

Topics

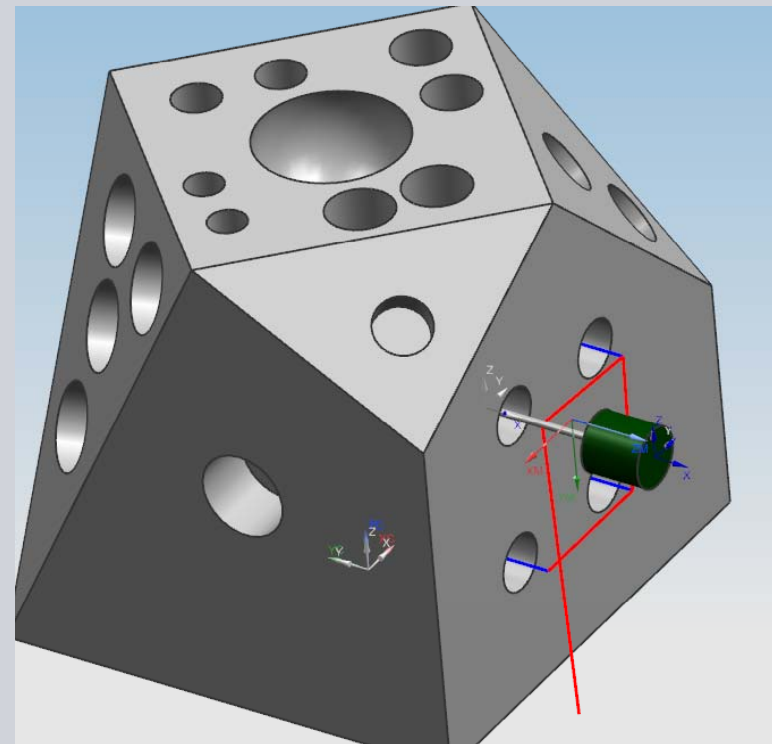
- Axis Control and Probing
 - 3+2
 - Rotary Point Move in Probing
 - 3D Point Probing, Normal to Face
 - 3D Point Probing, Along Vector
- Probing and GMC Operation customization
 - SubOp List
 - Custom Parameters on SubOps
 - User SubOp
- Probing post and machine support



Probing Axis Change

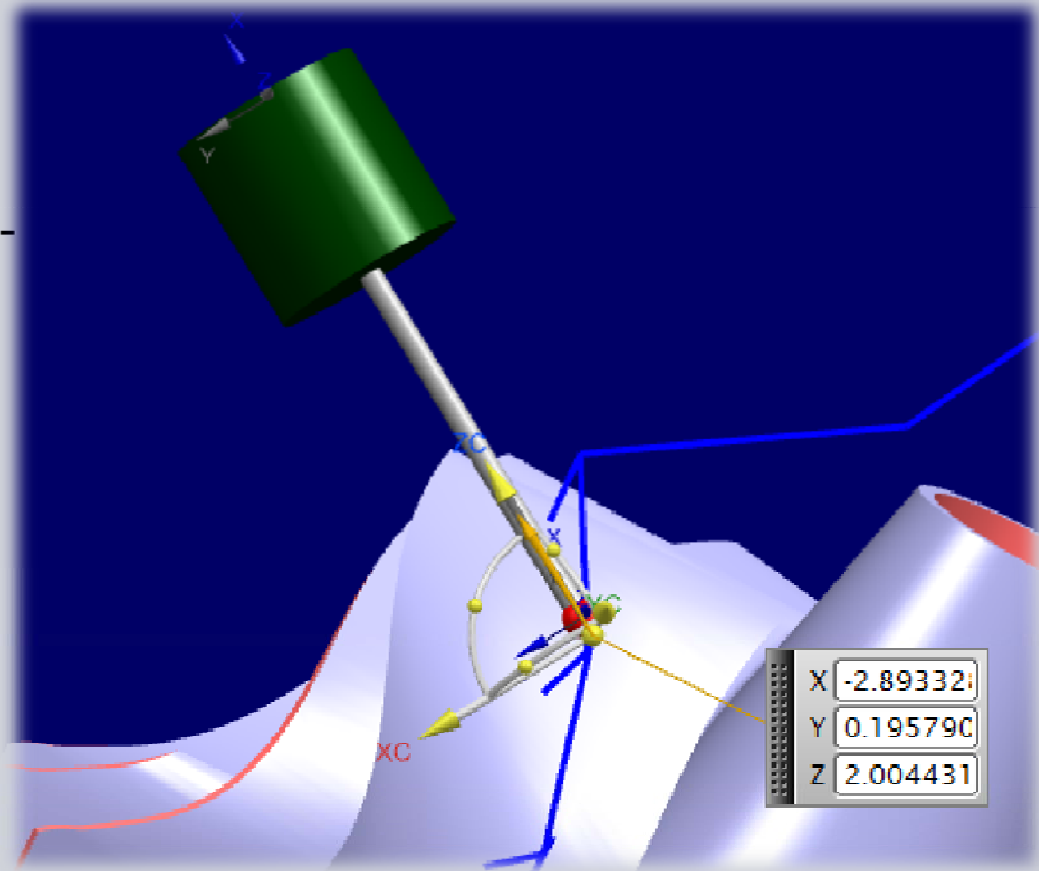
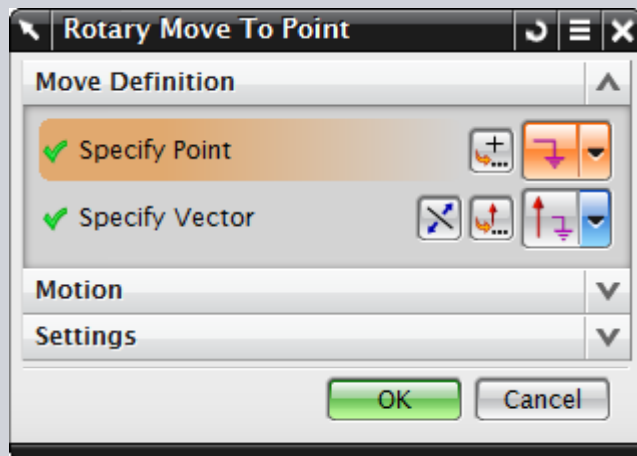
- Designed for 3+2
- Use coordinate system for Tool Axis switch

Name
GEOMETRY
Unused Items
WORKPIECE
G54
MCS_1_CSYS_ROT
DRING_BREAK_CHIP_G73
PROBING
MCS_2_CSYS_ROT
DRING_BREAK_CHIP_G73_COPY
PROBING_1
MCS_2_CSYS_ROT_COPY
PROBING_2
MCS_2_CSYS_ROT_COPY_1
PROBING_1_COPY
PROBING_3

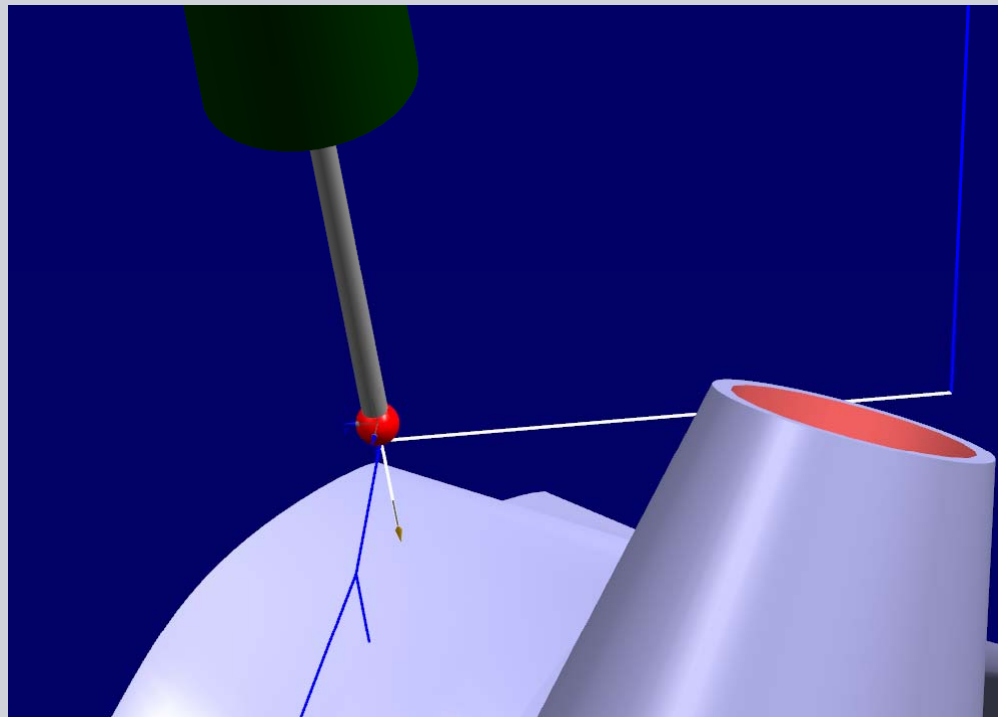
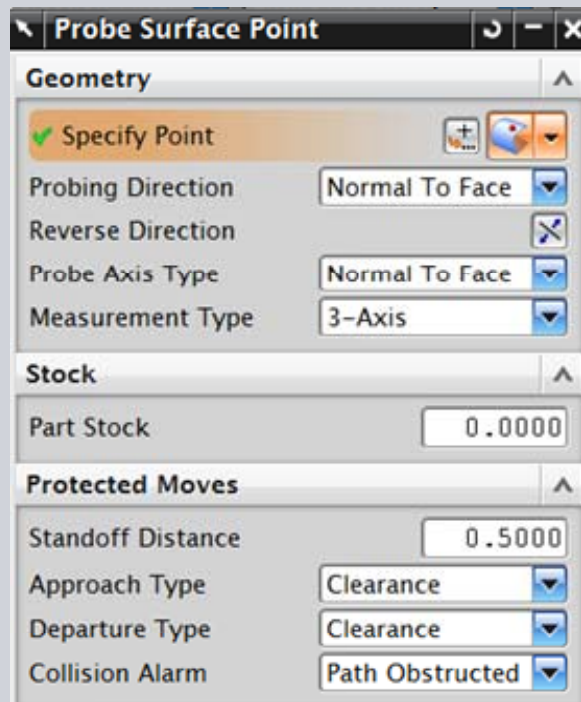


Rotary Point Move added to Probing

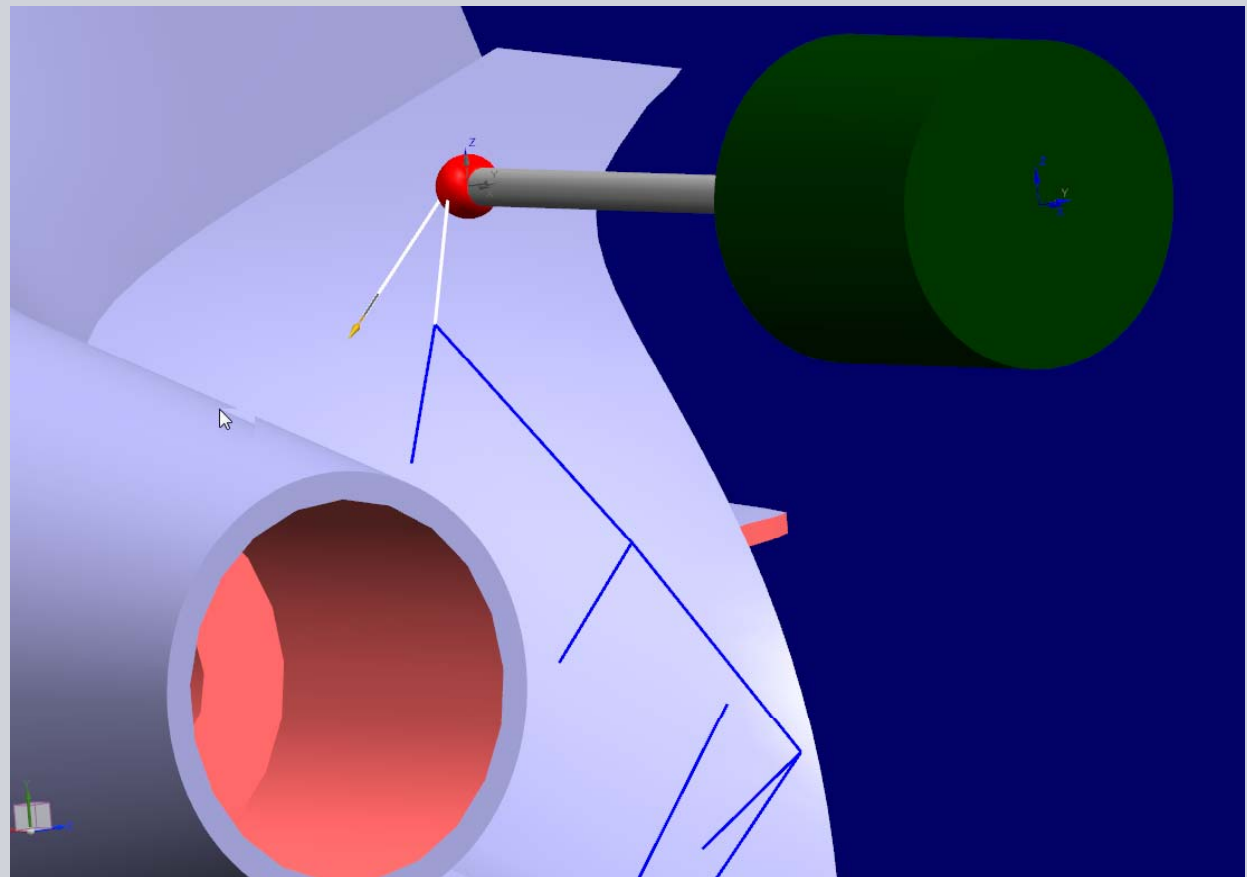
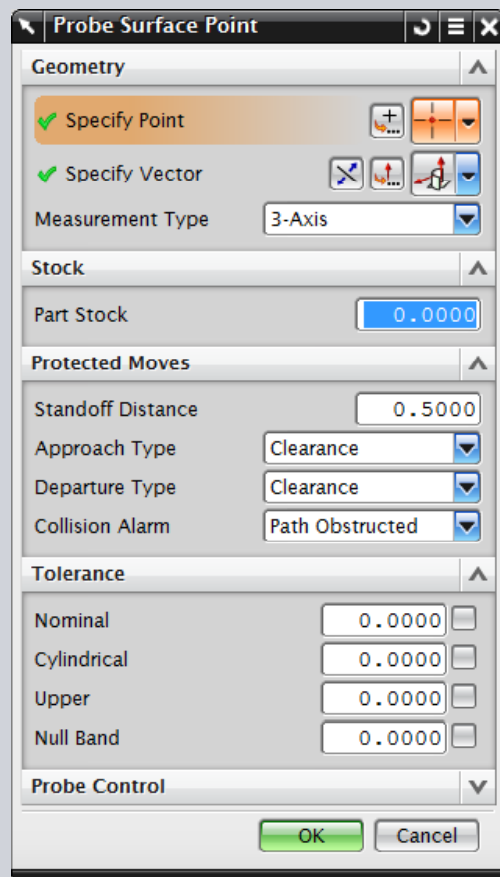
- Position with point/vector, drag handles
- Post should be set to treat the axis change as a CSYS-ROT



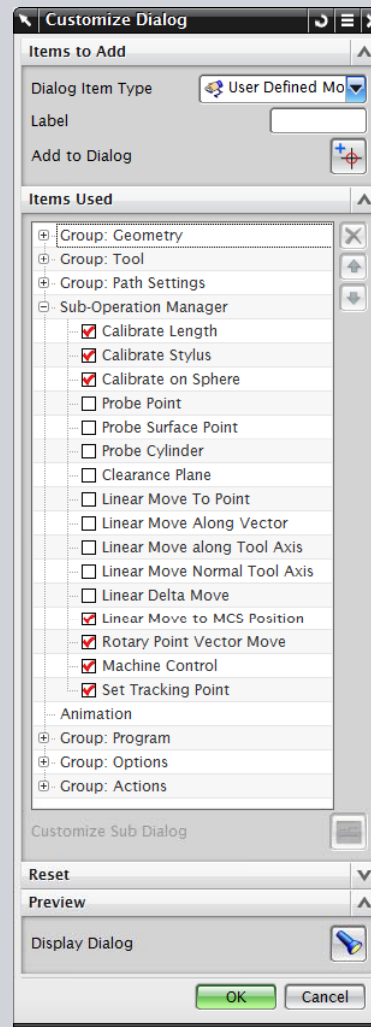
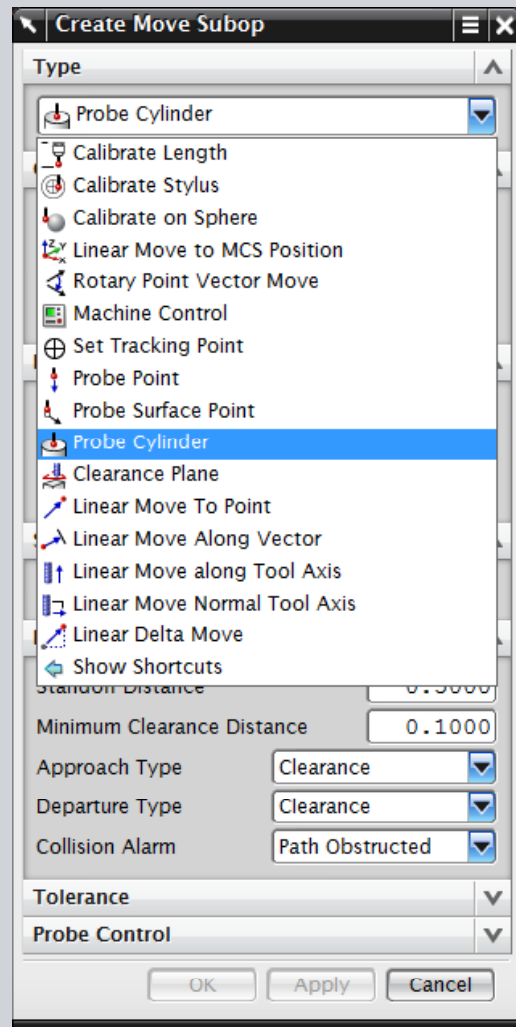
Probe Direction- Normal to Face (NX7.5.2)



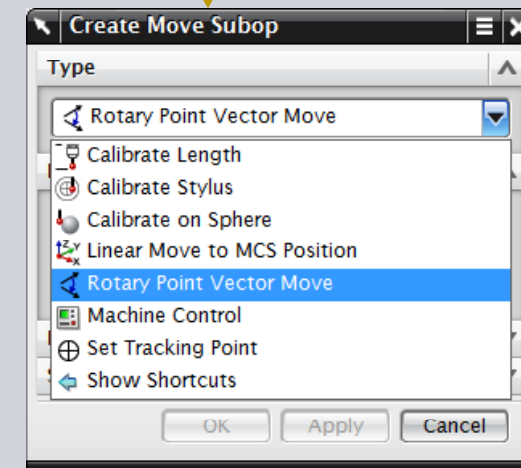
Probe Direction- Specify Vector (NX7.5.2)



Customization of GMC and Probing Subops (NX8.0)

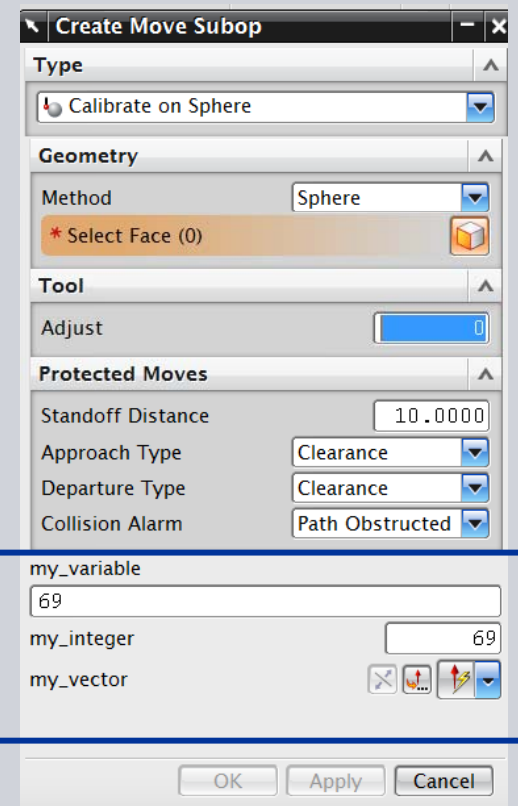
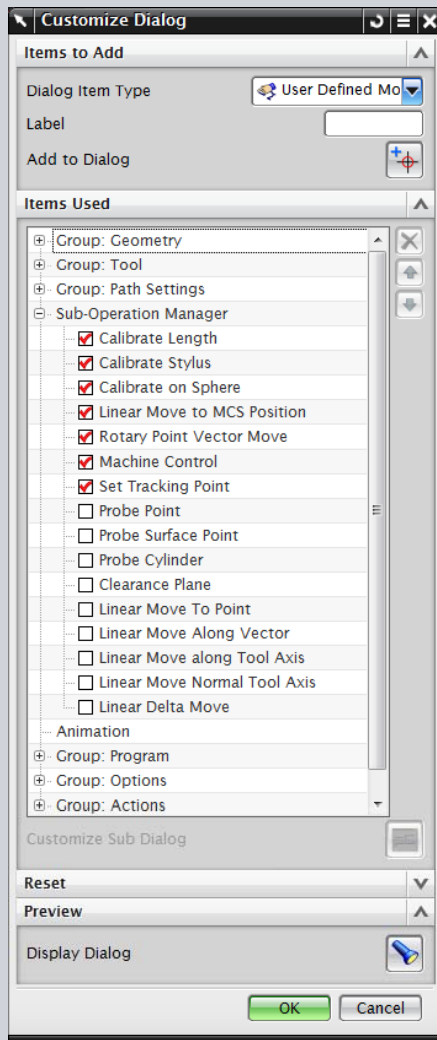


- Users can customize the existing OOTB Subops
- Can also remove entries from the list of Subops



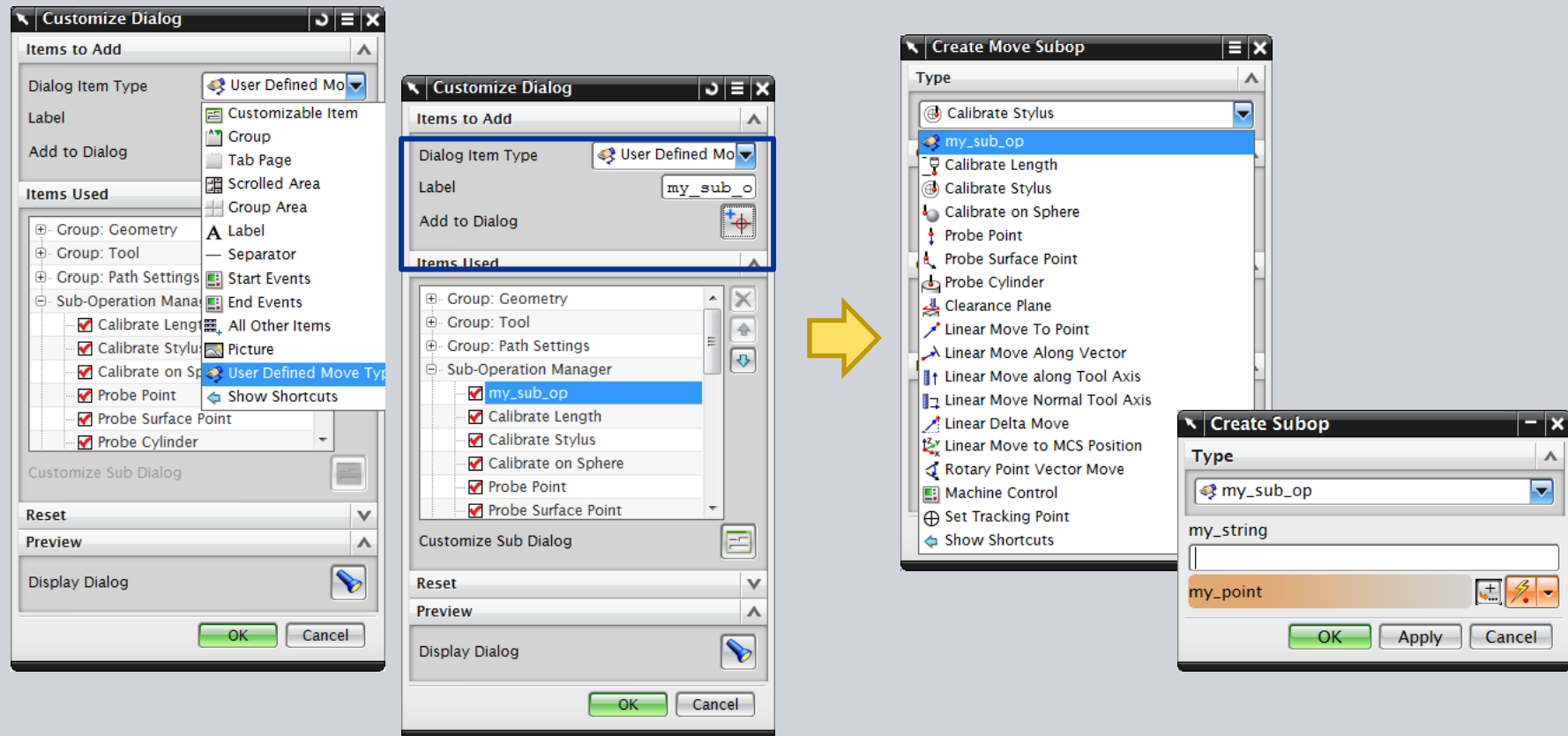
Customization of Subops

- Users can customize the OOTB Subops to add and /or remove parameters



Creating New SubOps

- Users can create their own Subops for their particular requirements



Data Flow

Create Move Subop

Type:

Geometry:

Method:

* Select Face (0)

Cycle:

Probe Settings:

Depth:

Angles:

Radial Clearance:

Stock:

Part Stock:

Protected Moves:

Standoff Distance:

Minimum Clearance Distance:

Approach Type:

Departure Type:

Collision Alarm:

Tolerance:

Probe Control:

OK Apply Cancel

MOM Event

MOM_probe_thru_point_bore

MOM Variables

mom_probe_angle (3)
mom_probe_radius
mom_probe_cylinder_diameter
mom_probe_boss_z
mom_probe_radial_clearance

Posted Output for Renishaw/Siemens

→ N0210 R26=-2.9205 R7=2. R18=0.0 R20=00 R23=00
N0220 L9814

} Surface measurement,
bore/boss

SubOp Customization Summary

- Users can modify the Subop list to match their probing requirements
 - Most used at the top
 - Not used off the list
- By customizing the OOTB Subops, users can add or remove parameters for their specific cycle requirements
 - This is the key to generalizing the NX Probing Operation
- Adding new Subops provides the capability to produce any type of desired probing cycles
- Must provide 'handlers' in postprocessors to take advantage of the added parameters

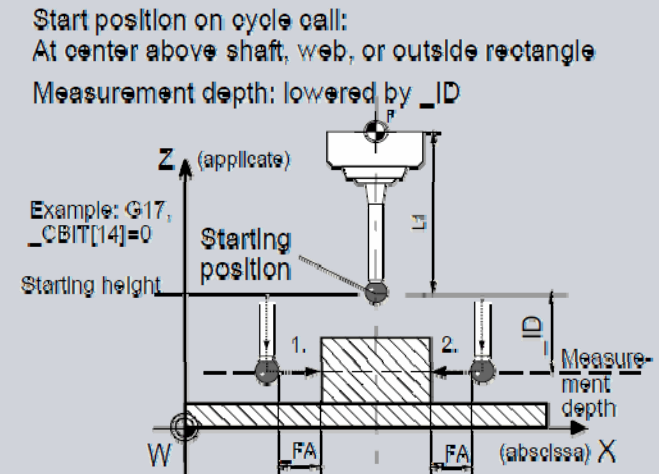
Probing Machine Support

- The demand for probing support in our posts has been on a sharp rise for the last few years
- We provided support for several machine and control combinations, for both part and tool probing
- We have provided support for 3D surface probing for adaptive machining with a combination of post and services
 - Siemens
 - Cycles 976, 977, and 978
 - Heidenhain
 - Have provided support for 16 400-series cycles
 - Fanuc
 - Mostly via UDEs

SIEMENS

 **HEIDENHAIN**

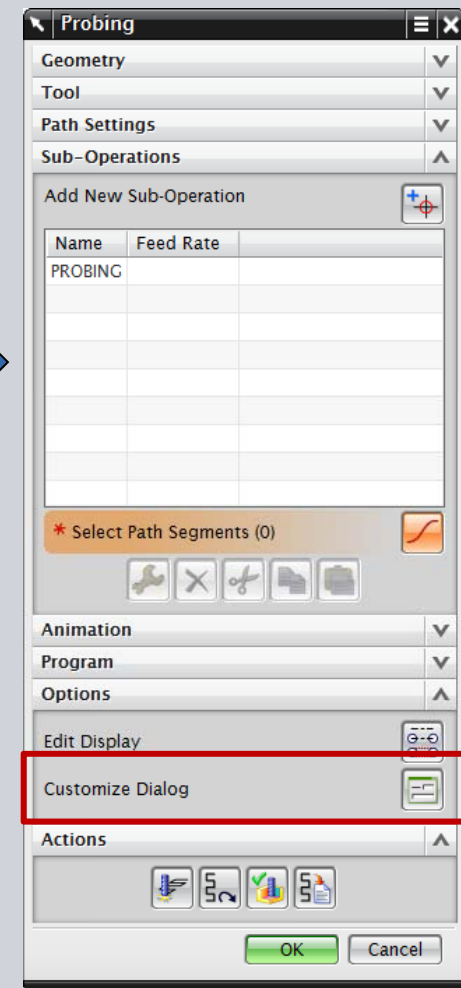
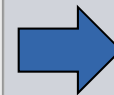
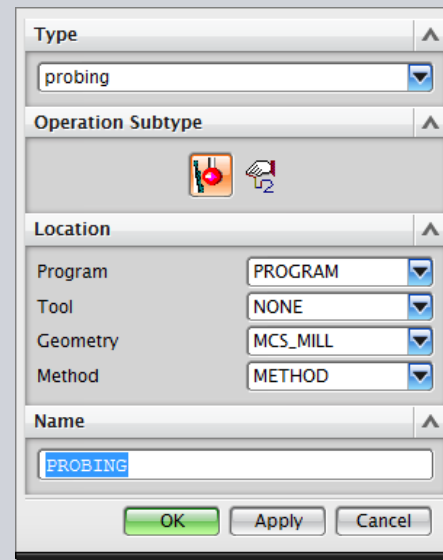
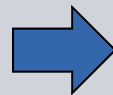
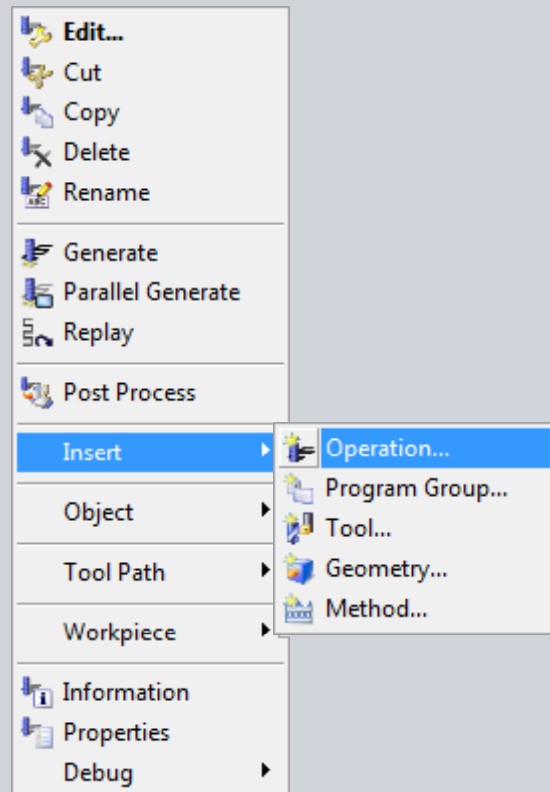
FANUC



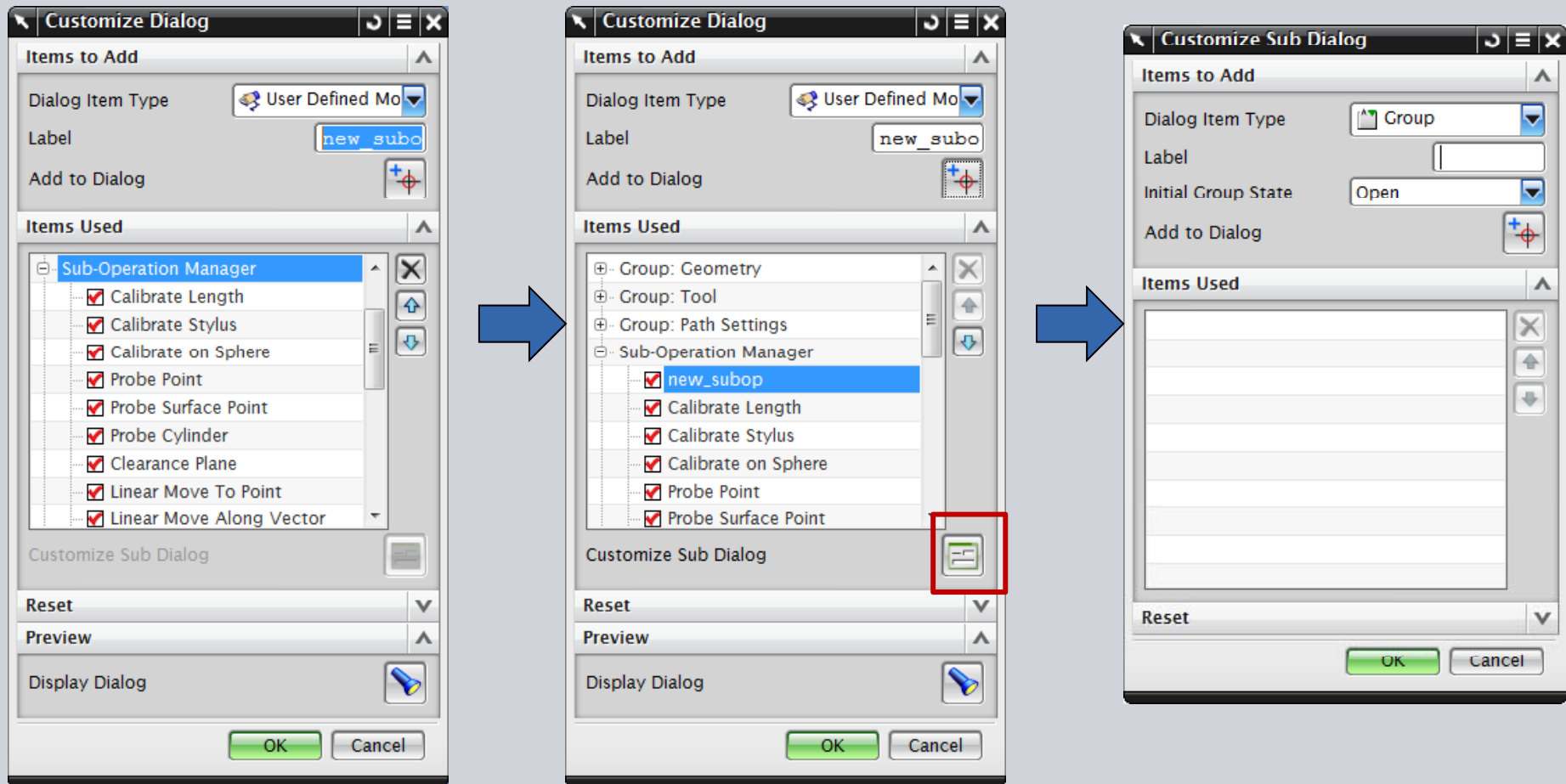
Supplemental Slides

- The following slides show the steps and some basic examples to deploy Probing and GMC using NX8 capabilities

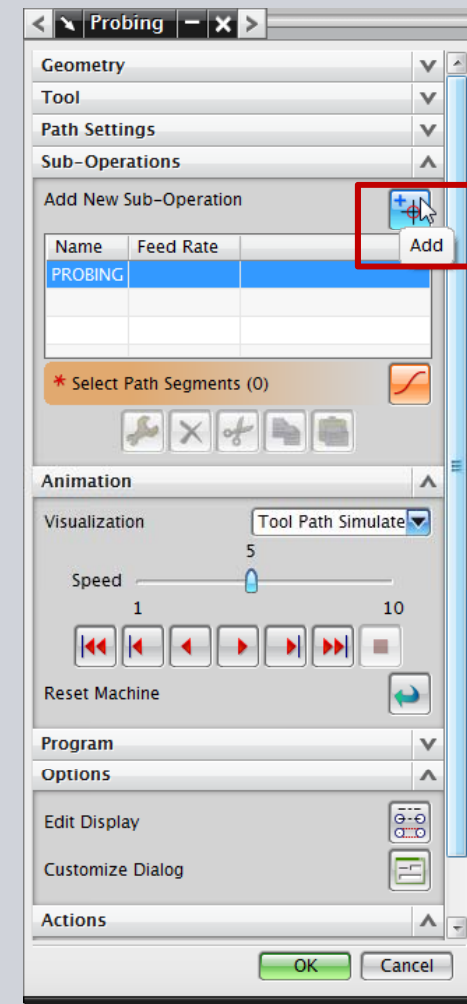
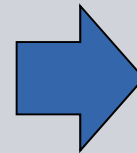
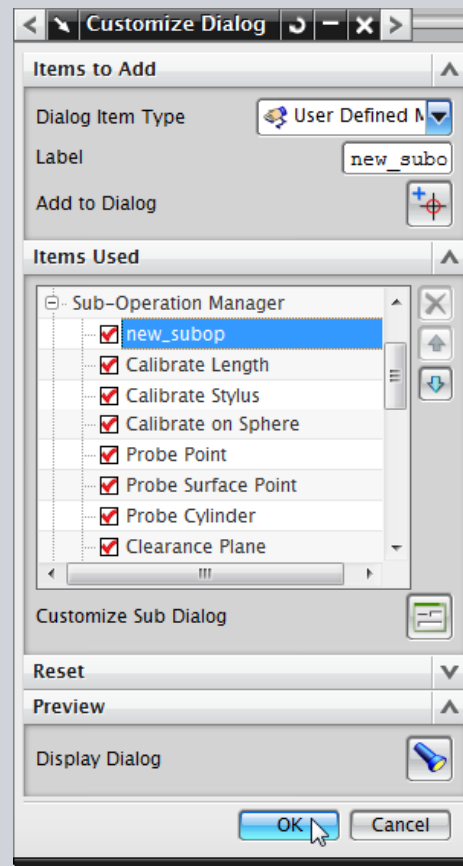
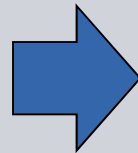
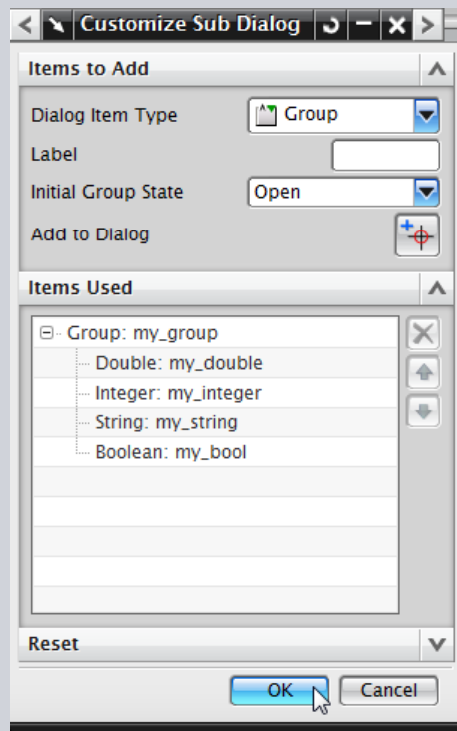
Creating a New Subop in NX8



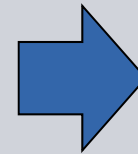
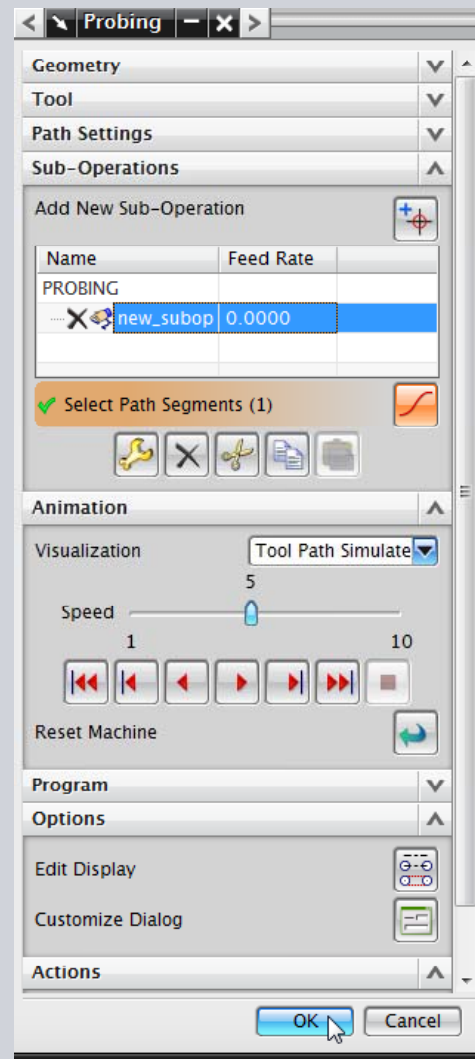
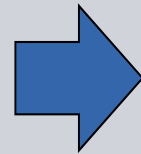
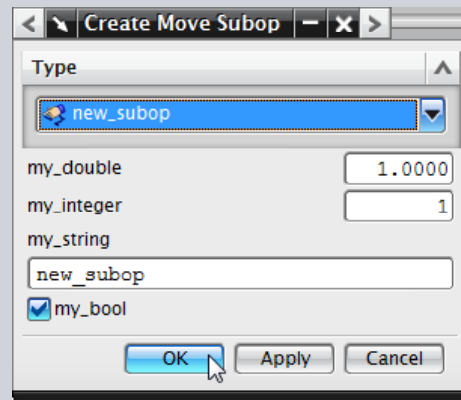
Creating a New Subop (cont.)



Customizing the New Subop

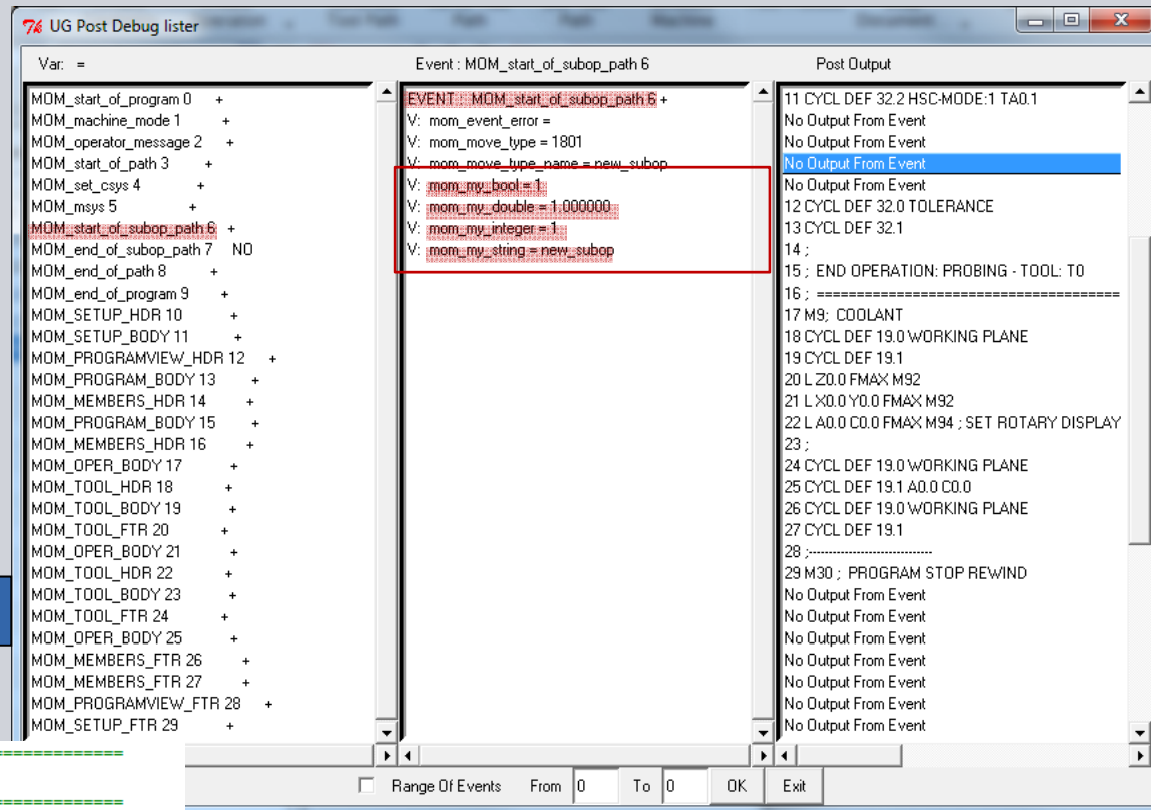
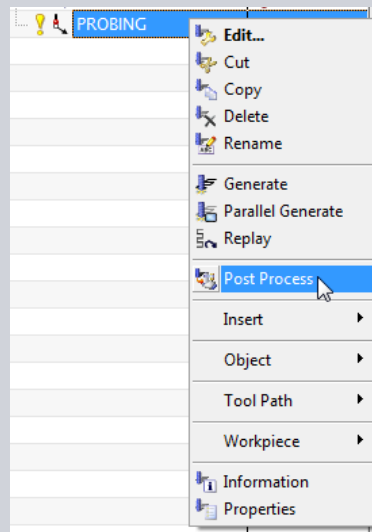


Using the Sub-Op



PROGRAM	
SUBOP_G410	
UDE_G410	
PROBING	

NX to the NX POST



```

6769 #-----
6770 proc MOM_start_of_subop_path { } {
6771 #-----
6772 #added by FWeisse
6773 PB_CMD_probing_cycle_handler
6774 }

```

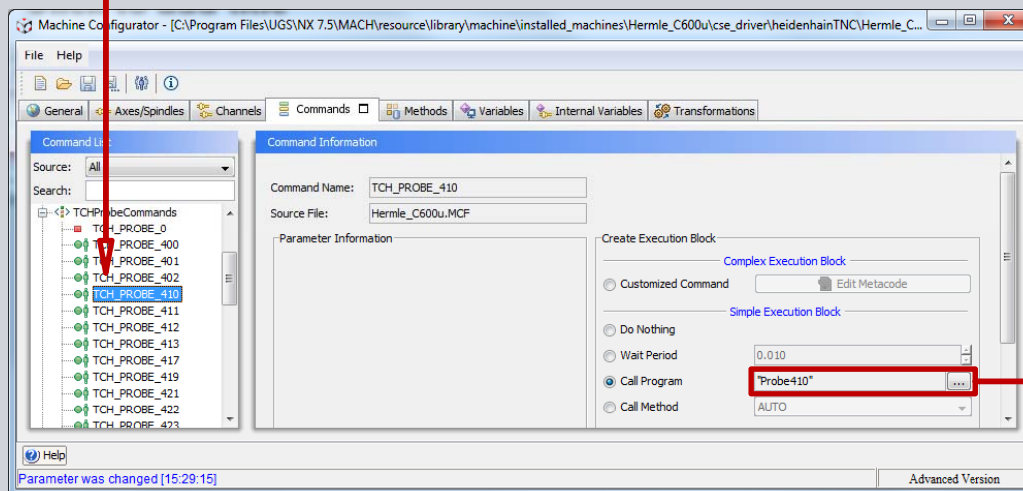
- event “MOM_start_of_subop_path” is called at the beginning of every subop
- All the mom_variables are present
- required to design a specific handler for each subop

Implementing Simulation for CSE– MCF Modification

```

Information
File Edit
27 ; ROTATION AXES SET
28 L X-3.6427 Y-.1453 FMAX M3; SPINDLE
29 T 7+2.5418 FMAX
30 TCH_PROBE_410 Q321=+2.7664 Q322=+4.1412 Q323=+1. Q324=+1. Q261=-.4582 Q320=+1. Q260=-.4582 Q301=0.0 Q305=0.0 Q331=0.0 Q332=0.0 Q303=0.0 Q381=0.0 Q333=0.0
31 CYCL DEF 32.0 TOLERANCE
32 CYCL DEF 32.1

```



```

1 0 BEGIN PGM 410 INCH
2 1 FN 18: SYSREAD Q2000 = ID20 NR9 ; read current feedrate
3
4
5 ; first measuring point
6 ; calculate standoff-point
7 20 Q1000=Q321 - Q323/2 + Q320
8 30 Q1001=Q322
9 40 L X +Q1000 Y +Q1001 Z +Q260 FMAX
10 50 L Z +Q261 FMAX ; move to standoff point in rapid
11
12 ; calculate contact point
13 60 Q1002=Q321 - Q323/2 + Q108 ;Q108 contains the tool radius set in M67
14 70 L X +Q1002 F +Q2000
15
16 ; back to standoff point
17 80 L X +Q1000 FMAX
18
19 ; retract to safety plane or not
20 90 FN 9: IF +Q301 EQU +0 GOTO LBL 110
21 100 L Z +Q260 FMAX
22 110 LBL 110
23
24 ; second measuring point
25 ; calculate standoff-point
26 20 Q1000=Q321
27 30 Q1001=Q322 - Q324/2 + Q320
28 40 L X +Q1000 Y +Q1001 FMAX
29 50 L Z +Q261 FMAX ; move to standoff point in rapid
30
31 ; calculate contact point
32 60 Q1002=Q322 - Q324/2 + Q108 ;Q108 contains the tool radius set in M67
33 70 L Y +Q1002 F +Q2000
34
35 ; back to standoff point
36 80 L Y +Q1001 FMAX
37
38 ; retract to safety plane or not
39 90 FN 9: IF +Q301 EQU +0 GOTO LBL 110
40 100 L Z +Q260 FMAX

```

Example Handler for CYCLE400/CYCLE410

```
#####
proc PB_CMD_probing_cycle_handler { } {
#####
#Fweisse Handler for Probing cycles

##### G400
global mom_probing_g400_active
if {([info exists mom_probing_g400_active ]) && ($mom_probing_g400_active ==
1))} {

    (...)
    #Mapping of subOp mom-vars to UDE mom-vars
    global mom_probe_cycle_q320    #UDE
    global mom_probing_g400_q320    #SubOp
    set mom_probe_cycle_q320 $mom_probing_g400_q320

    global mom_probe_cycle_q260_o #UDE
    global mom_probing_g400_q260    #SubOp
    set mom_probe_cycle_q260_o $mom_probing_g400_q260
    (...)

    #Call UDE Sub Prg
    PB_CMD_probe_cycle_400

}
##### G410
global mom_probing_g410_active
if {([info exists mom_probing_g410_active ]) && (mom_probing_g410_active ==
1))} {

    (...)
    global mom_cycle_410_corner_1_pos
    global mom_probing_g410_corner_1_pos
    array set mom_cycle_410_corner_1_pos [array get mom_probing_g410_corner_1_pos]

    global mom_cycle_410_corner_2_pos
    global mom_probing_g410_corner_2_pos
    array set mom_cycle_410_corner_2_pos [array get mom_probing_g410_corner_2_pos]
    (...)

    #Call UDE Sub Prg
    PB_CMD_probe_cycle_G410
}
}
```

- a wrapper around the UDE
- the subop handler calls the same subroutine

Example Handler for CYCLE400/CYCLE410

Output UDE:

TCH PROBE 410 Q321=-2.9016 Q322=-2. Q323=+2. Q324=+2. Q261=5.5443 Q320=+1. Q260=+5.5443 Q301=+1. Q305=0.0 Q331=0.0 Q332=0.0 Q303=0.0
Q381=0.0 Q333=0.0

Output SubOp:

TCH PROBE 410 Q321=-2.9016 Q322=-2. Q323=+2. Q324=+2. Q261=-5.5443 Q320=+1. Q260=+5.5443 Q301=+1. Q305=0.0 Q331=0.0 Q332=0.0 Q303=0.0
Q381=0.0 Q333=0.0