

Axis, PE block dimensions and RHWC framework

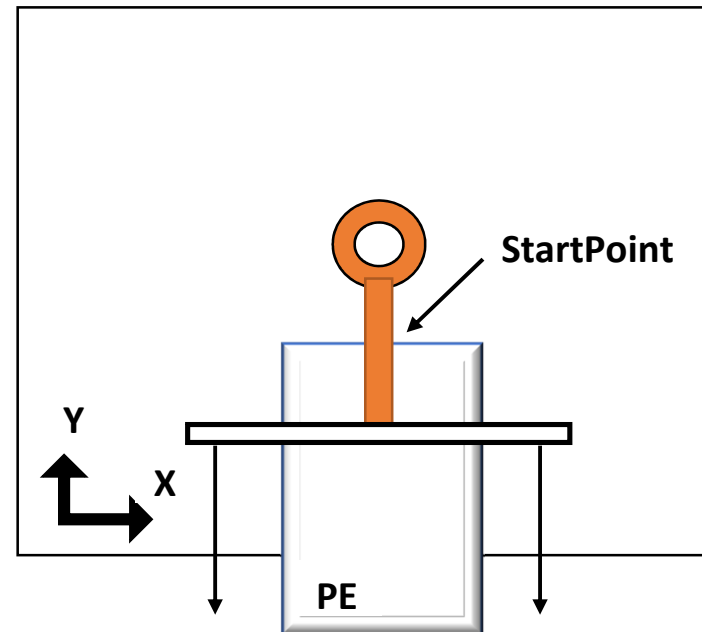
Start point

X ₀ , [mm]	818.44
Y ₀ , [mm]	500
Z ₀ , [mm]	100

A, [deg]	-90
B, [deg]	0
C, [deg]	180

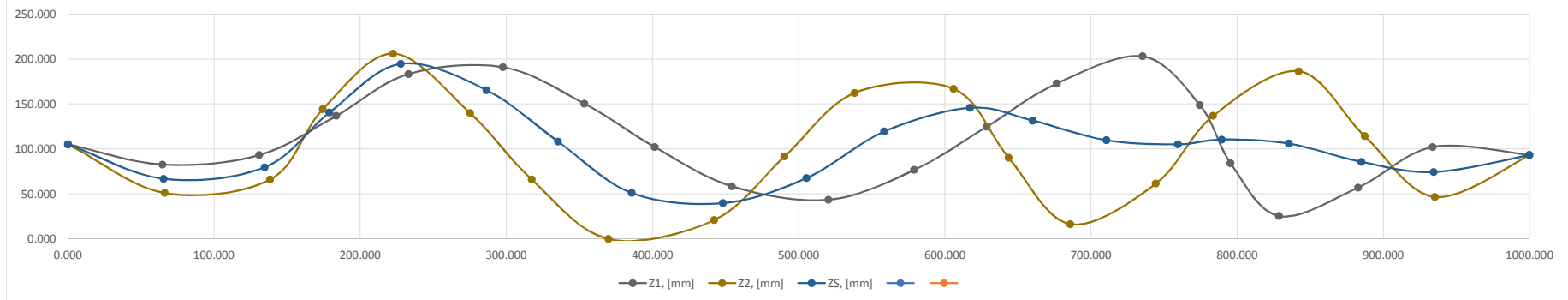
PE block

Length, [mm]	1000
Width, [mm]	500
Depth, [mm]	300



Coordinates in space [X,Y,Z] and angles of rotation [α;β]

X ₁ , [mm]	X ₂ , [mm]	X _{SR} , [mm]	Y ₁ , [mm]	Y ₂ , [mm]	Y ₁ , [mm]	Y ₂ , [mm]	Y _S , [mm]	Y _{SR} , [mm]	Z ₁ , [mm]	Z ₂ , [mm]	Z ₁ , [mm]	Z ₂ , [mm]	Z ₁ , [mm]	Z ₂ , [mm]	Z _S , [mm]	Z _{SR} , [mm]	tg (α)	α	tg (β)	β
568.440	1068.440	818.440	0.000	0.000	0.000	0.000	0.000	500.000	105.263	105.263	105.263	105.263	105.263	105.263	105.263	205.263	0.000	0.000	0.000	0.000
568.440	1068.440	818.440	64.662	66.165	64.662	66.165	65.414	434.586	82.707	51.128	82.707	51.128	82.707	51.128	66.917	166.917	-0.063	-3.614	0.003	0.172
568.440	1068.440	818.440	130.827	138.346	130.827	138.346	134.586	365.414	93.233	66.165	93.233	66.165	93.233	66.165	79.699	179.699	-0.054	-3.099	0.015	0.862
568.440	1068.440	818.440	183.459	174.436	183.459	174.436	178.947	321.053	136.842	144.361	136.842	144.361	136.842	144.361	140.602	240.602	0.015	0.862	-0.018	-1.034
568.440	1068.440	818.440	233.083	222.556	233.083	222.556	227.820	272.180	183.459	206.015	183.459	206.015	183.459	206.015	194.737	294.737	0.045	2.583	-0.021	-1.206
568.440	1068.440	818.440	297.744	275.188	297.744	275.188	286.466	213.534	190.977	139.850	190.977	139.850	190.977	139.850	165.414	265.414	-0.102	-5.839	-0.045	-2.583
568.440	1068.440	818.440	353.383	317.293	353.383	317.293	335.338	164.662	150.376	66.165	150.376	66.165	150.376	66.165	108.271	208.271	-0.168	-9.560	-0.072	-4.128
568.440	1068.440	818.440	401.504	369.925	401.504	369.925	385.714	114.286	102.256	0.000	102.256	0.000	102.256	0.000	51.128	151.128	-0.205	-11.558	-0.063	-3.614
568.440	1068.440	818.440	454.135	442.105	454.135	442.105	448.120	51.880	58.647	21.053	58.647	21.053	58.647	21.053	39.850	139.850	-0.075	-4.300	-0.024	-1.378
568.440	1068.440	818.440	520.301	490.226	520.301	490.226	505.263	-5.263	43.609	91.729	43.609	91.729	43.609	91.729	67.669	167.669	0.096	5.497	-0.060	-3.442
568.440	1068.440	818.440	578.947	538.346	578.947	538.346	558.647	-58.647	76.692	162.406	76.692	162.406	76.692	162.406	119.549	219.549	0.171	9.728	-0.081	-4.642
568.440	1068.440	818.440	628.571	606.015	628.571	606.015	617.293	-117.293	124.812	166.917	124.812	166.917	124.812	166.917	145.865	245.865	0.084	4.814	-0.045	-2.583
568.440	1068.440	818.440	676.692	643.609	676.692	643.609	660.150	-160.150	172.932	90.226	172.932	90.226	172.932	90.226	131.579	231.579	-0.165	-9.392	-0.066	-3.785
568.440	1068.440	818.440	735.338	685.714	735.338	685.714	710.526	-210.526	203.008	16.541	203.008	16.541	203.008	16.541	109.774	209.774	-0.373	-20.452	-0.099	-5.668
568.440	1068.440	818.440	774.436	744.361	774.436	744.361	759.398	-259.398	148.872	61.654	148.872	61.654	148.872	61.654	105.263	205.263	-0.174	-9.895	-0.060	-3.442
568.440	1068.440	818.440	795.489	783.459	795.489	783.459	789.474	-289.474	84.211	136.842	84.211	136.842	84.211	136.842	110.526	210.526	0.105	6.009	-0.024	-1.378
568.440	1068.440	818.440	828.571	842.105	828.571	842.105	835.338	-335.338	25.564	186.466	25.564	186.466	25.564	186.466	106.015	206.015	0.322	17.838	0.027	1.550
568.440	1068.440	818.440	882.707	887.218	882.707	887.218	884.962	-384.962	57.143	114.286	57.143	114.286	57.143	114.286	85.714	185.714	0.114	6.520	0.009	0.517
568.440	1068.440	818.440	933.835	935.338	933.835	935.338	934.586	-434.586	102.256	46.617	102.256	46.617	102.256	46.617	74.436	174.436	-0.111	-6.350	0.003	0.172
568.440	1068.440	818.440	1000.000	1000.000	1000.000	1000.000	1000.000	-500.000	93.233	93.233	93.233	93.233	93.233	93.233	93.233	193.233	0.000	0.000	0.000	0.000



////////////////////////////////////

Drat_PE_2019_02_01_21.src – soubor instrukci, obsahující výpočty, pohybové instrukce a potřebné funkce pro správné fungování robotické jednotky

////////////////////////////////////

```
&ACCESS RVO
&REL 87
&PARAM EDITMASK = *
&PARAM TEMPLATE = C:\KRC\Roboter\Template\vorgabe
&PARAM DISKPATH = KRC:\R1\Program\Danila
DEF Drat_PE_2019_02_01_21( )
; Nastavení počtu tubodů aproximace
  $ADVANCE = 3
; Inicializace robotických pohonů

;FOLD INI;{%PE}
;FOLD BASISTECH INI
  GLOBAL INTERRUPT DECL 3 WHEN $STOPMESS==TRUE DO IR_STOPM ( )
  INTERRUPT ON 3
  BAS (#INITMOV,0 )
;ENDFOLD (BASISTECH INI)
;FOLD USER INI
  ;Make your modifications here

;ENDFOLD (USER INI)
;ENDFOLD (INI)
```

; Presun TCP (koncovynastroj) do HOME pozice

;FOLD PTP HOME13 Vel=20 % DEFAULT Tool[13]:Drat_Polystyren Base[1]:Plocha001;{%PE}%R 8.3.44,%MKUKATPBASIS,%CMOVE,%VPTP,%P 1:PTP,
2:HOME13, 3:, 5:20, 7:DEFAULT

\$BWDSTART=FALSE
PDAT_ACT=PDEFAULT
FDAT_ACT=FHOME13
BAS(#PTP_PARAMS,10)
PTP XHOME13
;ENDFOLD

;Cesta do zacatkurezky za podminkyvyvarovanikoliznichbodu

;FOLD PTP cestaTam3 CONT Vel=20 % PDAT23 Tool[13]:Drat_Polystyren Base[1]:Plocha001;{%PE}%R 8.3.44,%MKUKATPBASIS,%CMOVE,%VPTP,%P 1:PTP,
2:cestaTam3, 3:C_DIS, 5:20, 7:PDAT23

\$BWDSTART=FALSE
PDAT_ACT=PPDAT23
FDAT_ACT=FcestaTam3
BAS(#PTP_PARAMS,20)
PTP XcestaTam3 C_DIS

;ENDFOLD

;FOLD PTP cestaTam4 CONT Vel=20 % PDAT22 Tool[13]:Drat_Polystyren Base[1]:Plocha001;{%PE}%R 8.3.44,%MKUKATPBASIS,%CMOVE,%VPTP,%P 1:PTP,
2:cestaTam4, 3:C_DIS, 5:20, 7:PDAT22

\$BWDSTART=FALSE
PDAT_ACT=PPDAT22
FDAT_ACT=FcestaTam4
BAS(#PTP_PARAMS,20)
PTP XcestaTam4 C_DIS

;ENDFOLD

;FOLD PTP cestaTam5 CONT Vel=20 % PDAT21 Tool[13]:Drat_Polystyren Base[1]:Plocha001;{%PE}%R 8.3.44,%MKUKATPBASIS,%CMOVE,%VPTP,%P 1:PTP,
2:cestaTam5, 3:C_DIS, 5:20, 7:PDAT21

\$BWDSTART=FALSE

```
PDAT_ACT=PPDAT21
FDAT_ACT=FcestaTam5
BAS(#PTP_PARAMS,20)
PTP XcestaTam5 C_DIS
;ENDFOLD
```

```
;Casova prodleva pro zahrati dratu na potrebnu teplotu
```

```
;FOLD WAIT Time=7 sec;{%PE}%R 8.3.44,%MKUKATPBASIS,%CWAIT,%VWAIT,%P 3:7
```

```
WAIT SEC 7
```

```
;ENDFOLD
```

```
;Body krivky pro rezani polystyrene vctne pootoceni TCP (Tool Center Point koncového nástroje)
```

```
;bodRezak_10( poradi_bodu , X_souradnice , Y_souradnice , Z_souradnice , A_pootoceni_TCP, B_pootoceni_TCP , C_pootoceni_TCP )
```

```
bodRezak_10( 1.0 , 818.440 , 500.000 , 205.263 , -90.000 , -0.100 , 180.0000 )
```

```
bodRezak_10( 2.0 , 818.440 , 434.586 , 166.917 , -89.828 , -0.200 , -176.3861 )
```

```
bodRezak_10( 3.0 , 818.440 , 365.414 , 179.699 , -89.138 , -0.300 , -176.9013 )
```

```
bodRezak_10( 4.0 , 818.440 , 321.053 , 240.602 , -91.034 , -0.400 , 179.1385 )
```

```
bodRezak_10( 5.0 , 818.440 , 272.180 , 294.737 , -91.206 , -0.500 , 177.4170 )
```

```
bodRezak_10( 6.0 , 818.440 , 213.534 , 265.414 , -92.583 , -0.600 , -174.1615 )
```

```
bodRezak_10( 7.0 , 818.440 , 164.662 , 208.271 , -94.128 , -0.700 , -170.4399 )
```

```
bodRezak_10( 8.0 , 818.440 , 114.286 , 151.128 , -93.614 , -0.800 , -168.4417 )
```

```
bodRezak_10( 9.0 , 818.440 , 51.880 , 139.850 , -91.378 , -0.900 , -175.7001 )
```

```
bodRezak_10( 10.0 , 818.440 , -5.263 , 167.669 , -93.442 , -1.000 , 174.5028 )
```

```
bodRezak_10( 11.0 , 818.440 , -58.647 , 219.549 , -94.642 , -1.100 , 170.2724 )
```

```
bodRezak_10( 12.0 , 818.440 , -117.293 , 245.865 , -92.583 , -1.200 , 175.1864 )
```

```
bodRezak_10( 13.0 , 818.440 , -160.150 , 231.579 , -93.785 , -1.300 , -170.6076 )
```

```
bodRezak_10( 14.0 , 818.440 , -210.526 , 209.774 , -95.668 , -1.400 , -159.5479 )
```

```
bodRezak_10( 15.0 , 818.440 , -259.398 , 205.263 , -93.442 , -1.500 , -170.1051 )
```

```
bodRezak_10( 16.0 , 818.440 , -289.474 , 210.526 , -91.378 , -1.600 , 173.9910 )
```

```
bodRezak_10( 17.0 , 818.440 , -335.338 , 206.015 , -88.450 , -1.700 , 162.1616 )
```

bodRezak_10(18.0 , 818.440 , -384.962 , 185.714 , -89.483 , -1.800 , 173.4802)
bodRezak_10(19.0 , 818.440 , -434.586 , 174.436 , -89.828 , -1.900 , -173.6504)
bodRezak_10(20.0 , 818.440 , -500.000 , 193.233 , -90.000 , -2.000 , 180.0000)

;Cesta od konce rezky za podminky vyvarovani koliznich bodu

;FOLD PTP cestaTam6 CONT Vel=5 % PDAT24 Tool[13]:Drat_Polystyren Base[1]:Plocha001;{%PE}%R 8.3.44,%MKUKATPBASIS,%CMOVE,%VPTP,%P 1:PTP,
2:cestaTam6, 3:C_DIS, 5:5, 7:PDAT24
\$BWDSTART=FALSE
PDAT_ACT=PPDAT24
FDAT_ACT=FcestaTam6
BAS(#PTP_PARAMS,5)
PTP XcestaTam6 C_DIS

;ENDFOLD

;FOLD PTP cestaTam7 CONT Vel=5 % PDAT25 Tool[13]:Drat_Polystyren Base[1]:Plocha001;{%PE}%R 8.3.44,%MKUKATPBASIS,%CMOVE,%VPTP,%P 1:PTP,
2:cestaTam7, 3:C_DIS, 5:5, 7:PDAT25
\$BWDSTART=FALSE
PDAT_ACT=PPDAT25
FDAT_ACT=FcestaTam7
BAS(#PTP_PARAMS,5)
PTP XcestaTam7 C_DIS

;ENDFOLD

;FOLD PTP cestaTam8 CONT Vel=5 % PDAT26 Tool[13]:Drat_Polystyren Base[1]:Plocha001;{%PE}%R 8.3.44,%MKUKATPBASIS,%CMOVE,%VPTP,%P 1:PTP,
2:cestaTam8, 3:C_DIS, 5:5, 7:PDAT26
\$BWDSTART=FALSE
PDAT_ACT=PPDAT26
FDAT_ACT=FcestaTam8
BAS(#PTP_PARAMS,5)
PTP XcestaTam8 C_DIS

;ENDFOLD

```
;cesta do Home
; Presun TCP (koncovynastroj) do HOME pozice
;FOLD PTP HOME13 Vel=20 % DEFAULT Tool[13]:Drat_Polystyren Base[1]:Plocha001;{%PE}%R 8.3.44,%MKUKATPBASIS,%CMOVE,%VPTP,%P 1:PTP,
2:HOME13, 3:, 5:20, 7:DEFAULT
$BWDSTART=FALSE
PDAT_ACT=PDEFAULT
FDAT_ACT=FHOME13
BAS(#PTP_PARAMS,10)
PTP XHOME13
;ENDFOLD
```

END

```
; funkce reznych bodu
```

```
DEF bodRezak_10(NPozice: IN, XPozice: IN, YPozice: IN, ZPozice: IN, APozice: IN, BPozice: IN, CPozice: IN)
DECL REAL NPozice, XPozice, YPozice, ZPozice, APozice, BPozice, CPozice
```

```
XpracovniBodRezak.X = XPozice
```

```
XpracovniBodRezak.Y = YPozice
```

```
XpracovniBodRezak.Z = ZPozice + 100
```

```
XpracovniBodRezak.A = APozice - 4.4
```

```
;XpracovniBodRezak.B = BPozice - NPozice/3.0
```

```
;XpracovniBodRezak.B = BPozice
```

```
XpracovniBodRezak.B = (YPozice-500)*20/1000
```

```
;XpracovniBodRezak.B = 0
```

```
XpracovniBodRezak.C = CPozice
```

```
;FOLD LIN pracovniBodRezak CONT Vel=0.01 m/s CPDAT24 Tool[13]:Drat_Polystyren Base[1]:Plocha001;{%PE}%R
8.3.44,%MKUKATPBASIS,%CMOVE,%VLIN,%P 1:LIN, 2:pracovniBodRezak, 3:C_DIS C_DIS, 5:0.01, 7:CPDAT24
$BWDSTART=FALSE
```

```
LDAT_ACT=LCPDAT24
FDAT_ACT=FpracovniBodRezak
BAS(#CP_PARAMS,0.01)
LIN XpracovniBodRezak C_DIS C_DIS
;ENDFOLD
```

END

```
////////////////////////////////////
```

Drat_PE_2019_02_01_21.dat – datovy soubor, obsahující potrebna data pro spravne fungovani roboticke jednotky

```
////////////////////////////////////
```

```
&ACCESS RVO
&REL 87
&PARAM EDITMASK = *
&PARAM TEMPLATE = C:\KRC\Roboter\Template\vorgabe
&PARAM DISKPATH = KRC:\R1\Program\Danila
DEFDAT Drat_PE_2019_02_01_21
;FOLD EXTERNAL DECLARATIONS;{%PE}%MKUKATPBASIS,%CEXT,%VCOMMON,%P
;FOLD BASISTECH EXT;{%PE}%MKUKATPBASIS,%CEXT,%VEXT,%P
EXT BAS (BAS_COMMAND :IN,REAL :IN )
;ENDFOLD (BASISTECH EXT)
;FOLD USER EXT;{%E}%MKUKATPUSER,%CEXT,%VEXT,%P
;Make yourmodificationshere
;ENDFOLD (USER EXT)
;ENDFOLD (EXTERNAL DECLARATIONS)
DECL E6POS XHOME13={X 818.446411,Y 520.321533,Z 632.714294,A -
94.4100,B 0.00870240666,C 179.910828,S 2,T 2,E1 0.0,E2 0.0,E3 0.0,E4 0.0,E5 0.0,E6 0.0}
DECL FDAT FHOME13={TOOL_NO 13,BASE_NO 1,IPO_FRAME #BASE,POINT2[" "],TQ_STATE FALSE}
```



```
DECL E6POS XpracovniBodRezak={X 818.440,Y -500.000,Z 293.233,A -94.4000,B -20.0000,C 180.000,E1 0.0,E2 0.0,E3 0.0,E4 0.0,E5 0.0,E6 0.0}
DECL FDAT FpracovniBodRezak={TOOL_NO 13,BASE_NO 1,IPO_FRAME #BASE,POINT2[" ",TQ_STATE FALSE}
DECL LDAT LCPDAT24={VEL 2.00000,ACC 100.000,APO_DIST 100.000,APO_FAC 50.0000,AXIS_VEL 100.000,AXIS_ACC 100.000,ORI_TYP #VAR,CIRC_TYP
#BASE,JERK_FAC 50.0000,GEAR_JERK 50.0000,EXAX_IGN 0}
DECL E6POS XCESTATAM5={X 818.122192,Y 526.580383,Z 282.337646,A -94.3961411,B -0.0365558974,C -
179.905899,S 2,T 10,E1 0.0,E2 0.0,E3 0.0,E4 0.0,E5 0.0,E6 0.0}
DECL FDAT FcestaTam5={TOOL_NO 13,BASE_NO 1,IPO_FRAME #BASE,POINT2[" ",TQ_STATE FALSE}
DECL PDAT PPDAT21={VEL 100.000,ACC 100.000,APO_DIST 100.000,APO_MODE #CDIS,GEAR_JERK 50.0000,EXAX_IGN 0}
DECL E6POS XCESTATAM4={X 818.384399,Y 526.576721,Z 491.289856,A -94.3961411,B -0.0365559235,C -
179.905899,S 2,T 10,E1 0.0,E2 0.0,E3 0.0,E4 0.0,E5 0.0,E6 0.0}
DECL FDAT FcestaTam4={TOOL_NO 13,BASE_NO 1,IPO_FRAME #BASE,POINT2[" ",TQ_STATE FALSE}
DECL PDAT PPDAT22={VEL 100.000,ACC 100.000,APO_DIST 100.000,APO_MODE #CDIS,GEAR_JERK 50.0000,EXAX_IGN 0}
DECL E6POS XCESTATAM3={X 818.457764,Y 526.575684,Z 549.791077,A -94.3961411,B -0.0365559347,C -
179.905899,S 2,T 10,E1 0.0,E2 0.0,E3 0.0,E4 0.0,E5 0.0,E6 0.0}
DECL FDAT FcestaTam3={TOOL_NO 13,BASE_NO 1,IPO_FRAME #BASE,POINT2[" ",TQ_STATE FALSE}
DECL PDAT PPDAT23={VEL 100.000,ACC 100.000,APO_DIST 100.000,APO_MODE #CDIS,GEAR_JERK 50.0000,EXAX_IGN 0}
DECL E6POS XCESTATAM6={X 819.062073,Y -519.915161,Z 301.248718,A -94.3486938,B -24.4221268,C -
178.647308,S 2,T 2,E1 0.0,E2 0.0,E3 0.0,E4 0.0,E5 0.0,E6 0.0}
DECL FDAT FcestaTam6={TOOL_NO 13,BASE_NO 1,IPO_FRAME #BASE,POINT2[" ",TQ_STATE FALSE}
DECL PDAT PPDAT24={VEL 100.000,ACC 100.000,APO_DIST 100.000,APO_MODE #CDIS,GEAR_JERK 50.0000,EXAX_IGN 0}
DECL E6POS XCESTATAM7={X 821.614075,Y -724.400208,Z 452.213470,A -96.0832,B -51.1655807,C -
175.430878,S 2,T 2,E1 0.0,E2 0.0,E3 0.0,E4 0.0,E5 0.0,E6 0.0}
DECL FDAT FcestaTam7={TOOL_NO 13,BASE_NO 1,IPO_FRAME #BASE,POINT2[" ",TQ_STATE FALSE}
DECL PDAT PPDAT25={VEL 100.000,ACC 100.000,APO_DIST 100.000,APO_MODE #CDIS,GEAR_JERK 50.0000,EXAX_IGN 0}
DECL E6POS XCESTATAM8={X 822.002,Y -637.913574,Z 944.270142,A -104.022942,B -73.7771606,C -
166.589096,S 2,T 2,E1 0.0,E2 0.0,E3 0.0,E4 0.0,E5 0.0,E6 0.0}
DECL FDAT FcestaTam8={TOOL_NO 13,BASE_NO 1,IPO_FRAME #BASE,POINT2[" ",TQ_STATE FALSE}
DECL PDAT PPDAT26={VEL 100.000,ACC 100.000,APO_DIST 100.000,APO_MODE #CDIS,GEAR_JERK 50.0000,EXAX_IGN 0}
ENDDAT
```