.

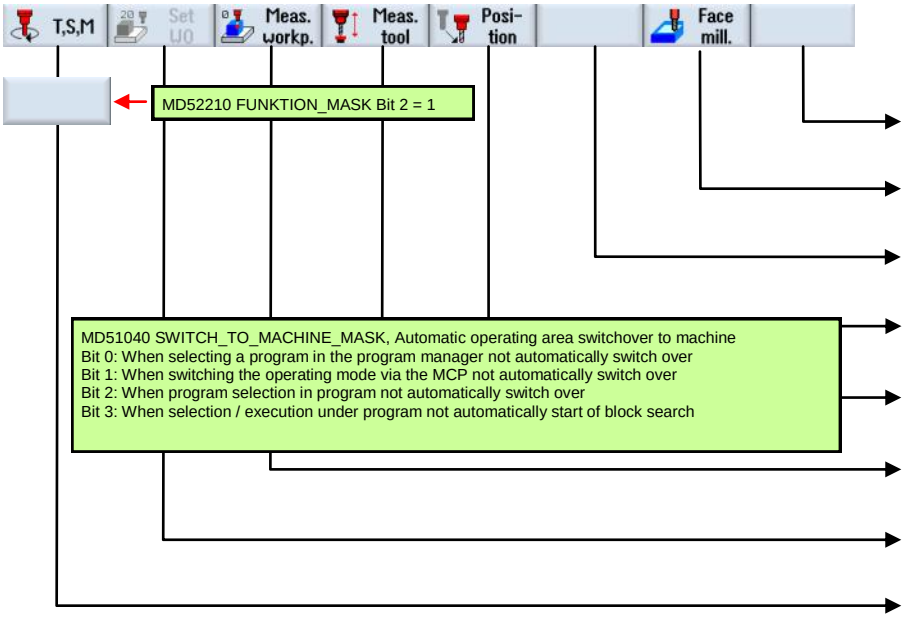
Notes

Notes

Menu and Technology settings

Machine —> JOG

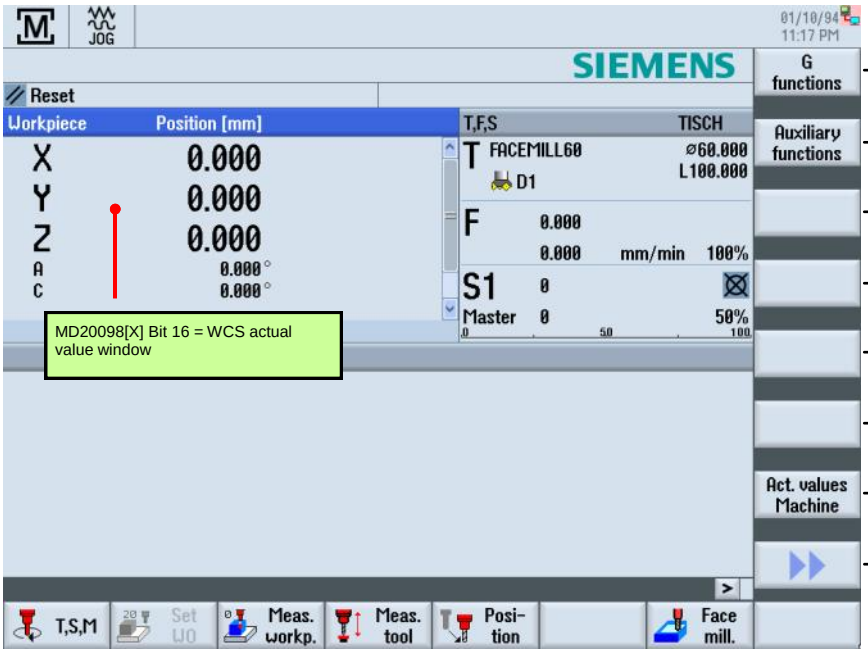




Softkey selection	Description
MD52200 = 2	=2: Technology Milling
MD52200 = 2	=2: Technology Milling
MD52200 = 2	=2: Technology Milling
MD52210 Bit 2 = 0	Bit 2 = 0 Show Softkey "T,S,M" in JOG area

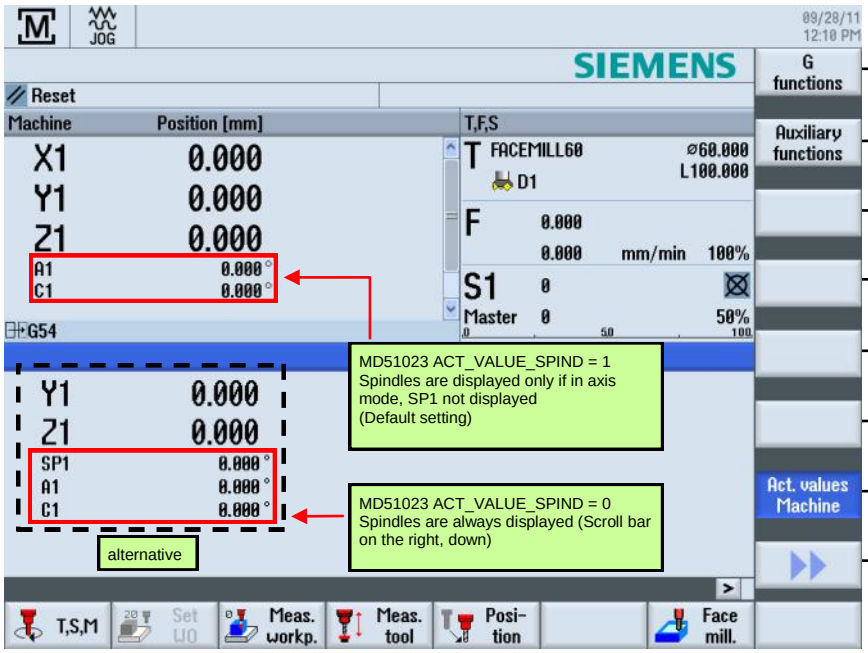
Notes

Machine —> JOG —> WCS



Softkey selection	Description
Switchover MCS/WCS	Switchover Softkey from MCS to WCS via PLC (DB19)

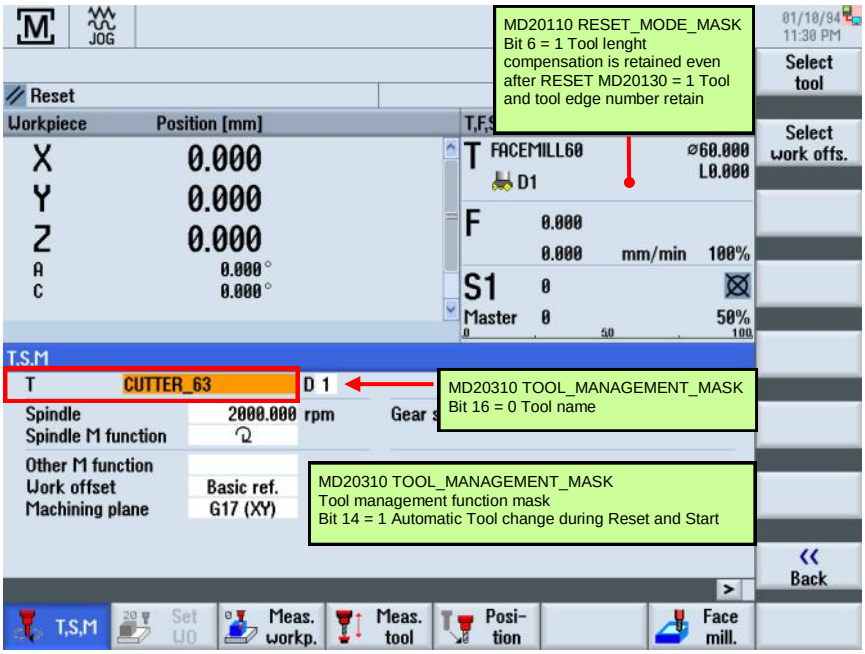
Machine —> JOG —>MCS



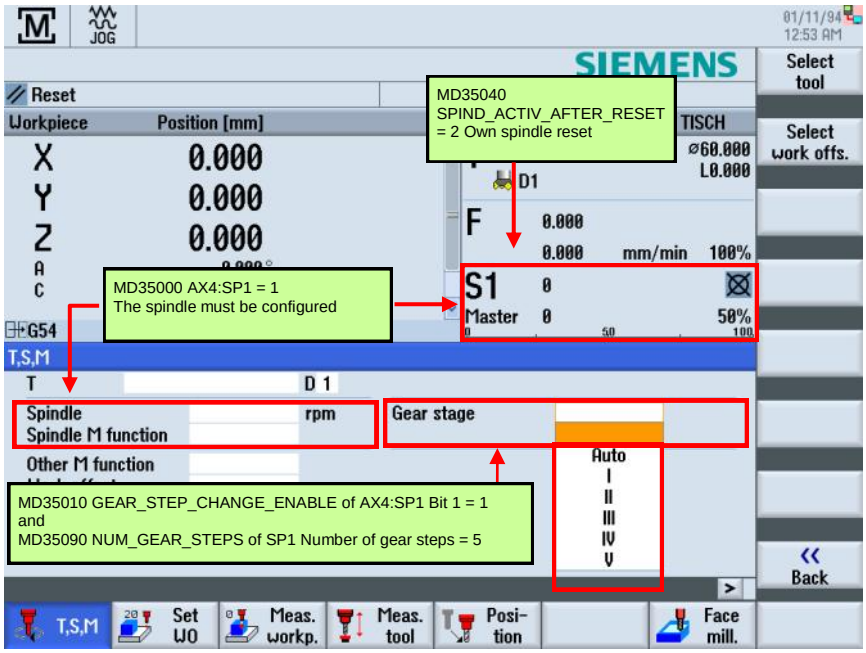
Softkey selection	Description
Switchover MCS/WCS	Switchover Softkey from MCS to WCS via PLC (DB19)

Notes

Machine —> JOG —> T,S,M

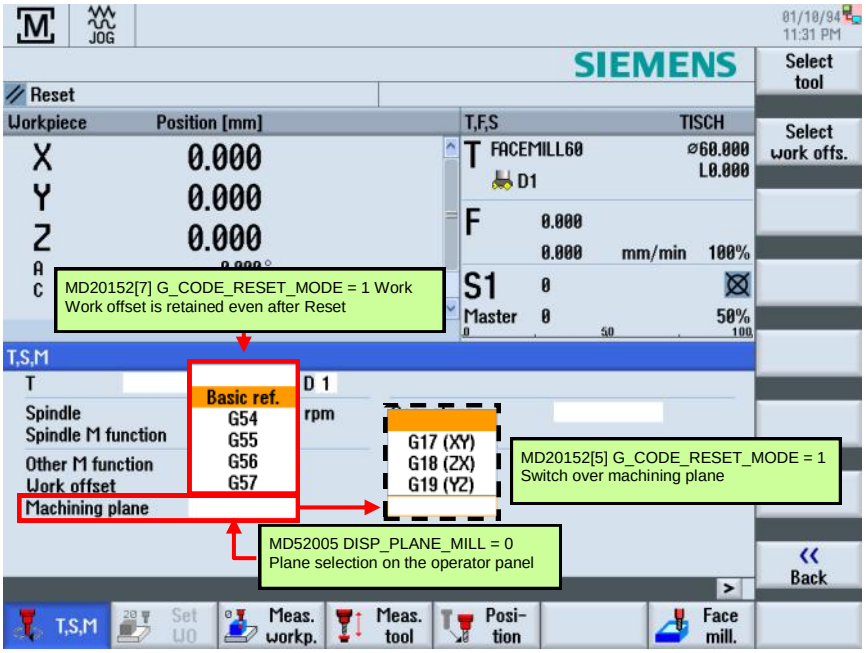


Machine —> JOG —> T,S,M

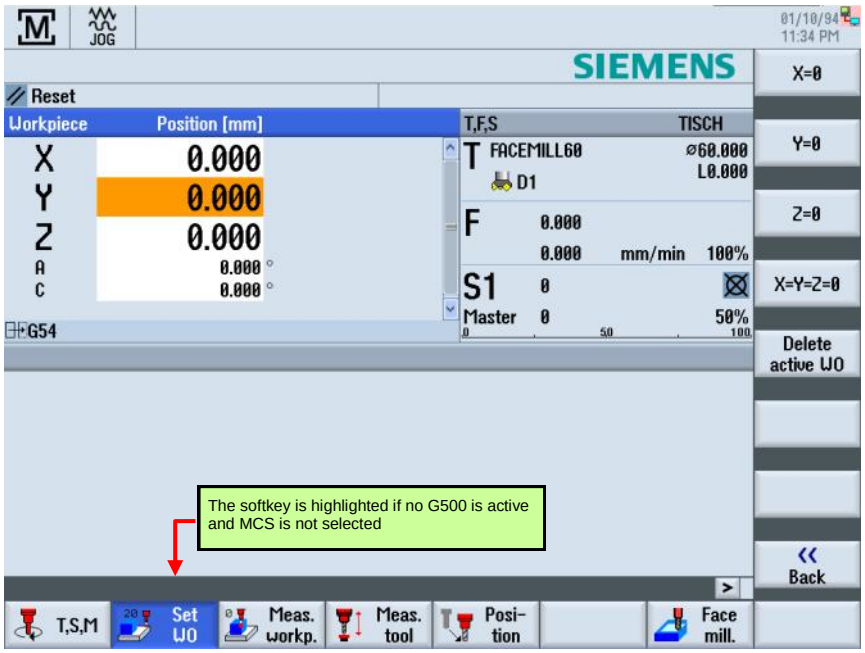


Notes

Machine —> JOG —> T,S,M

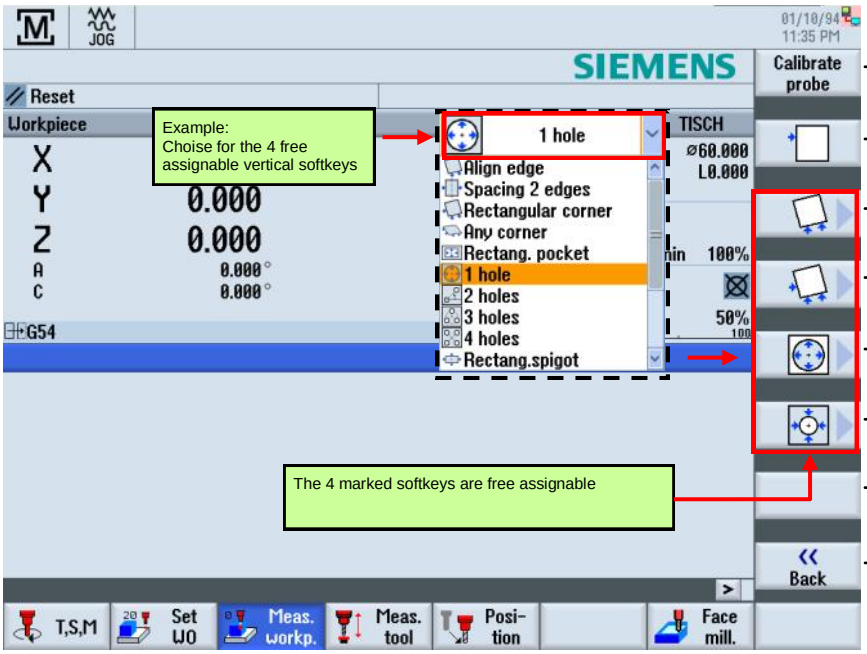


Machine —> JOG —> Set WO



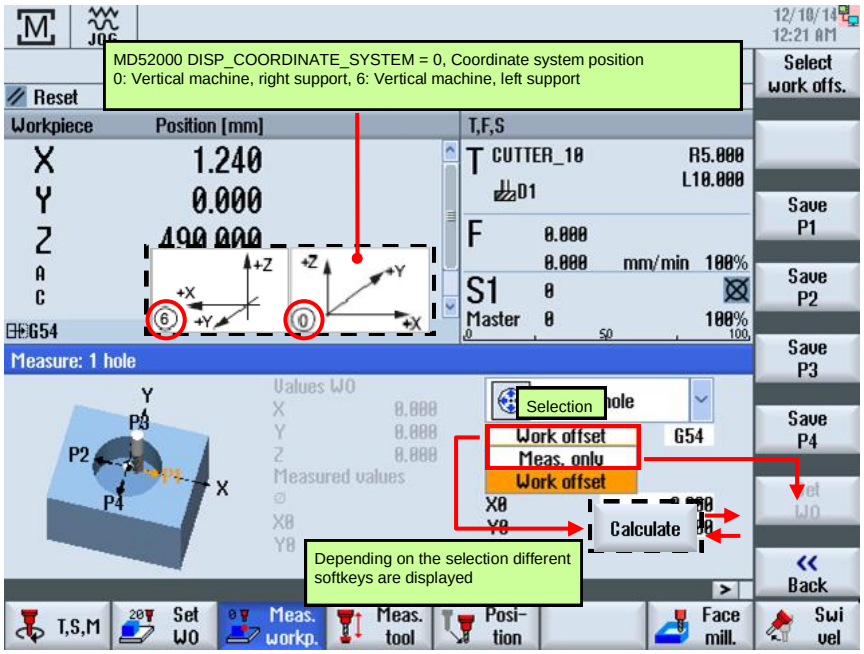
Notes

Machine —> JOG —> Measure workpiece



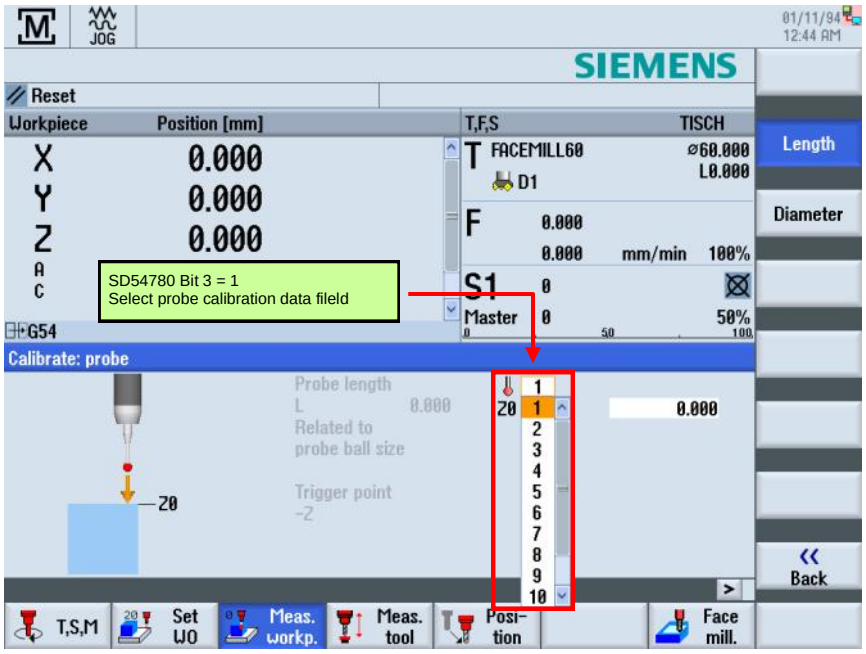
Softkey selection	Description
SD54780 Bit 2 = 1	Bit 2 = 1 Activate calibration for electronic workpiece probe

Machine —> JOG —> Measure workpiece

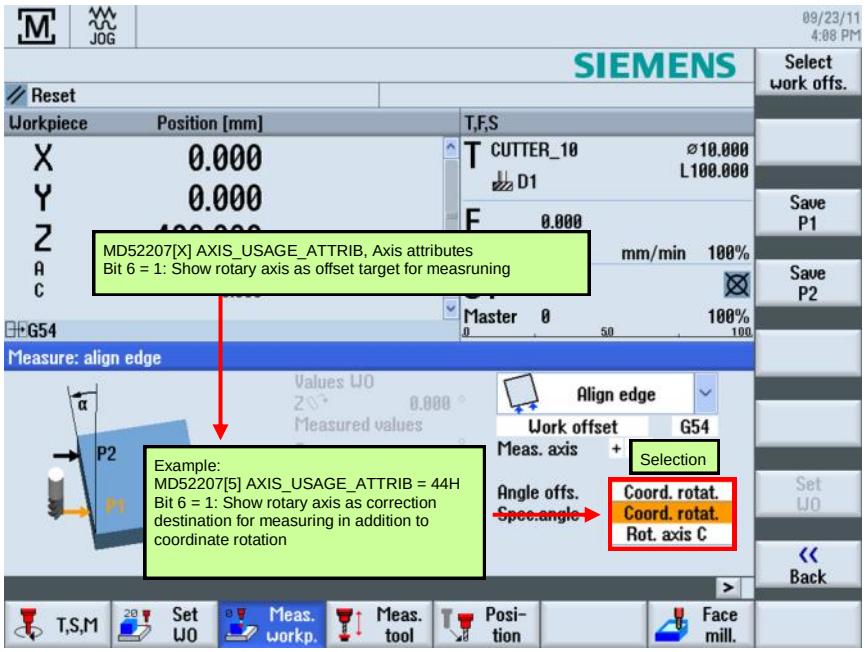


Notes

Machine —> JOG —> Measure workpiece

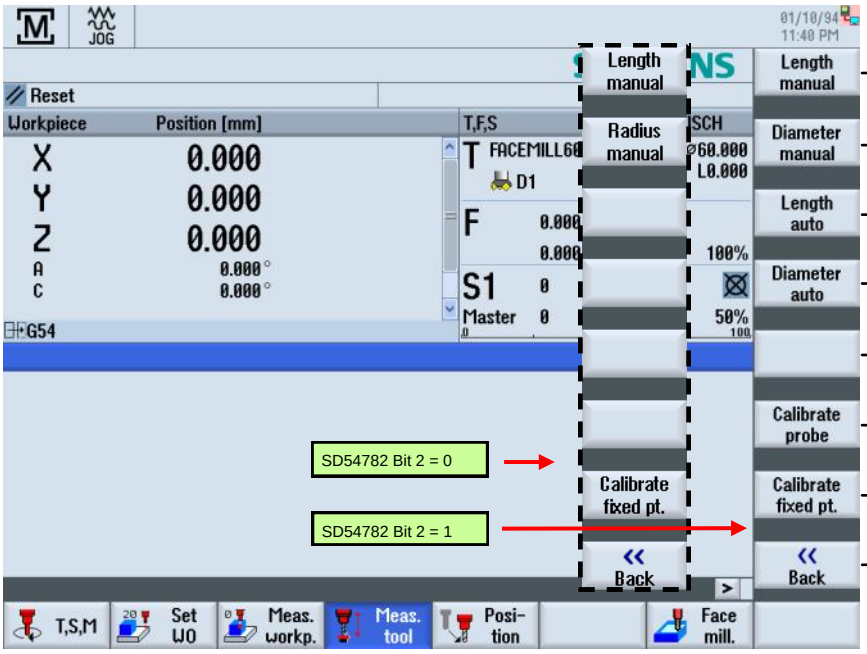


Machine —> JOG —> Measure workpiece



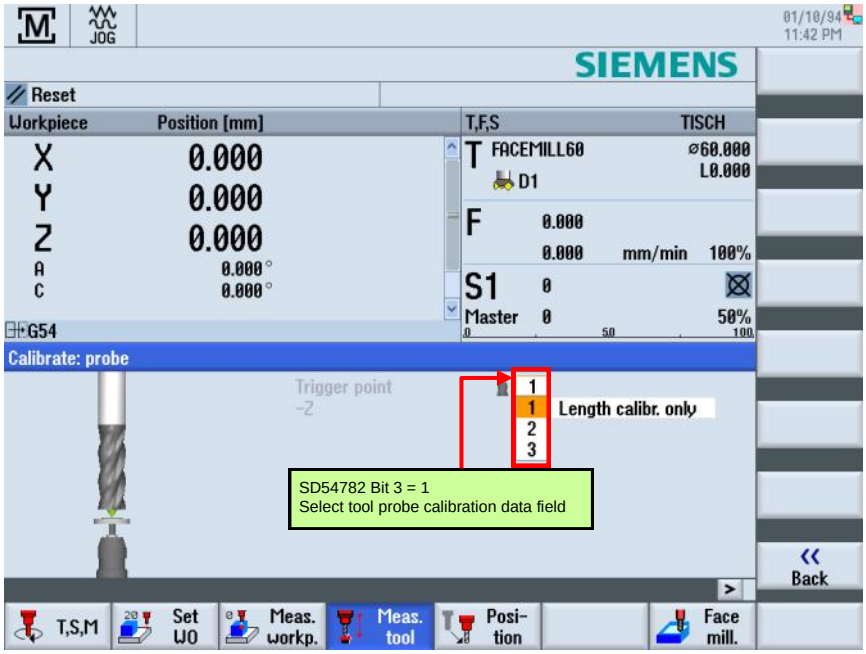
Notes

Machine —> JOG —> Measure tool



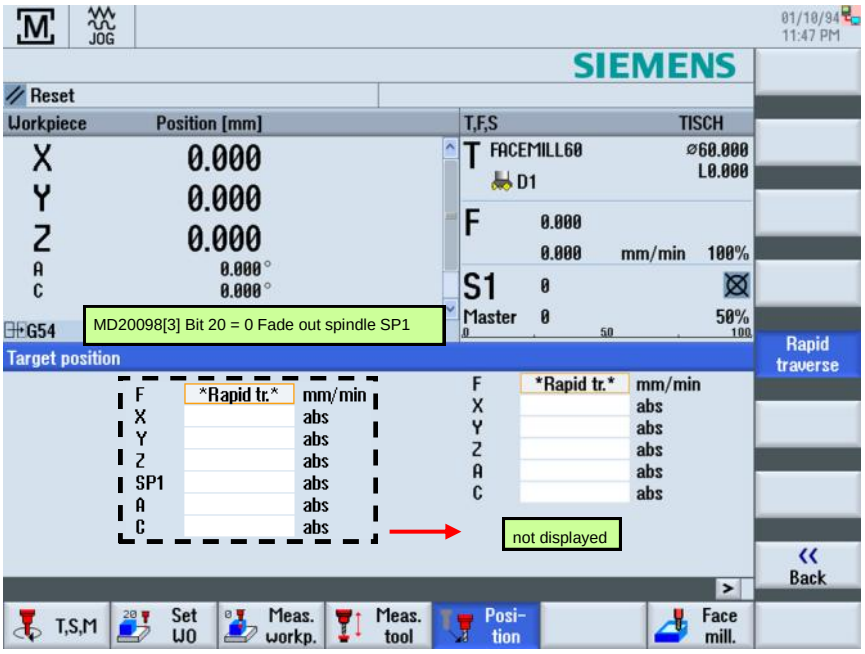
Softkey selection	Description
SD54782 Bit 2 = 1	Bit 2 = 1 Enable automatic tool measurement
SD54782 Bit 2 = 1	Bit 2 = 1 Enable automatic tool measurement
SD54782 Bit 2 = 1	Bit 2 = 1 Enable automatic tool measurement

Machine —> JOG —> Measure tool

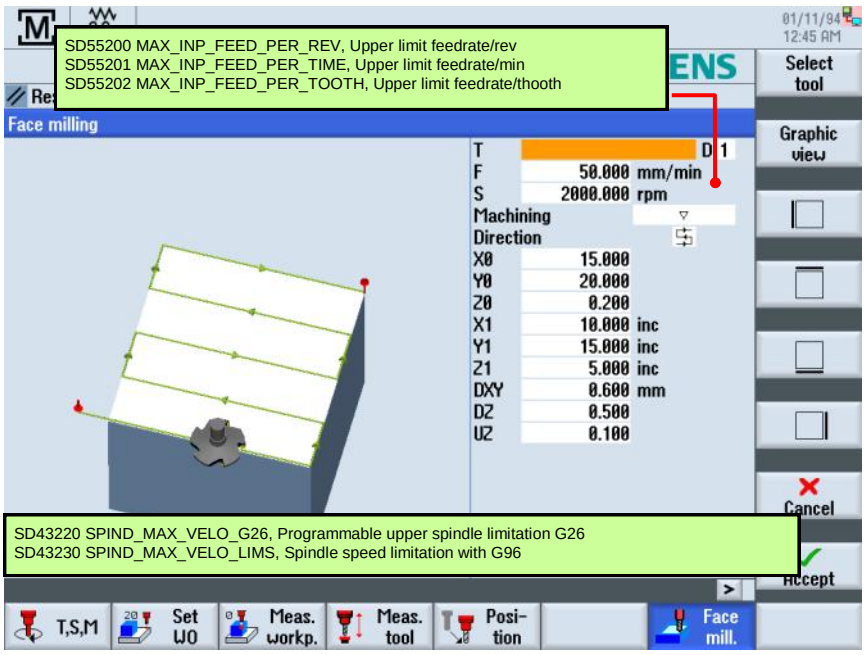


Notes

Machine —> JOG —> Position

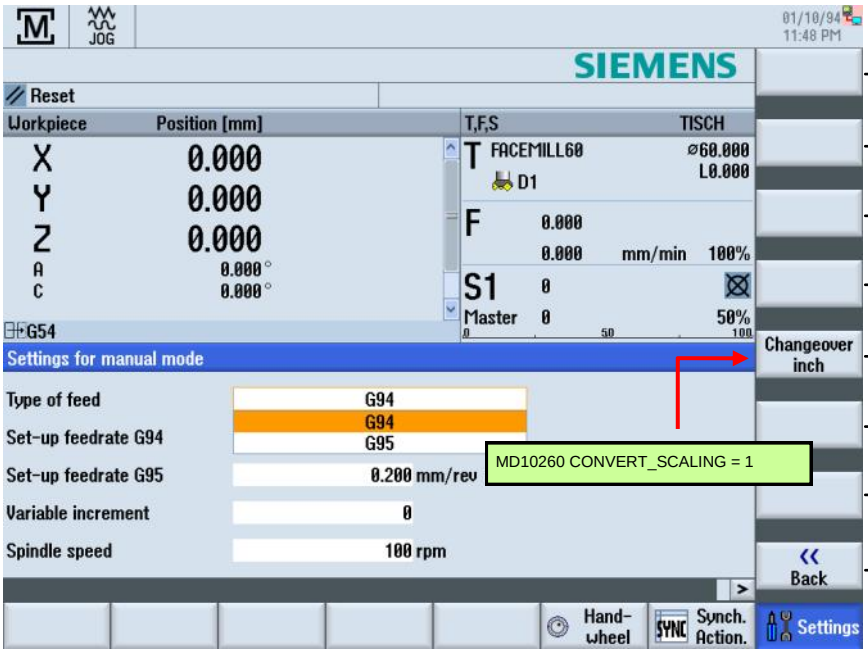


Machine —> JOG —> Face milling

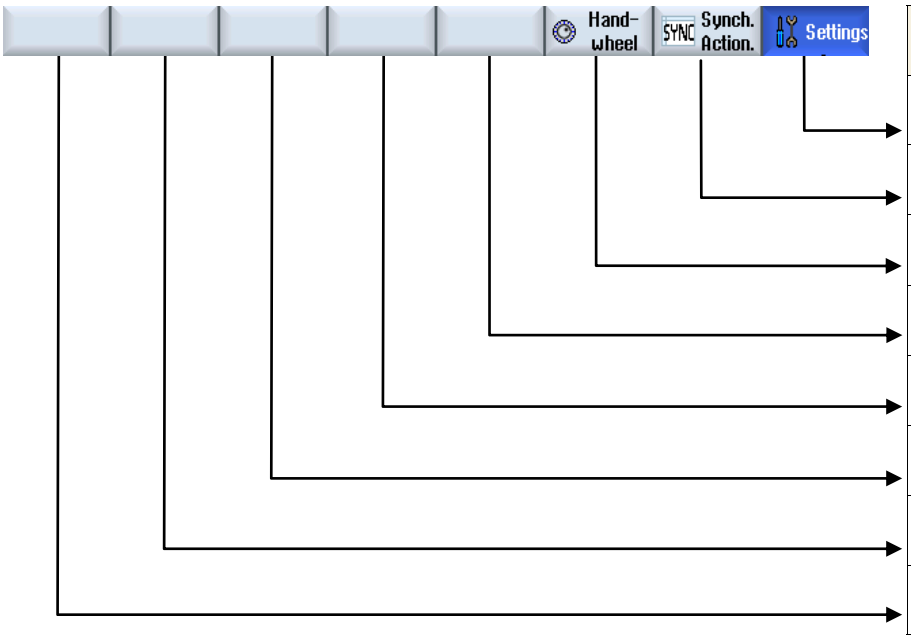


Notes

Machine —> JOG —> Settings



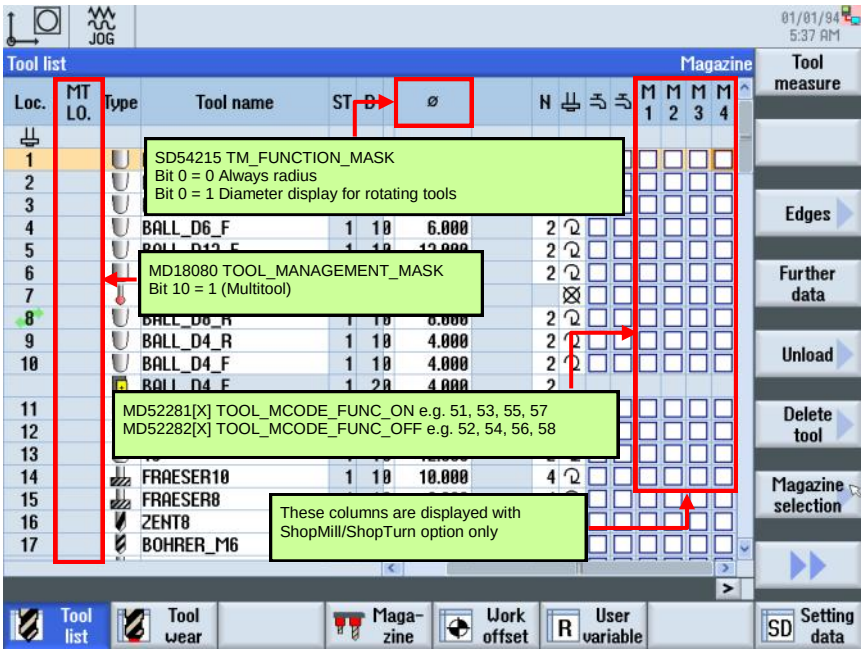
Softkey selection	Description
MD10260 = 1	=1: Enable basic system conversion

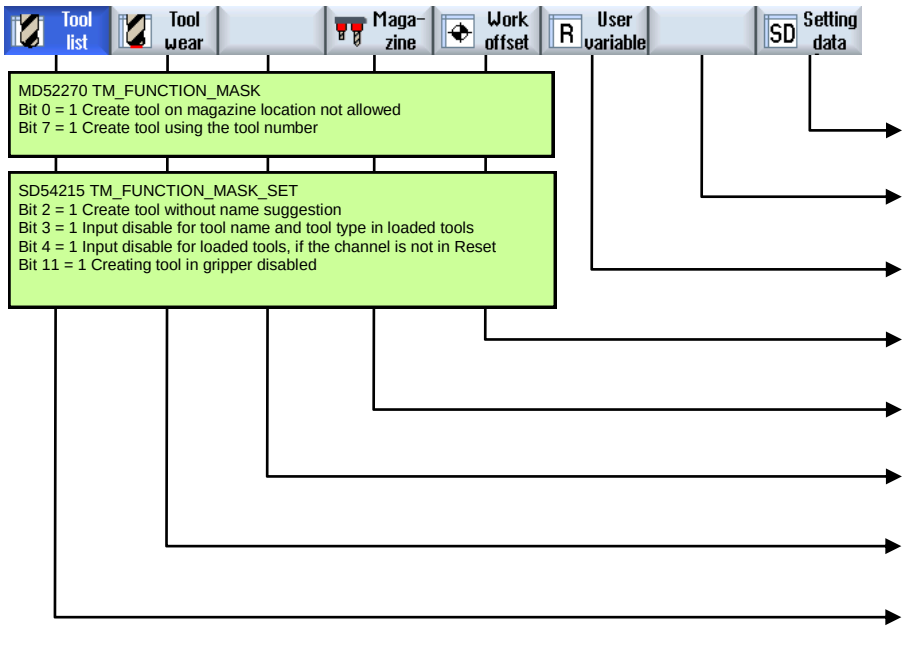


Softkey selection	Description
MD51067=1	=1: Show handwheel window (Handwheel must be configured in MD11350)

Notes

Parameter —> Tool list

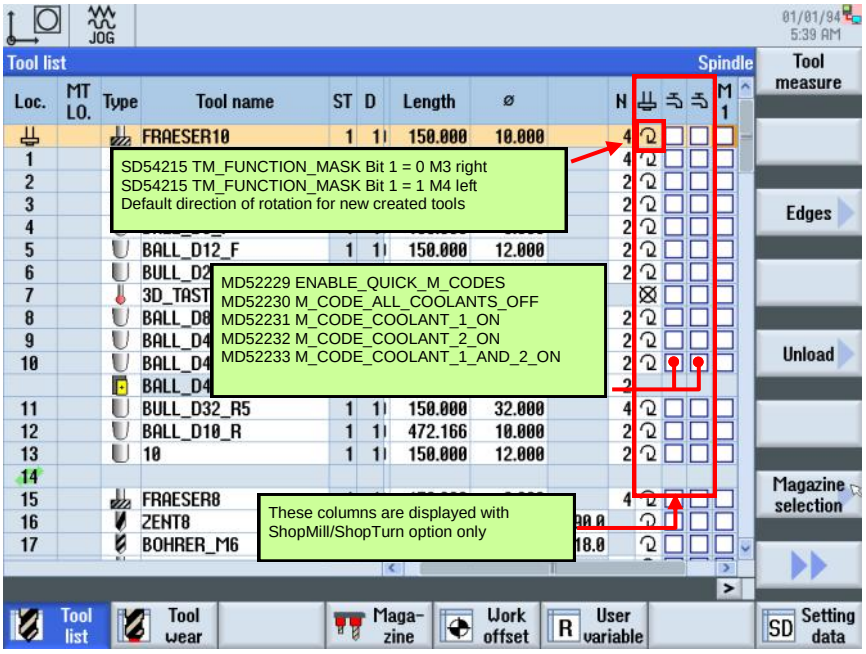




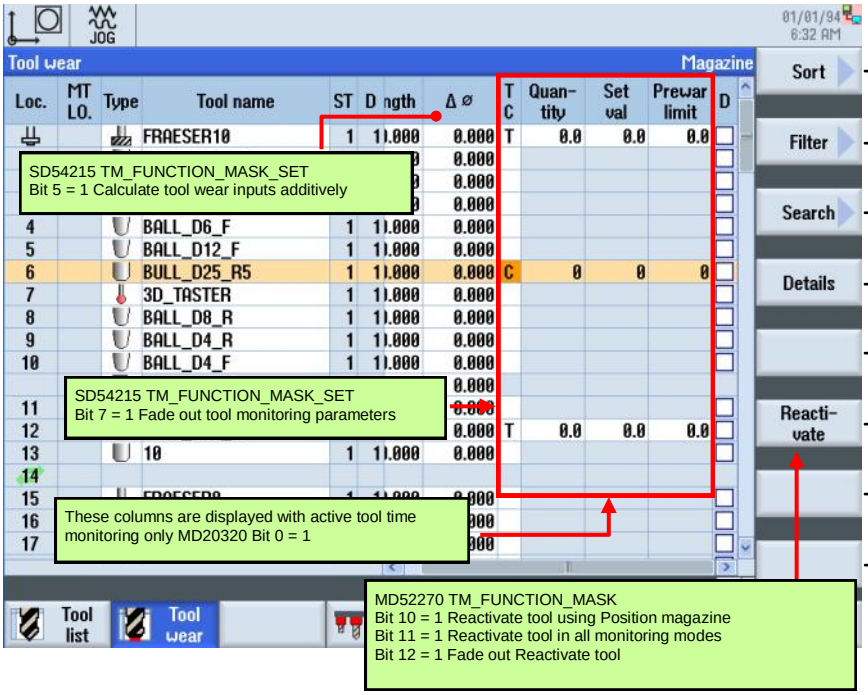
Softkey selection	Description
MD19320 Bit 4 = 1	Bit 4 = 1 Enable Tool Management

Notes

Parameter —> Tool list



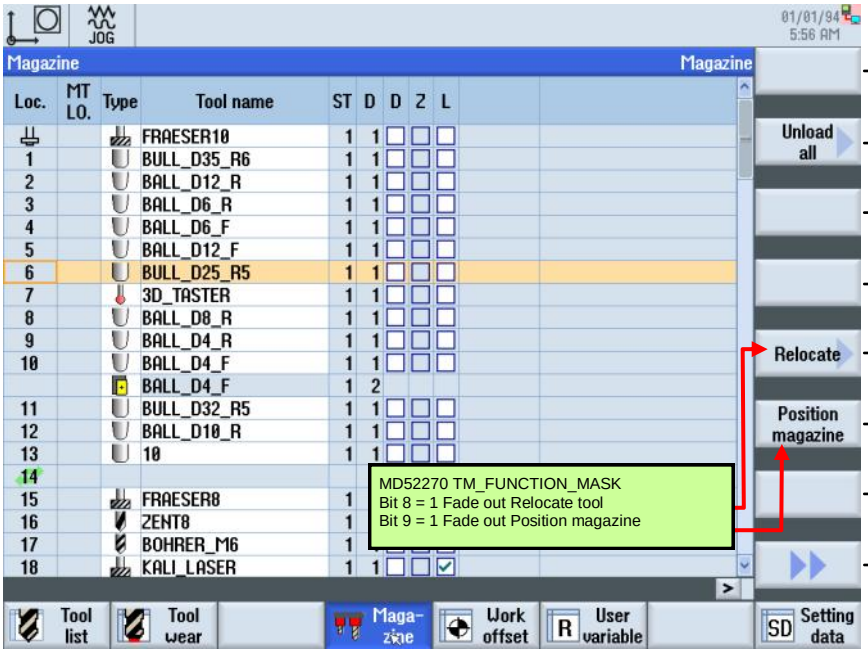
Parameter —> Tool wear



Softkey Sichtbar	Description
MD52270 Bit 12 = 0	Bit 12 = 0 Enable Reactivate tool

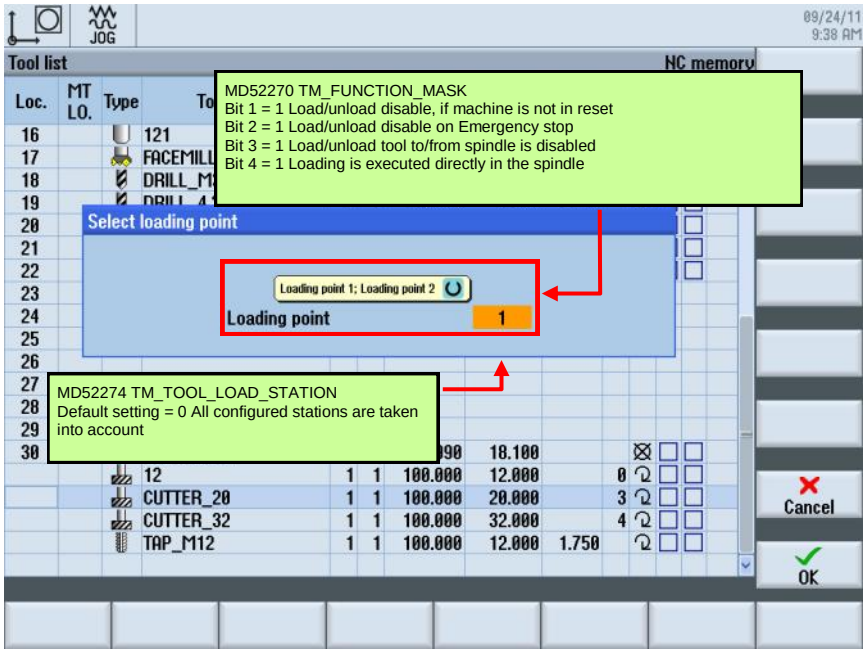
Notes

Parameter —> Magazine



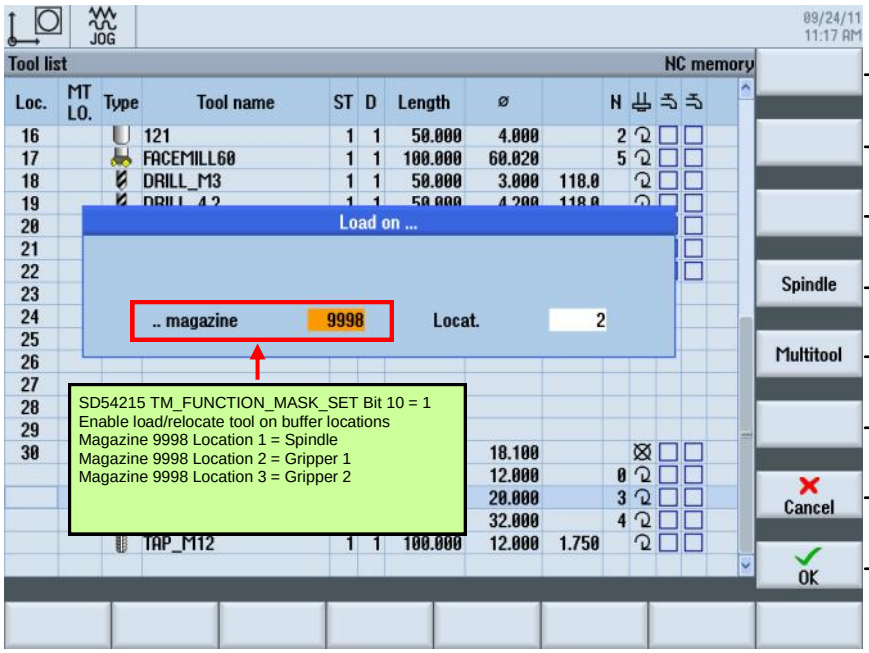
Softkey selection	Description
MD52270 Bit 8 = 0	Bit 8 = 0 Enable Relocate tool
MD52270 Bit 9 = 0	Bit 9 = 0 Enable Position magazine

Parameter —> Load tool



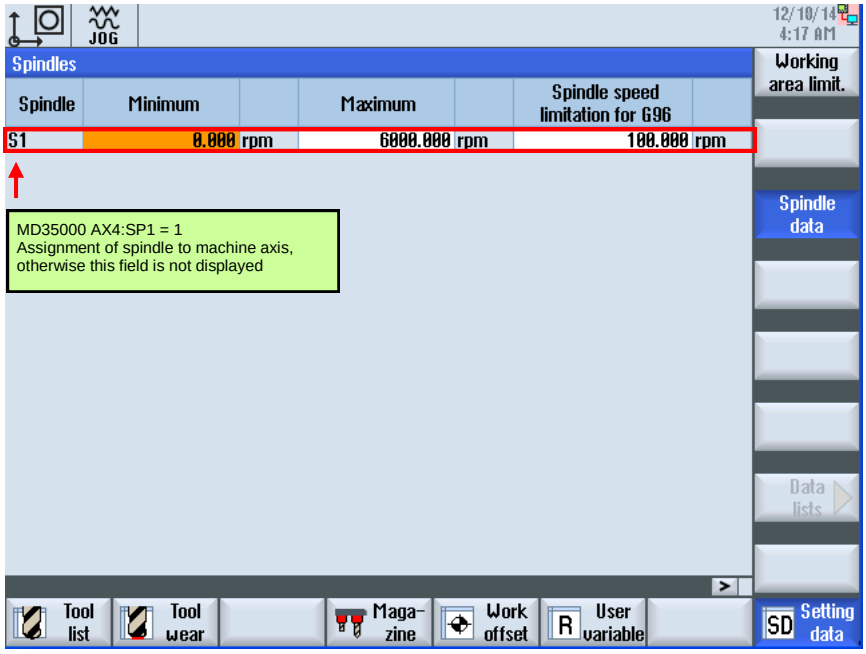
Notes

Parameter —> Load tool



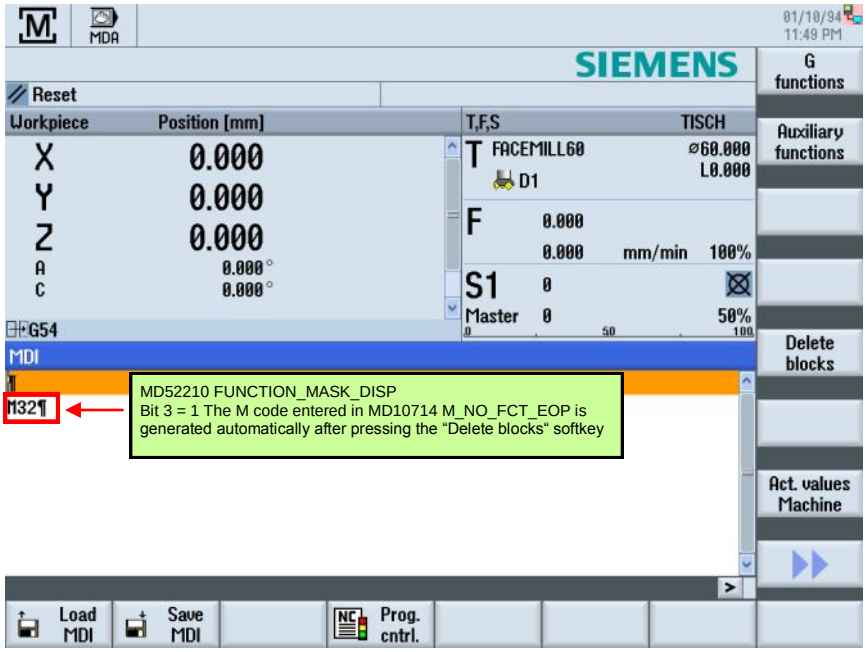
Softkey selection	Description
MD18080 Bit 10 = 1	Bit 10 = 1 The multitool function is available

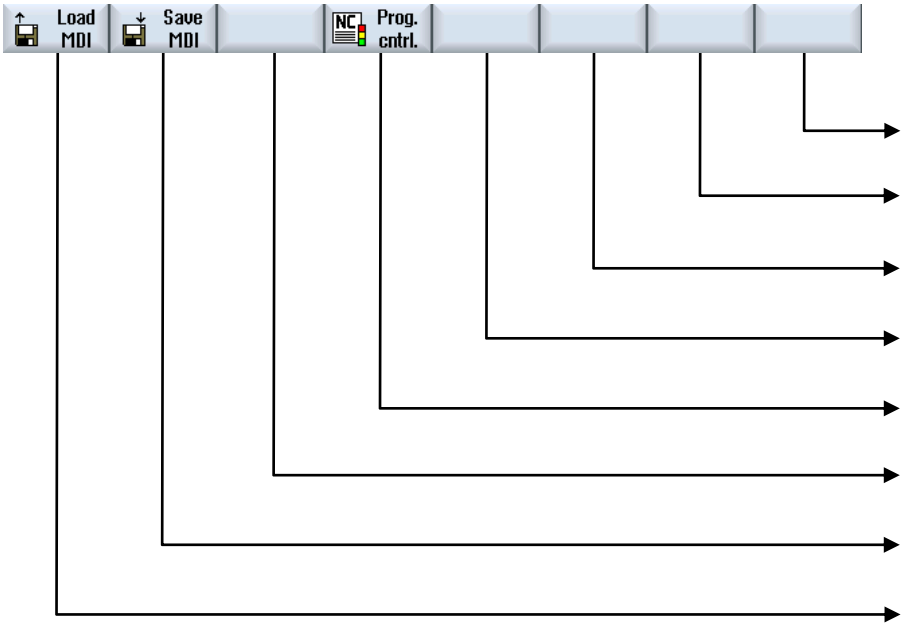
Parameter —> Setting data



Notes

Machine —> MDA

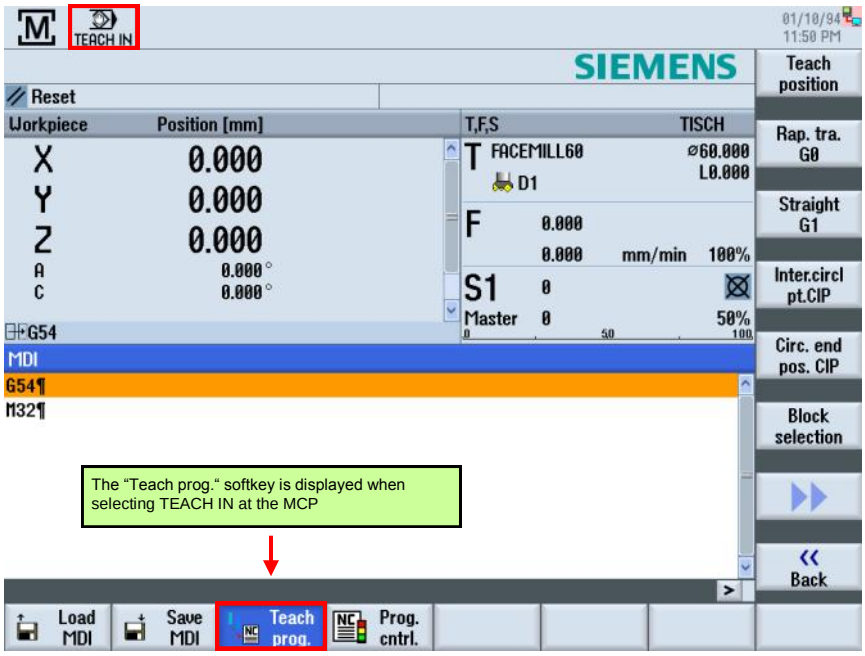


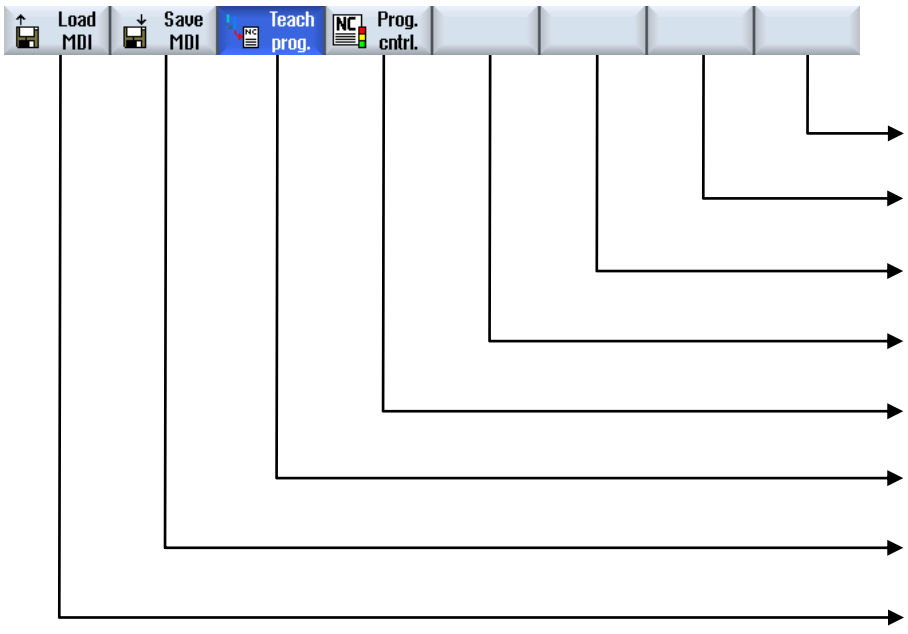


Softkey selection	Description

Notes

Machine —> TEACH IN —> Teach program

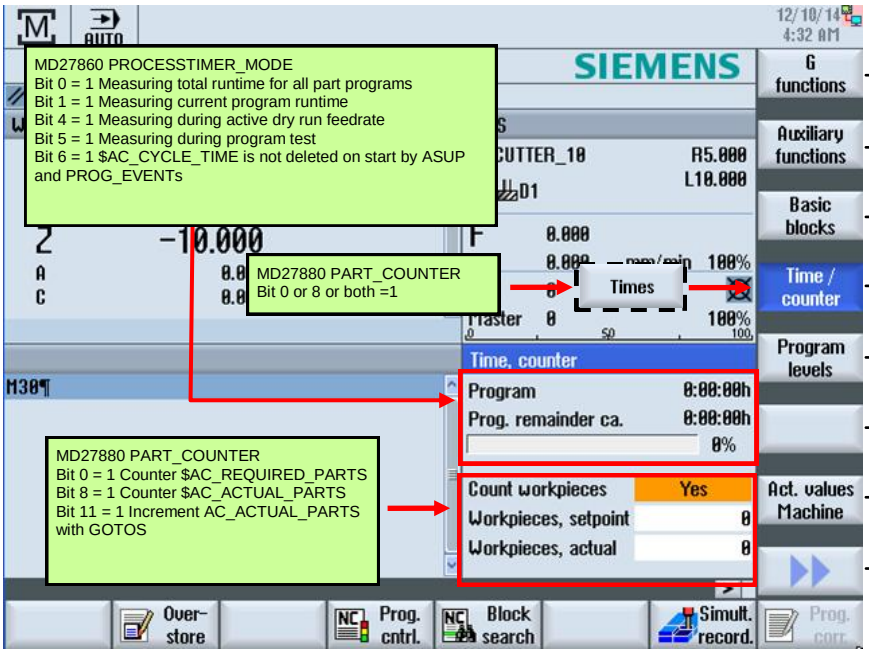




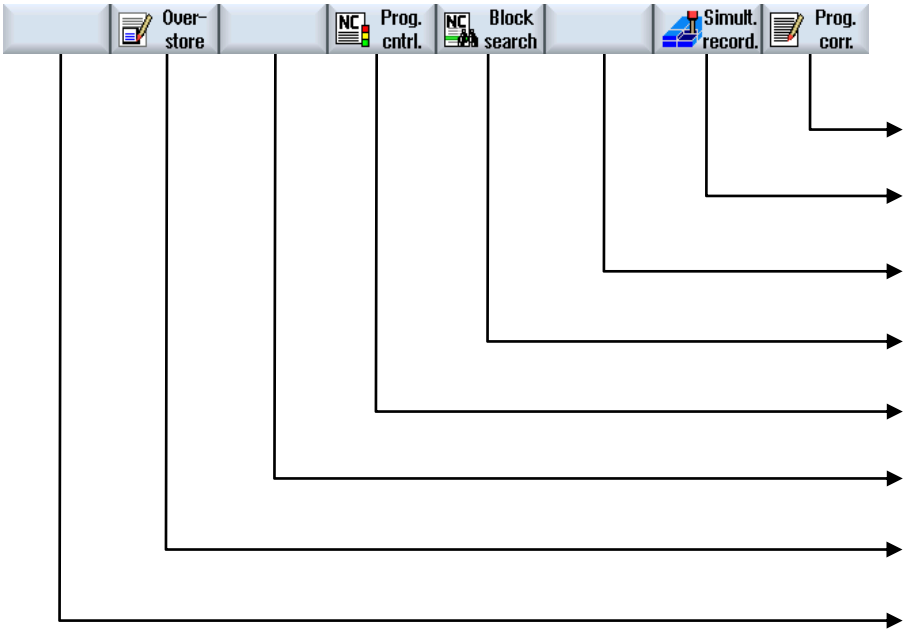
Softkey selection	Description
MSTT Taste TEACH IN	Switchover operating mode from MDA to TEACH IN via PLC (DB11)

Notes

Machine —> AUTO —> Time / Counter



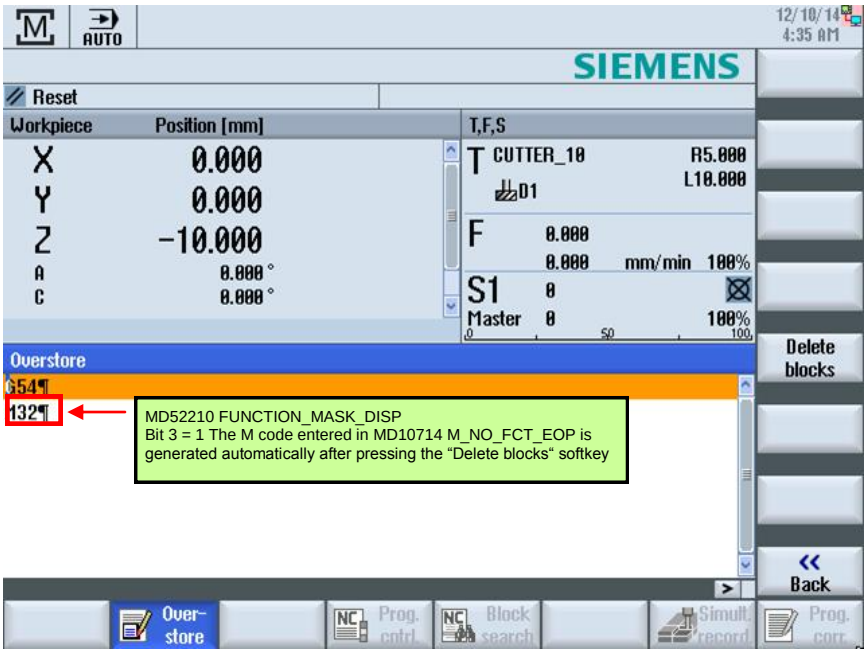
Softkey selection	Description
MD28400 = 1	=1: Activate basic blocks with absolute values
MD27860 Bit 0 or Bit 8 = 1	=1: Sotkey Time/Counter =0: Softkey Times (Default setting)



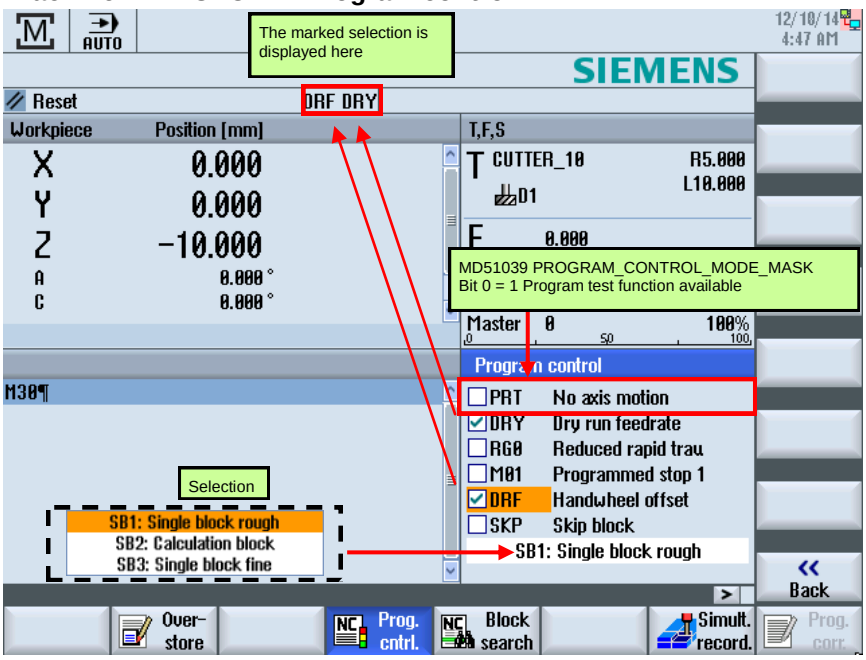
Softkey selection	Description
Option P22	Simultan. recording (real-time simulation)

Notes

Machine —> AUTO —> Overstore

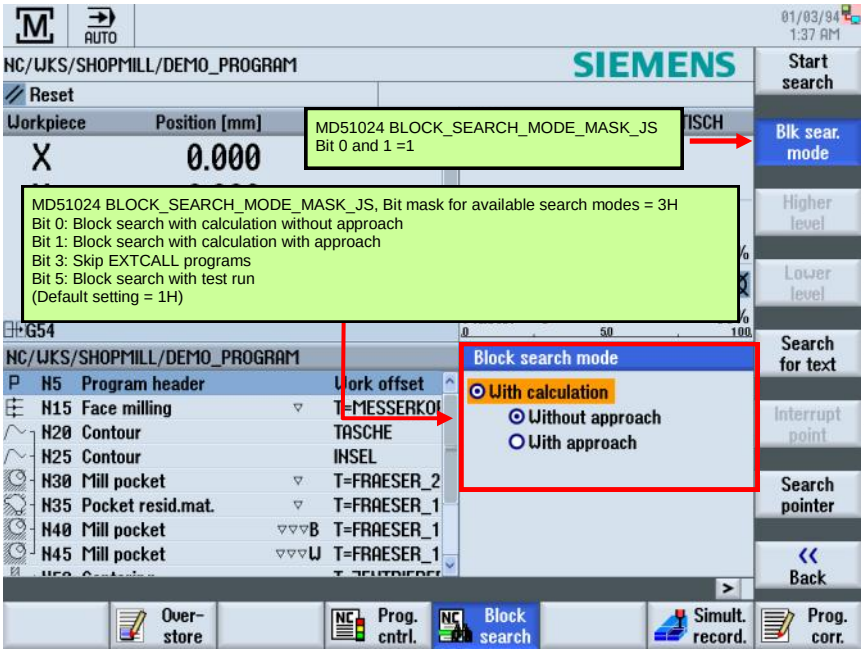


Machine —> AUTO —> Program control



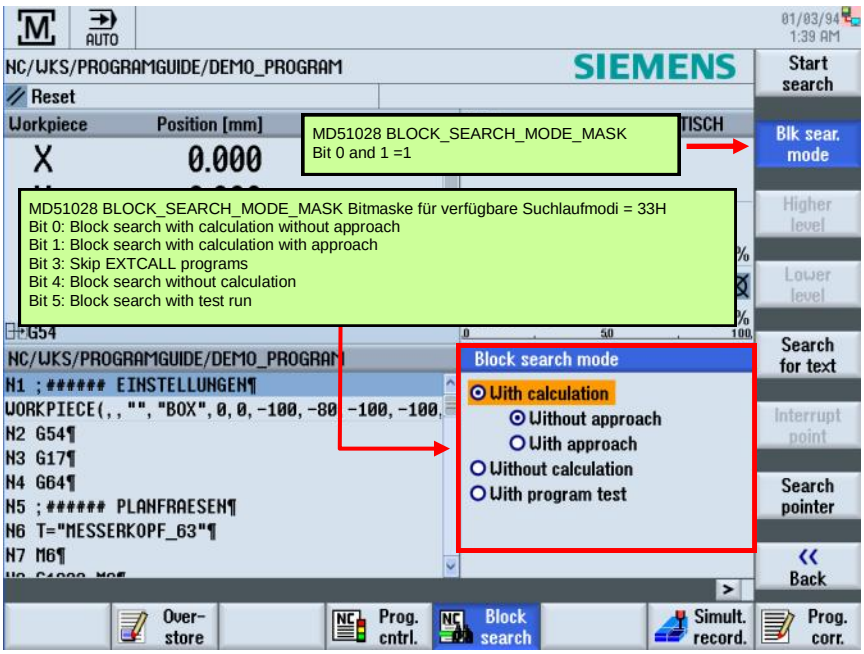
Notes

Machine —> AUTO —> Block search (ShopMill)



Softkey selection	Description
MD51024 Bit 0 und Bit 1 = 1	Bit mask for available search modes in ShopMill program

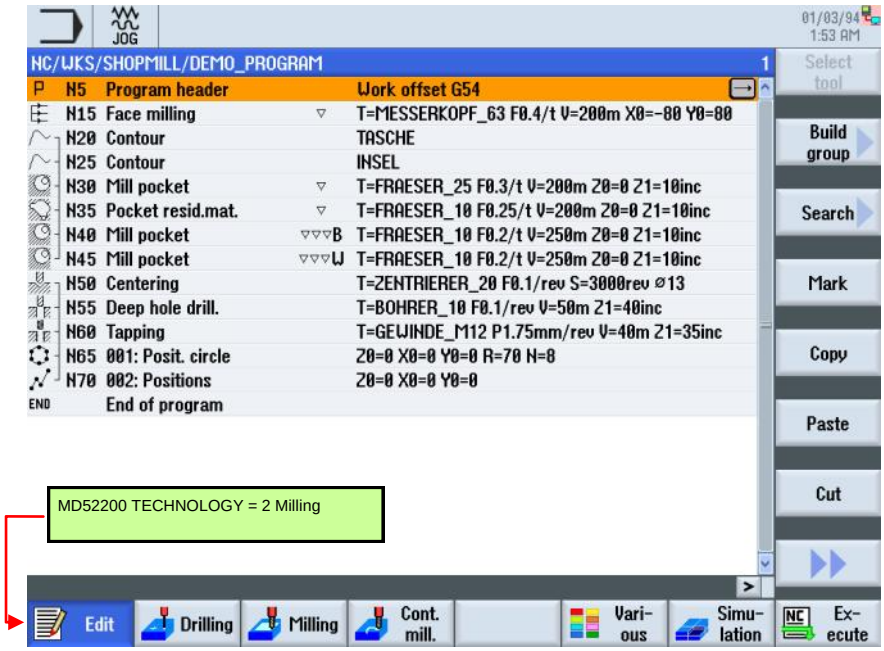
Machine —> AUTO —> Block search (G code program)

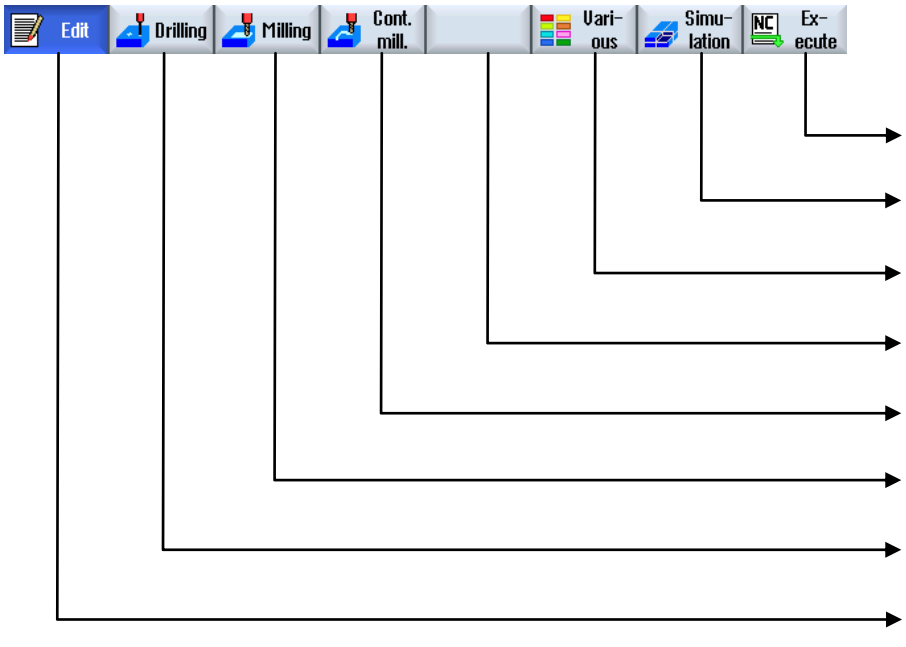


Softkey selection	Description
MD51028 Bit 0 und Bit 1 = 1	Bit mask for available search modes in G code program

Notes

Program —> Edit

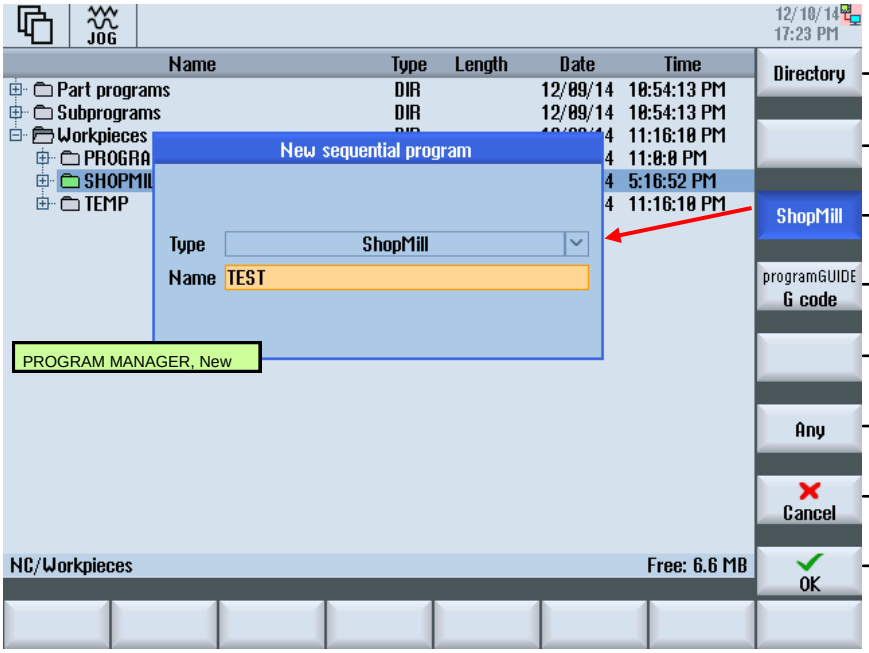




Softkey selection	Description
MD52200 = 2	=2: Technology Milling
MD52200 = 2	=2: Technology Milling
MD52200 = 2	=2: Technology Milling
MD52200 = 2	=2: Technology Milling

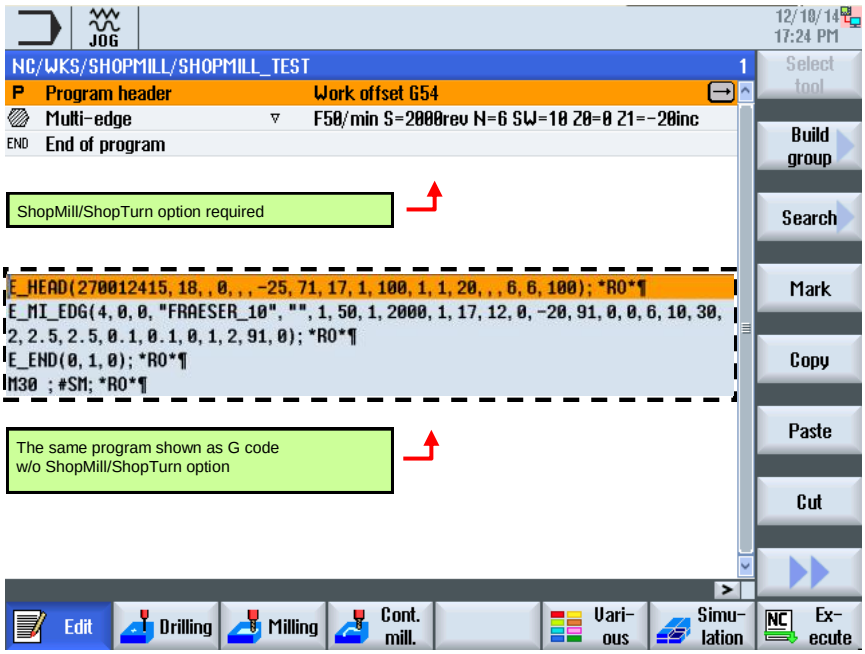
Notes

Program manager —> New



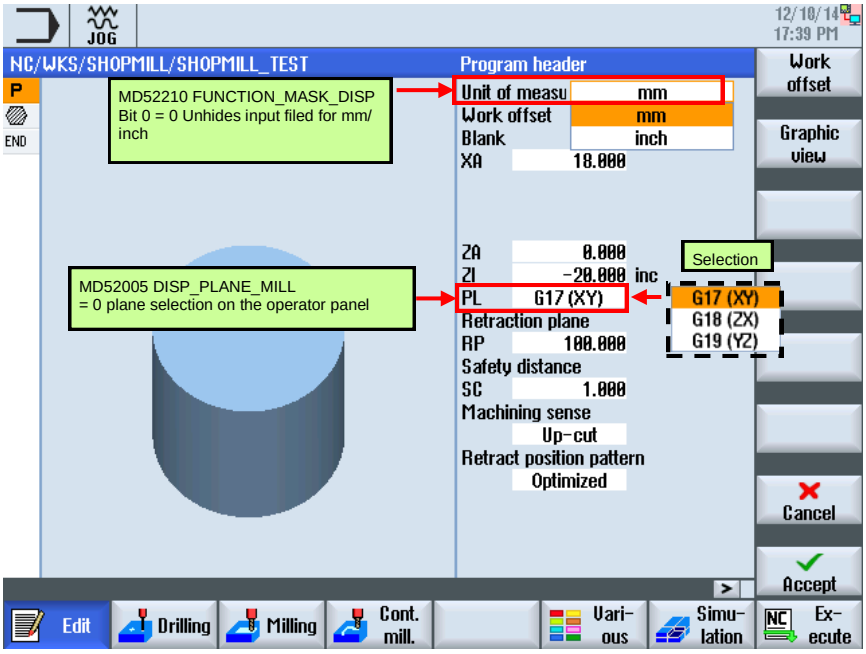
Softkey selection	Description
Option P17	ShopMill/ShopTurn

Program —> Edit

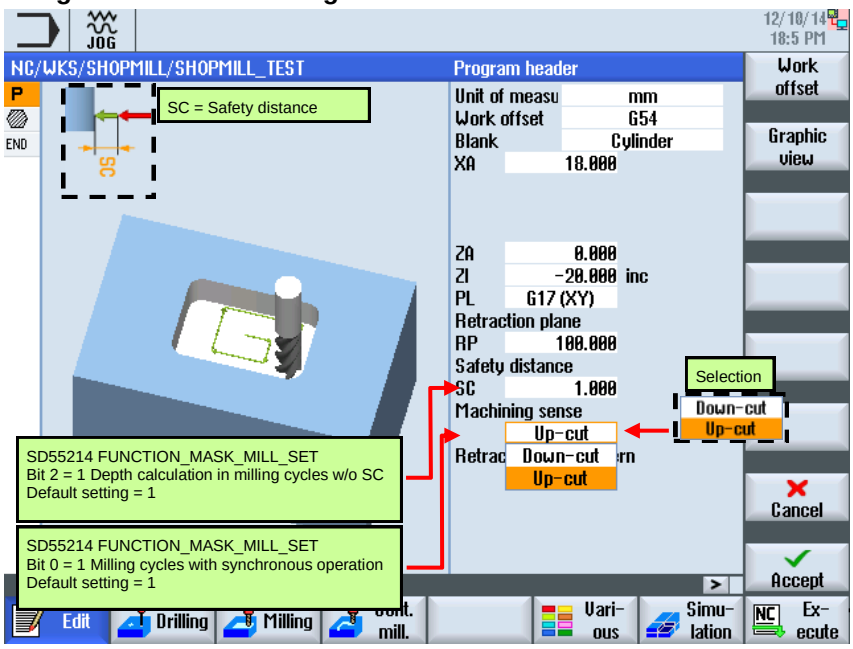


Notes

Program —> Edit —> Program header

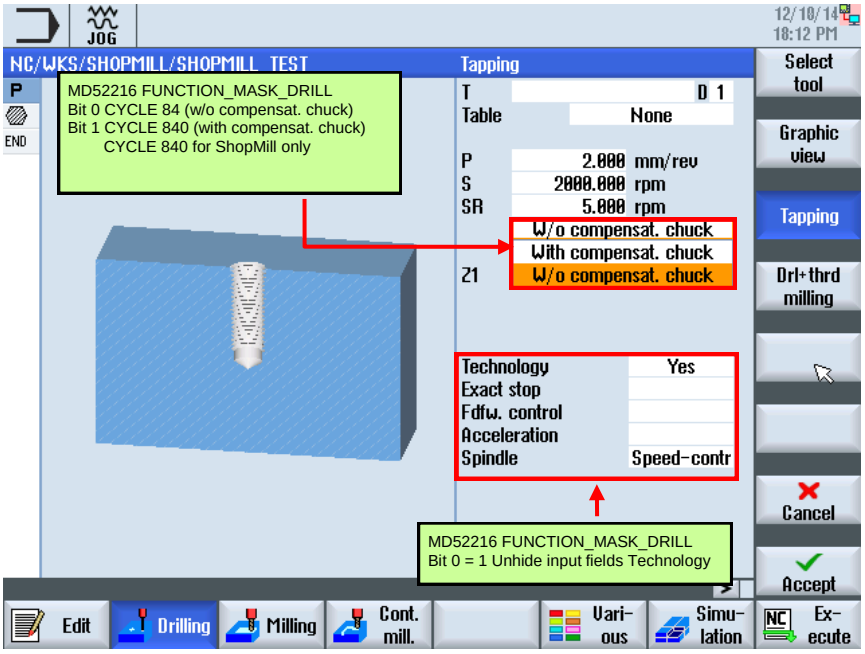


Program —> Edit—> Program header

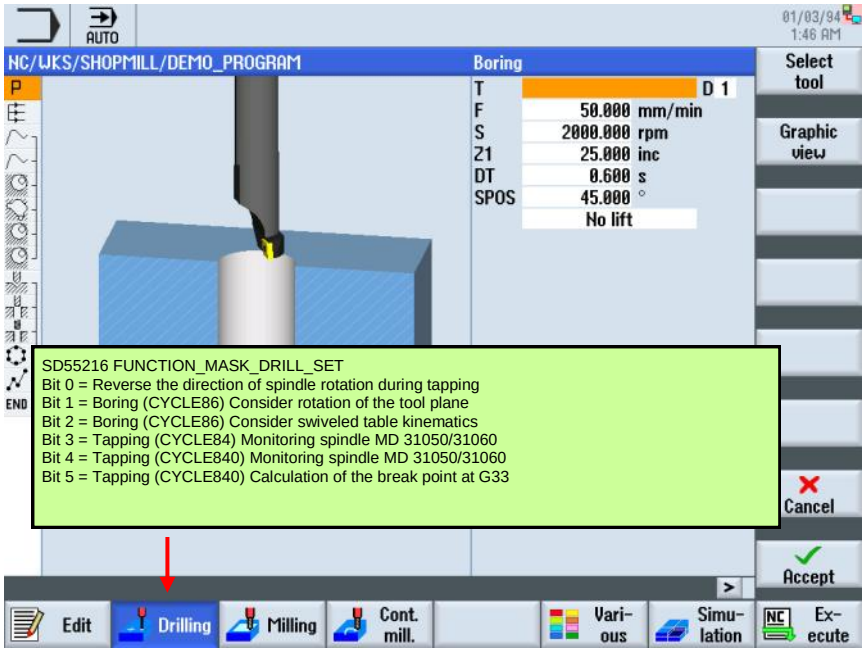


Notes

Program —> Drilling

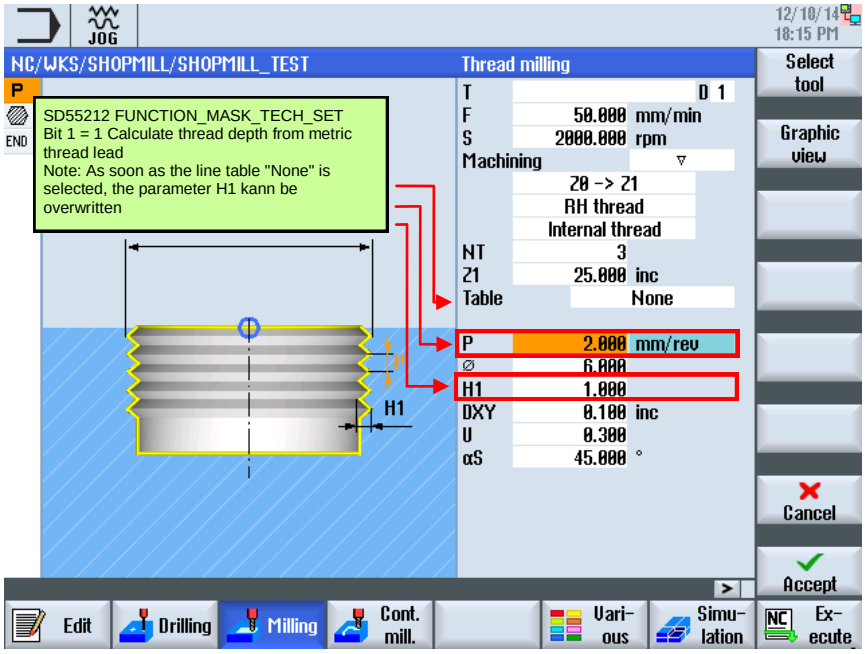


Program —> Drilling

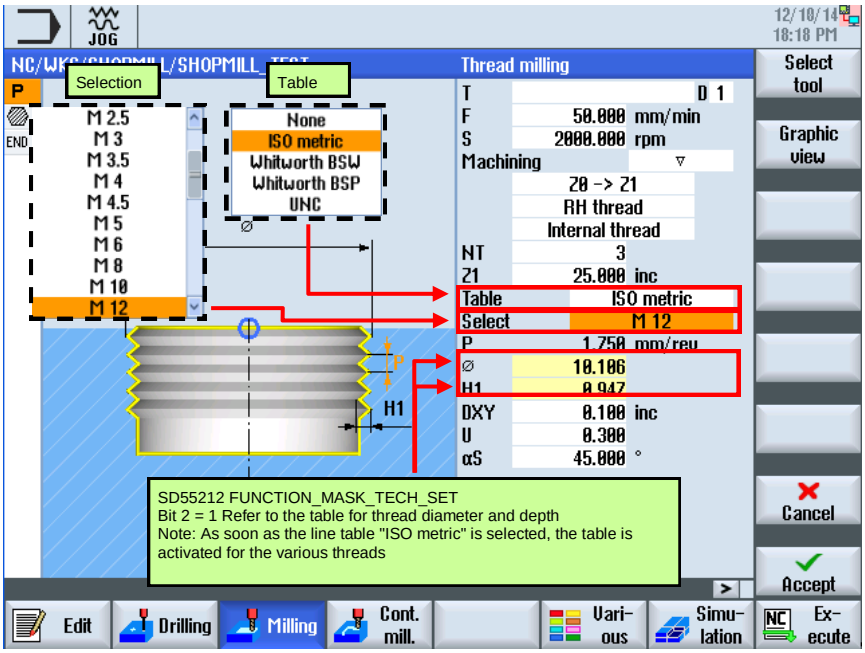


Notes

Program —> Milling

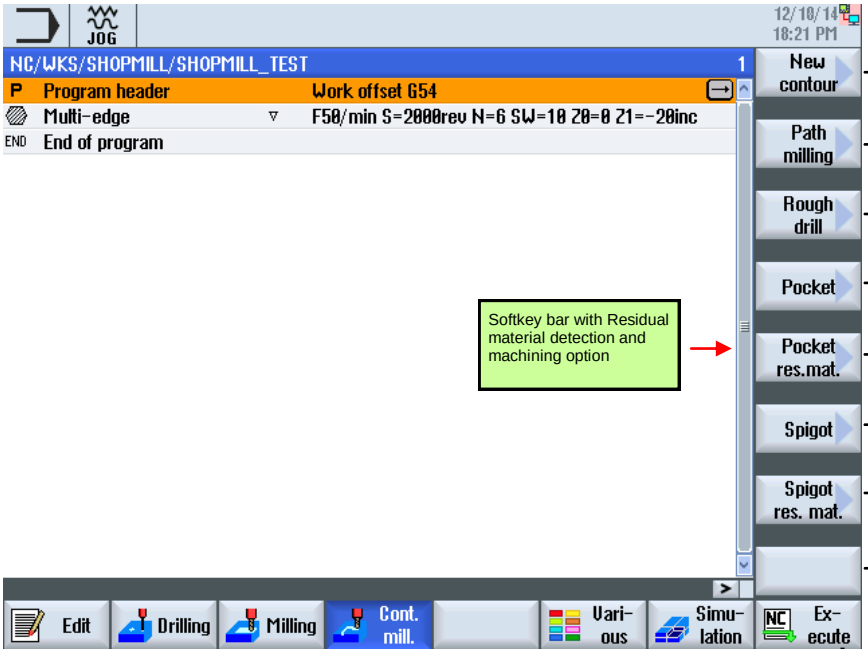


Program —> Milling



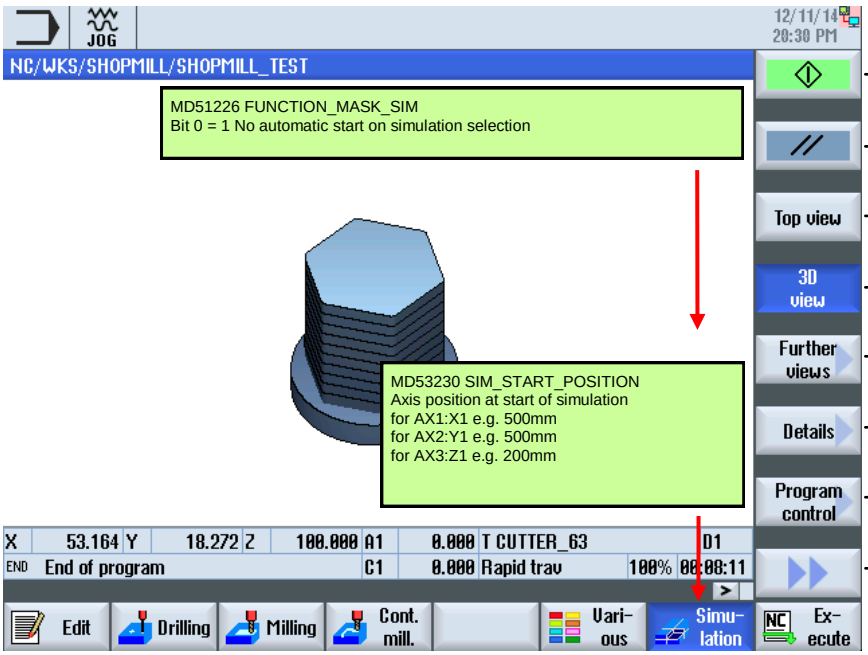
Notes

Program —> Contour milling



Softkey selection	Description
Option P13	Residual material detection and machining
Option P13	Residual material detection and machining

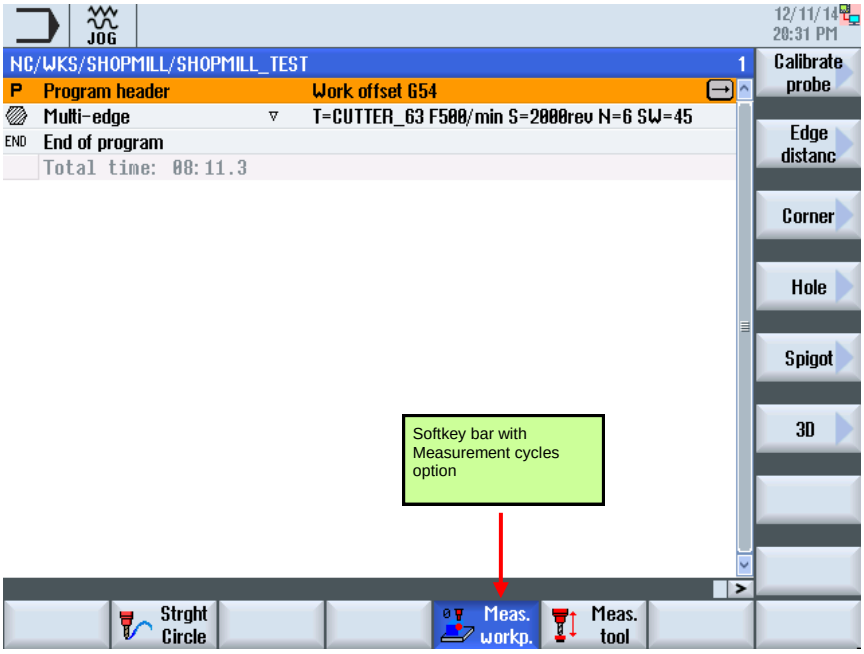
Program —> Simulation



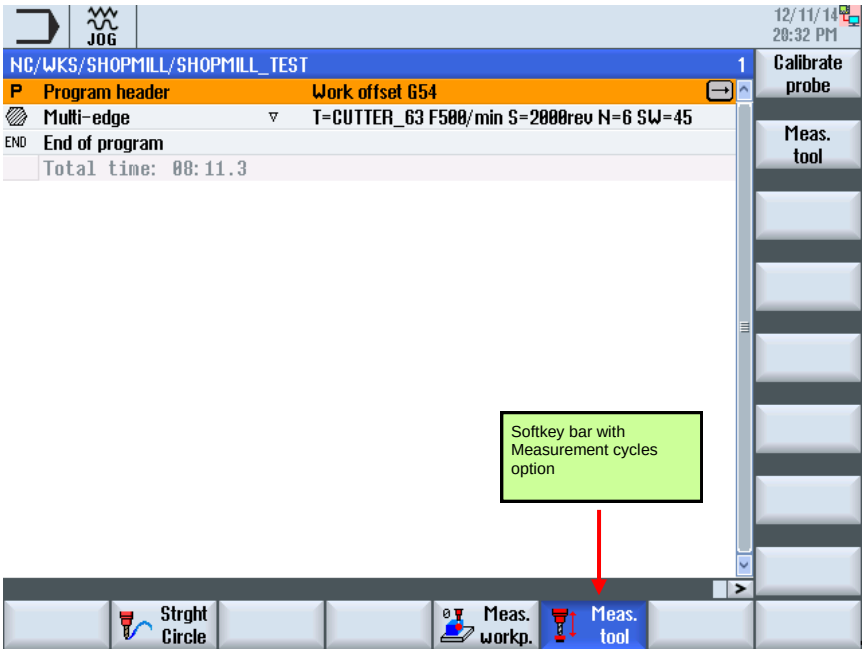
Softkey selection	Description
Option P25	3D simulation 1 (finished part)

Notes

Program —> Measure workpiece



Program —> Measure tool



A110: END

Notes