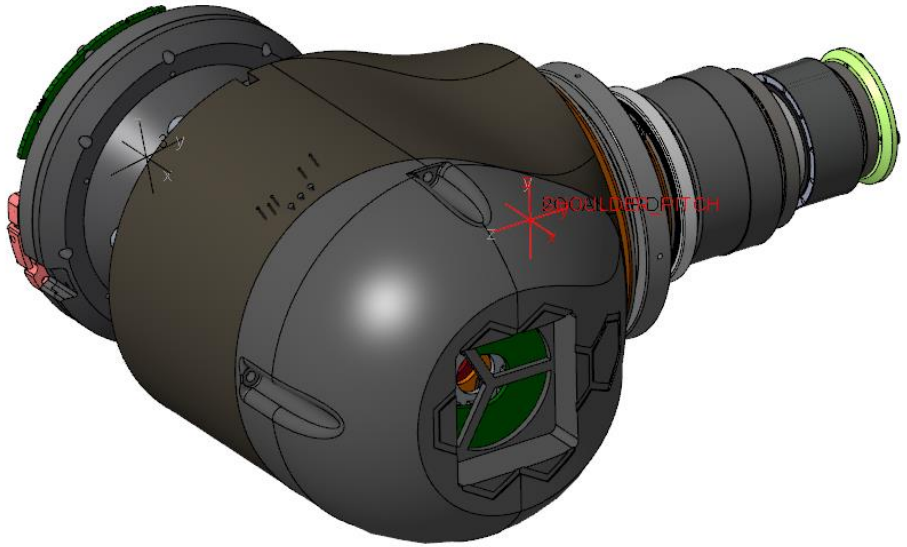
COGIMON URDF-DATA

Shoulder_pitch



VOLUME = 4.0842136e+05 MM^3
SURFACE AREA = 3.7139426e+05 MM^2
AVERAGE DENSITY = 4.8059864e-06 KILOGRAM / MM^3
MASS = 1.9628675e+00 KILOGRAM

CENTER OF GRAVITY with respect to SHOULDER_PITCH coordinate frame:
X Y Z -7.4457212e+00 -3.4107960e+01 1.0978102e-01 MM

INERTIA with respect to SHOULDER_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 7.6383030e+03 -8.6277588e+02 1.6694014e+01
Iyx Iyy Iyz -8.6277588e+02 3.5011754e+03 -4.8342538e+01
Izx Izy Izz 1.6694014e+01 -4.8342538e+01 9.2844679e+03

INERTIA at CENTER OF GRAVITY with respect to SHOULDER_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 5.3547717e+03 -3.6428926e+02 1.5089568e+01
Iyx Iyy Iyz -3.6428926e+02 3.3923328e+03 -5.5692312e+01
Izx Izy Izz 1.5089568e+01 -5.5692312e+01 6.8921413e+03

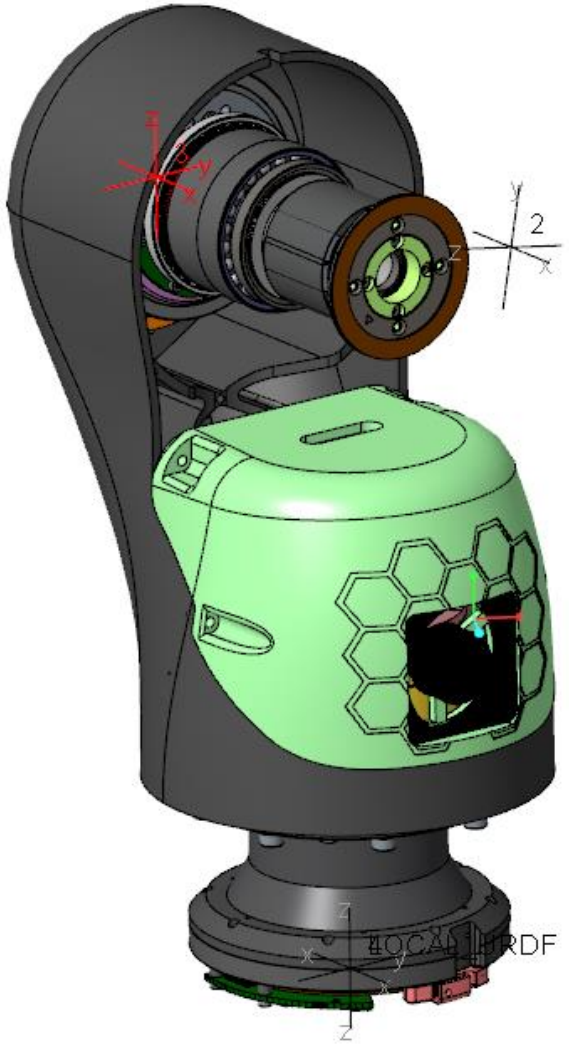
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 3.3261291e+03 5.4197988e+03 6.8933178e+03

ROTATION MATRIX from SHOULDER_PITCH orientation to PRINCIPAL AXES:
0.17662 -0.98418 0.01391
0.98417 0.17637 -0.01735
0.01462 0.01676 0.99975

ROTATION ANGLES from SHOULDER_PITCH orientation to PRINCIPAL AXES (degrees):
angles about x y z 0.994 0.797 79.826

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 4.1164615e+01 5.2546777e+01 5.9260956e+01 MM

Shoulder_roll



VOLUME = 5.2738006e+05 MM^3
SURFACE AREA = 4.2768894e+05 MM^2
AVERAGE DENSITY = 3.5260739e-06 KILOGRAM / MM^3
MASS = 1.8595811e+00 KILOGRAM

CENTER OF GRAVITY with respect to 3 coordinate frame:
X Y Z 5.8142302e+01 -5.7450803e-02 -7.7477683e+01 MM

INERTIA with respect to 3 coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 2.4939327e+04 -3.1577076e+01 1.2145929e+04
Iyx Iyy Iyz -3.1577076e+01 3.3126505e+04 1.2120711e+00
Izx Izy Izz 1.2145929e+04 1.2120711e+00 1.0918136e+04

INERTIA at CENTER OF GRAVITY with respect to 3 coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.3776643e+04 -3.7788675e+01 3.7690171e+03
Iyx Iyy Iyz -3.7788675e+01 1.5677464e+04 9.4893549e+00
Izx Izy Izz 3.7690171e+03 9.4893549e+00 4.6317657e+03

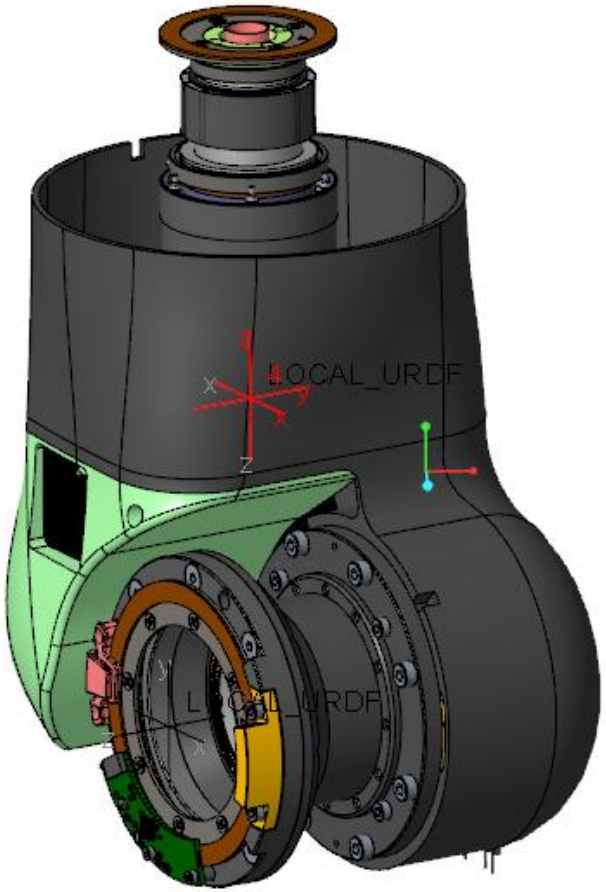
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 3.2785707e+03 1.5127895e+04 1.5679407e+04

ROTATION MATRIX from 3 orientation to PRINCIPAL AXES:
-0.33791 0.93952 -0.05591
-0.00175 0.05878 0.99827
0.94118 0.33742 -0.01822

ROTATION ANGLES from 3 orientation to PRINCIPAL AXES (degrees):
angles about x y z -91.045 -3.205 -109.782

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 4.1988921e+01 9.0194840e+01 9.1824221e+01 MM

Shoulder_yaw



VOLUME = 4.5522556e+05 MM^3
SURFACE AREA = 4.0974002e+05 MM^2
AVERAGE DENSITY = 3.6637021e-06 KILOGRAM / MM^3
MASS = 1.6678109e+00 KILOGRAM

CENTER OF GRAVITY with respect to 4 coordinate frame:
X Y Z 1.4625194e+01 -8.1726720e-01 -2.8333545e+01 MM

INERTIA with respect to 4 coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 7.7880590e+03 1.7632576e+02 1.9116493e+03
Iyx Iyy Iyz 1.7632576e+02 9.0328478e+03 -1.2856149e+02
Izx Izy Izz 1.9116493e+03 -1.2856149e+02 4.0316973e+03

INERTIA at CENTER OF GRAVITY with respect to 4 coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 6.4480435e+03 1.5639093e+02 1.2205359e+03
Iyx Iyy Iyz 1.5639093e+02 7.3372077e+03 -8.9941532e+01
Izx Izy Izz 1.2205359e+03 -8.9941532e+01 3.6738448e+03

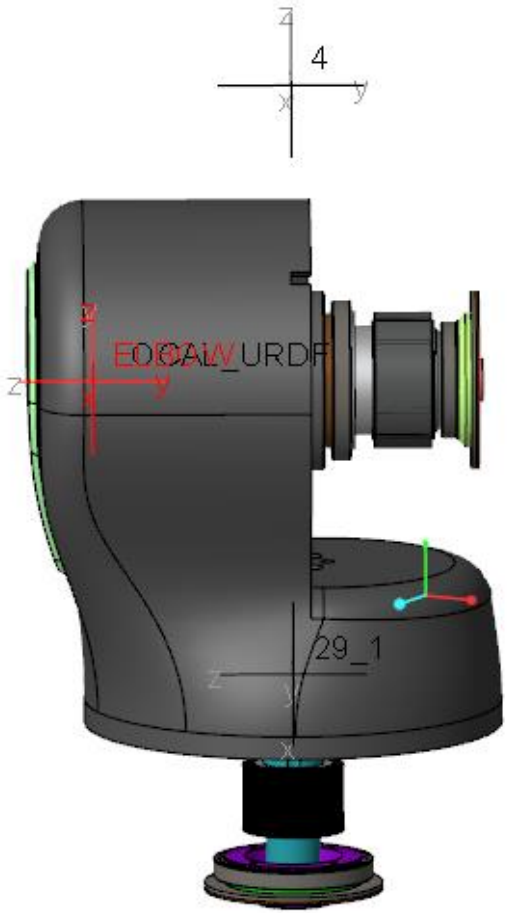
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 3.2086017e+03 6.8801863e+03 7.3703080e+03

ROTATION MATRIX from 4 orientation to PRINCIPAL AXES:
-0.35380 0.90488 0.23668
0.03376 -0.24053 0.97005
0.93471 0.35120 0.05455

ROTATION ANGLES from 4 orientation to PRINCIPAL AXES (degrees):
angles about x y z -86.782 13.691 -111.355

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 4.3861604e+01 6.4228340e+01 6.6476695e+01 MM

elbow



VOLUME = 2.8053180e+05 MM^3
SURFACE AREA = 2.7186630e+05 MM^2
AVERAGE DENSITY = 4.6901240e-06 KILOGRAM / MM^3
MASS = 1.3157289e+00 KILOGRAM

CENTER OF GRAVITY with respect to ELBOW coordinate frame:
X Y Z -7.6833067e+00 4.0302205e+01 -4.3492779e+01 MM

INERTIA with respect to ELBOW coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 8.9563516e+03 5.2479490e+02 -8.5890698e+02
Iyx Iyy Iyz 5.2479490e+02 6.4205251e+03 3.1020123e+03
Izx Izy Izz -8.5890698e+02 3.1020123e+03 3.9742366e+03

INERTIA at CENTER OF GRAVITY with respect to ELBOW coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 4.3303940e+03 1.1737391e+02 -4.1923199e+02
Iyx Iyy Iyz 1.1737391e+02 3.8539919e+03 7.9573038e+02
Izx Izy Izz -4.1923199e+02 7.9573038e+02 1.7594689e+03

PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 1.4263634e+03 4.1201959e+03 4.3972955e+03

ROTATION MATRIX from ELBOW orientation to PRINCIPAL AXES:
0.14807 0.07979 -0.98575
-0.31450 0.94880 0.02955
0.93764 0.30564 0.16558

ROTATION ANGLES from ELBOW orientation to PRINCIPAL AXES (degrees):
angles about x y z -10.120 -80.317 -28.318

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 3.2925462e+01 5.5959744e+01 5.7810884e+01 MM

Forearm_yaw

VOLUME = 4.1068471e+05 MM^3
SURFACE AREA = 3.5142556e+05 MM^2
AVERAGE DENSITY = 3.6301686e-06 KILOGRAM / MM^3
MASS = 1.4908547e+00 KILOGRAM

CENTER OF GRAVITY with respect to FOREARM_PITCH coordinate frame:
X Y Z -1.1079615e-01 -1.1590836e+01 -7.8160260e+01 MM

INERTIA with respect to FOREARM_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.7877176e+04 -1.9770838e+01 6.4687772e+00
Iyx Iyy Iyz -1.9770838e+01 1.6853105e+04 -1.0220281e+03
Izx Izy Izz 6.4687772e+00 -1.0220281e+03 2.9445030e+03

INERTIA at CENTER OF GRAVITY with respect to FOREARM_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 8.5692128e+03 -1.7856252e+01 1.9379365e+01
Iyx Iyy Iyz -1.7856252e+01 7.7454159e+03 3.2860094e+02
Izx Izy Izz 1.9379365e+01 3.2860094e+02 2.7441921e+03

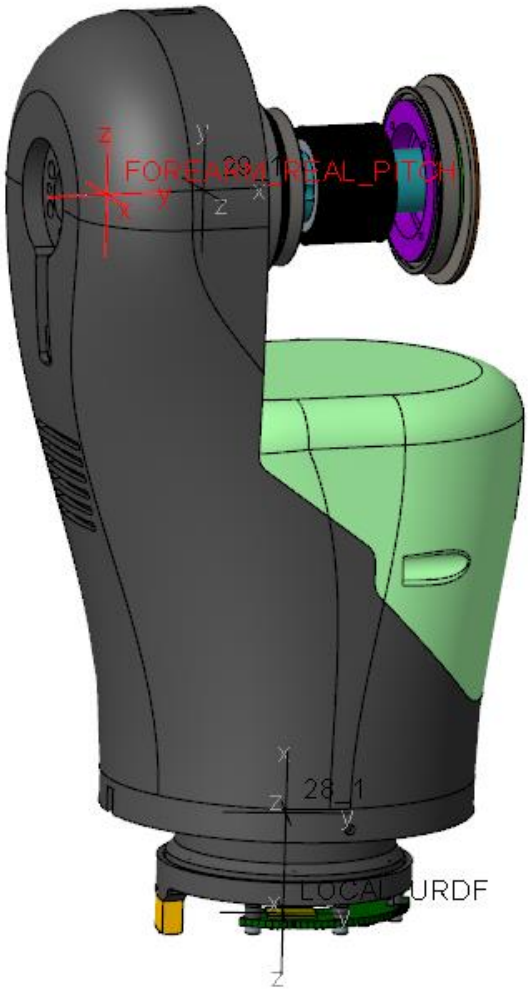
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 2.7226222e+03 7.7665726e+03 8.5696260e+03

ROTATION MATRIX from FOREARM_PITCH orientation to PRINCIPAL AXES:
-0.00351 0.02062 -0.99978
-0.06529 0.99765 0.02080
0.99786 0.06535 -0.00215

ROTATION ANGLES from FOREARM_PITCH orientation to PRINCIPAL AXES (degrees):
angles about x y z -95.908 -88.802 -99.654

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 4.2734244e+01 7.2176703e+01 7.5816420e+01 MM

Forearm_pitch



VOLUME = 2.7686053e+05 MM^3
SURFACE AREA = 2.6060639e+05 MM^2
AVERAGE DENSITY = 4.0683345e-06 KILOGRAM / MM^3
MASS = 1.1263612e+00 KILOGRAM

CENTER OF GRAVITY with respect to FOREARM_REAL_PITCH coordinate frame:
X Y Z -4.6502396e-03 3.8014094e+01 -6.9926878e+01 MM

INERTIA with respect to FOREARM_REAL_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.2322496e+04 -2.7045258e+01 1.9170832e+00
Iyx Iyy Iyz -2.7045258e+01 1.0311424e+04 3.7157578e+03
Izx Izy Izz 1.9170832e+00 3.7157578e+03 2.9048112e+03

INERTIA at CENTER OF GRAVITY with respect to FOREARM_REAL_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 5.1871784e+03 -2.7244370e+01 2.2833496e+00
Iyx Iyy Iyz -2.7244370e+01 4.8037789e+03 7.2165653e+02
Izx Izy Izz 2.2833496e+00 7.2165653e+02 1.2771388e+03

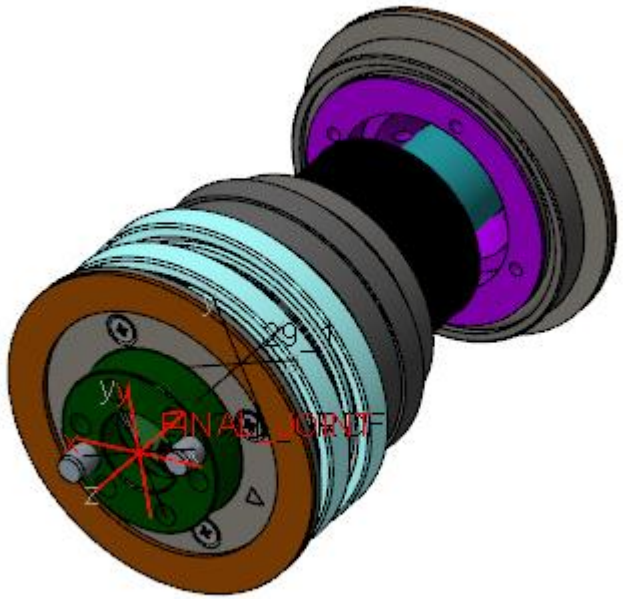
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 1.1351666e+03 4.9429076e+03 5.1900219e+03

ROTATION MATRIX from FOREARM_REAL_PITCH orientation to PRINCIPAL AXES:
-0.00185 0.10701 -0.99426
-0.19303 0.97552 0.10535
0.98119 0.19211 0.01885

ROTATION ANGLES from FOREARM_REAL_PITCH orientation to PRINCIPAL AXES (degrees):
angles about x y z -79.856 -83.856 -90.991

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 3.1746142e+01 6.6244892e+01 6.7880611e+01 MM

Forearm_last joint yaw



VOLUME = 4.3878646e+04 MM^3
SURFACE AREA = 5.2821743e+04 MM^2
AVERAGE DENSITY = 6.3735851e-06 KILOGRAM / MM^3
MASS = 2.7966428e-01 KILOGRAM

CENTER OF GRAVITY with respect to FINAL_JOINT coordinate frame:
X Y Z 0.0000000e+00 0.0000000e+00 3.1270570e+01 MM

INERTIA with respect to FINAL_JOINT coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 4.1762123e+02 9.8651826e-02 0.0000000e+00
Iyx Iyy Iyz 9.8651826e-02 4.1763942e+02 0.0000000e+00
Izx Izy Izz 0.0000000e+00 0.0000000e+00 6.0500616e+01

INERTIA at CENTER OF GRAVITY with respect to FINAL_JOINT coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.4415192e+02 9.8651826e-02 0.0000000e+00
Iyx Iyy Iyz 9.8651826e-02 1.4417010e+02 0.0000000e+00
Izx Izy Izz 0.0000000e+00 0.0000000e+00 6.0500616e+01

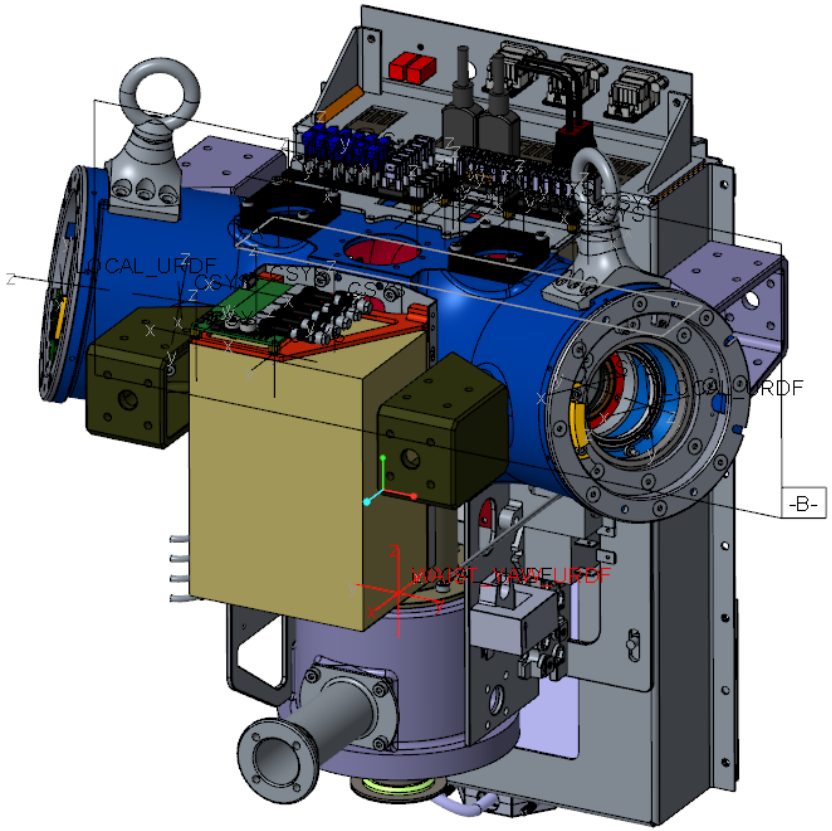
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 6.0500616e+01 1.4406194e+02 1.4426008e+02

ROTATION MATRIX from FINAL_JOINT orientation to PRINCIPAL AXES:
0.00000 0.73884 0.67388
0.00000 -0.67388 0.73884
1.00000 0.00000 0.00000

ROTATION ANGLES from FINAL_JOINT orientation to PRINCIPAL AXES (degrees):
angles about x y z -90.000 42.367 -90.000

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 1.4708263e+01 2.2696355e+01 2.2711958e+01 MM

Torso yaw



VOLUME = 4.0551122e+06 MM^3
SURFACE AREA = 1.9553402e+06 MM^2
AVERAGE DENSITY = 3.0855606e-06 KILOGRAM / MM^3
MASS = 1.2512295e+01 KILOGRAM

CENTER OF GRAVITY with respect to WAIST_YAW_URDF coordinate frame:
X Y Z -5.9646212e+01 1.4305062e+00 4.2741527e+01 MM

INERTIA with respect to WAIST_YAW_URDF coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 2.3309971e+05 9.1233034e+02 -1.8318131e+04
Iyx Iyy Iyz 9.1233034e+02 2.6720252e+05 -1.0570749e+03
Izx Izy Izz -1.8318131e+04 -1.0570749e+03 1.8479117e+05

INERTIA at CENTER OF GRAVITY with respect to WAIST_YAW_URDF coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 2.1021617e+05 -1.5527214e+02 -5.0216602e+04
Iyx Iyy Iyz -1.5527214e+02 1.9982996e+05 -2.9204792e+02
Izx Izy Izz -5.0216602e+04 -2.9204792e+02 1.4025094e+05

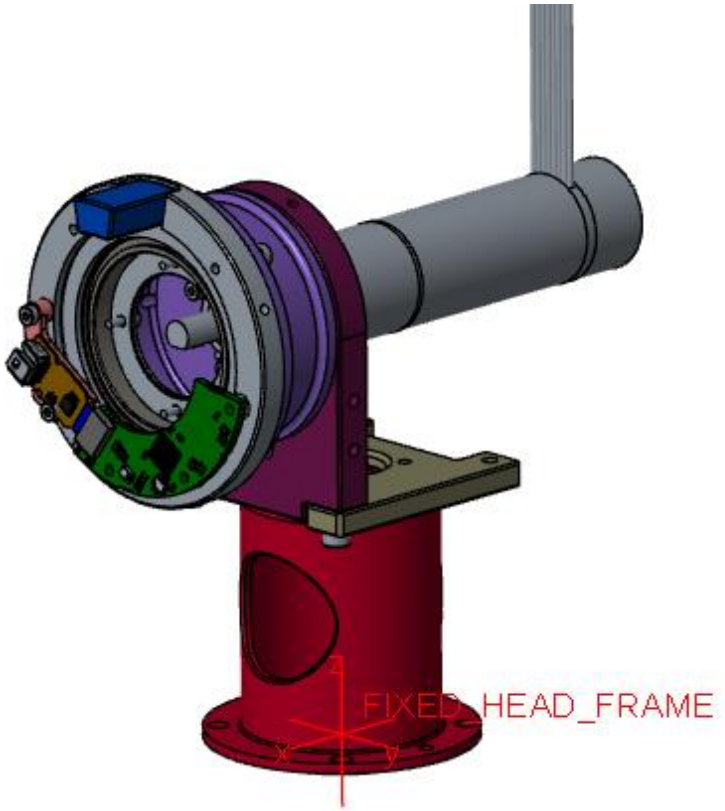
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 1.1403187e+05 1.9983123e+05 2.3643397e+05

ROTATION MATRIX from WAIST_YAW_URDF orientation to PRINCIPAL AXES:
0.46281 -0.00172 -0.88646
0.00385 0.99999 0.00007
0.88645 -0.00345 0.46281

ROTATION ANGLES from WAIST_YAW_URDF orientation to PRINCIPAL AXES (degrees):
angles about x y z 0.000 -62.431 0.213

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 9.5465103e+01 1.2637559e+02 1.3746320e+02 MM

Head_fixed_frame



VOLUME = 1.1151079e+05 MM^3
SURFACE AREA = 7.1763700e+04 MM^2
AVERAGE DENSITY = 2.1338690e-06 KILOGRAM / MM^3
MASS = 2.3794941e-01 KILOGRAM

CENTER OF GRAVITY with respect to FIXED_HEAD_FRAME coordinate frame:
X Y Z 1.9525578e+01 8.7785097e-02 7.3374976e+01 MM

INERTIA with respect to FIXED_HEAD_FRAME coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.5656977e+03 -9.4980522e-01 -4.1415769e+02
Iyx Iyy Iyz -9.4980522e-01 1.8248980e+03 -1.6271608e+00
Izx Izy Izz -4.1415769e+02 -1.6271608e+00 3.6747496e+02

INERTIA at CENTER OF GRAVITY with respect to FIXED_HEAD_FRAME coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 2.8460315e+02 -5.4194691e-01 -7.3250232e+01
Iyx Iyy Iyz -5.4194691e-01 4.5308750e+02 -9.4474115e-02
Izx Izy Izz -7.3250232e+01 -9.4474115e-02 2.7675534e+02

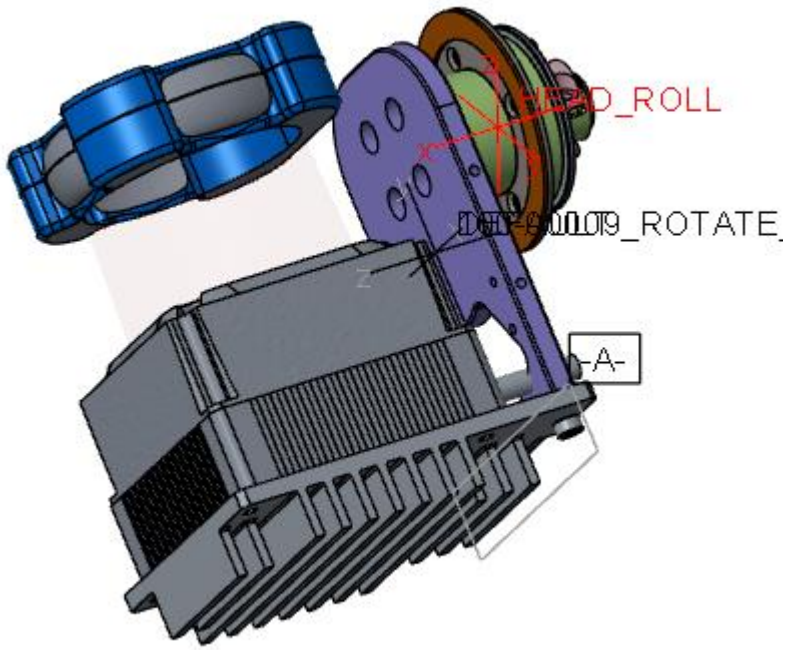
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 2.0732320e+02 3.5403341e+02 4.5308938e+02

ROTATION MATRIX from FIXED_HEAD_FRAME orientation to PRINCIPAL AXES:
0.68794 0.72576 -0.00364
0.00180 0.00331 0.99999
0.72577 -0.68794 0.00098

ROTATION ANGLES from FIXED_HEAD_FRAME orientation to PRINCIPAL AXES (degrees):
angles about x y z -89.944 -0.209 -46.533

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 2.9517640e+01 3.8572680e+01 4.3636472e+01 MM

Head_roll



VOLUME = 2.9710037e+05 MM^3
SURFACE AREA = 7.1221233e+04 MM^2
AVERAGE DENSITY = 1.8381599e-06 KILOGRAM / MM^3
MASS = 5.4611797e-01 KILOGRAM

CENTER OF GRAVITY with respect to HEAD_ROLL coordinate frame:
X Y Z 5.5322369e+01 1.8472201e+01 -1.8483703e+01 MM

INERTIA with respect to HEAD_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 2.3486269e+03 -6.7097184e+02 6.7128534e+02
Iyx Iyy Iyz -6.7097184e+02 6.2610765e+03 6.8186580e+02
Izx Izy Izz 6.7128534e+02 6.8186580e+02 6.2605683e+03

INERTIA at CENTER OF GRAVITY with respect to HEAD_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.9756996e+03 -1.1287972e+02 1.1284571e+02
Iyx Iyy Iyz -1.1287972e+02 4.4030675e+03 4.9540219e+02
Izx Izy Izz 1.1284571e+02 4.9540219e+02 4.4027914e+03

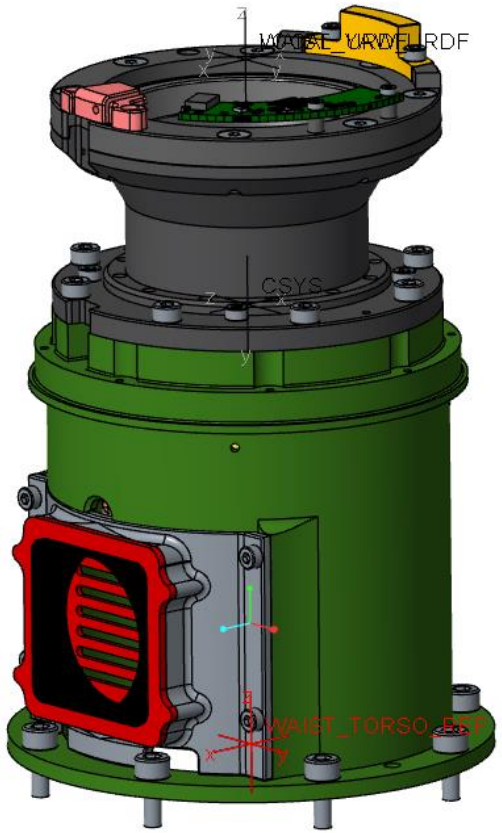
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 1.9626009e+03 3.9206259e+03 4.8983317e+03

ROTATION MATRIX from HEAD_ROLL orientation to PRINCIPAL AXES:
0.99665 -0.08179 -0.00002
0.05784 0.70464 0.70721
-0.05783 -0.70484 0.70701

ROTATION ANGLES from HEAD_ROLL orientation to PRINCIPAL AXES (degrees):
angles about x y z -45.008 0.000 4.692

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 5.9947732e+01 8.4729466e+01 9.4706734e+01 MM

Waist_Torso ref



VOLUME = 2.9399292e+05 MM^3
SURFACE AREA = 2.2348045e+05 MM^2
AVERAGE DENSITY = 3.2963595e-06 KILOGRAM / MM^3
MASS = 9.6910635e-01 KILOGRAM

CENTER OF GRAVITY with respect to WAIST_TORSO_REF coordinate frame:
X Y Z 1.5386429e-03 5.1668430e-02 9.5210134e+01 MM

INERTIA with respect to WAIST_TORSO_REF coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.1826409e+04 -2.8414459e+00 9.6709070e+01
Iyx Iyy Iyz -2.8414459e+00 1.1831451e+04 -1.3569911e+01
Izx Izy Izz 9.6709070e+01 -1.3569911e+01 1.5978754e+03

INERTIA at CENTER OF GRAVITY with respect to WAIST_TORSO_REF coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 3.0414870e+03 -2.8413688e+00 9.6851038e+01
Iyx Iyy Iyz -2.8413688e+00 3.0465319e+03 -8.8025302e+00
Izx Izy Izz 9.6851038e+01 -8.8025302e+00 1.5978729e+03

PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 1.5913534e+03 3.0437794e+03 3.0507589e+03

ROTATION MATRIX from WAIST_TORSO_REF orientation to PRINCIPAL AXES:
-0.06663 -0.63265 0.77157
0.00591 -0.77352 -0.63374
0.99776 -0.03767 0.05527

ROTATION ANGLES from WAIST_TORSO_REF orientation to PRINCIPAL AXES (degrees):
angles about x y z 85.015 50.495 96.012

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 4.0522628e+01 5.6042934e+01 5.6107152e+01 MM

WAIST LINK ROLL

VOLUME = 1.7539954e+05 MM^3
SURFACE AREA = 1.7111720e+05 MM^2
AVERAGE DENSITY = 4.2293547e-06 KILOGRAM / MM^3
MASS = 7.4182685e-01 KILOGRAM

CENTER OF GRAVITY with respect to WAIST_LINK_ROLL coordinate frame:
X Y Z -3.9412845e+01 3.1221526e-01 5.6331027e+00 MM

INERTIA with respect to WAIST_LINK_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 9.6798257e+02 1.3979573e+01 2.7227427e+02
Iyx Iyy Iyz 1.3979573e+01 2.7746836e+03 -1.2352221e+01
Izx Izy Izz 2.7227427e+02 -1.2352221e+01 2.6567053e+03

INERTIA at CENTER OF GRAVITY with respect to WAIST_LINK_ROLL coordinate frame:
(KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 9.4437073e+02 4.8511769e+00 1.0757639e+02
Iyx Iyy Iyz 4.8511769e+00 1.5988107e+03 -1.1047540e+01
Izx Izy Izz 1.0757639e+02 -1.1047540e+01 1.5042997e+03

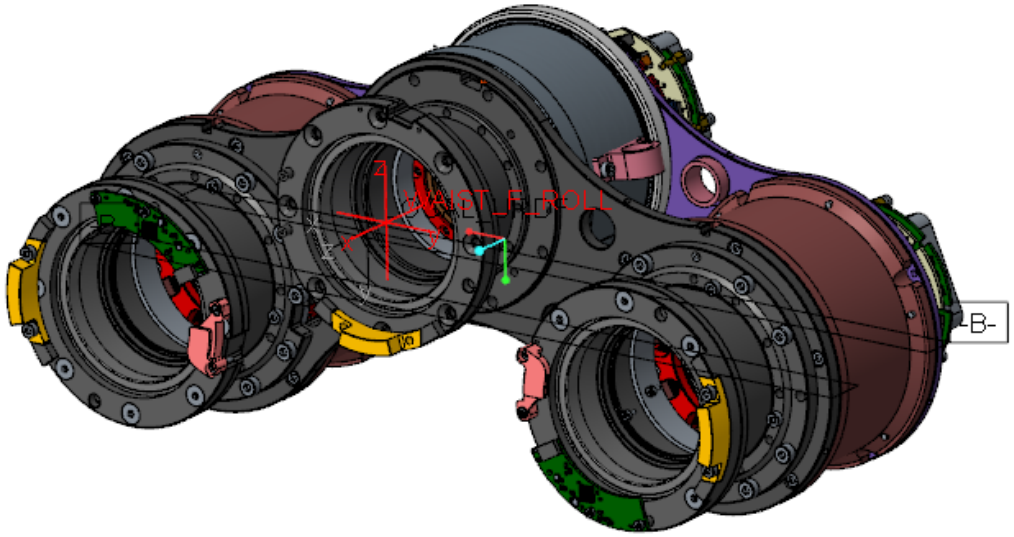
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 9.2434563e+02 1.5229457e+03 1.6001898e+03

ROTATION MATRIX from WAIST_LINK_ROLL orientation to PRINCIPAL AXES:
0.98314 0.18230 0.01397
-0.01006 0.13026 -0.99143
-0.18256 0.97458 0.12990

ROTATION ANGLES from WAIST_LINK_ROLL orientation to PRINCIPAL AXES (degrees):
angles about x y z 82.535 0.801 -10.505

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 3.5299286e+01 4.5309674e+01 4.6444520e+01 MM

waist



VOLUME = 1.0924781e+06 MM^3
SURFACE AREA = 7.2290644e+05 MM^2
AVERAGE DENSITY = 3.1670623e-06 KILOGRAM / MM^3
MASS = 3.4599462e+00 KILOGRAM

CENTER OF GRAVITY with respect to WAIST_F_ROLL coordinate frame:
X Y Z -5.6796324e+01 4.5196345e-01 -3.8136153e+01 MM

INERTIA with respect to WAIST_F_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 4.3163054e+04 1.8426740e+02 -7.5767018e+03
Iyx Iyy Iyz 1.8426740e+02 2.5169260e+04 6.8799877e+01
Izx Izy Izz -7.5767018e+03 6.8799877e+01 5.0812723e+04

INERTIA at CENTER OF GRAVITY with respect to WAIST_F_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 3.8130318e+04 9.5451056e+01 -8.2481481e+01
Iyx Iyy Iyz 9.5451056e+01 8.9760596e+03 9.1637353e+00
Izx Izy Izz -8.2481481e+01 9.1637353e+00 3.9650845e+04

PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 8.9757442e+03 3.8126172e+04 3.9655306e+04

ROTATION MATRIX from WAIST_F_ROLL orientation to PRINCIPAL AXES:
-0.00327 -0.99854 -0.05400
0.99999 -0.00329 0.00013
-0.00031 -0.05400 0.99854

ROTATION ANGLES from WAIST_F_ROLL orientation to PRINCIPAL AXES (degrees):
angles about x y z 0.000 -3.095 90.188

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 5.0933153e+01 1.0497284e+02 1.0705722e+02 MM

Pennacchio

VOLUME = 4.0300873e+05 MM^3
SURFACE AREA = 1.0312402e+05 MM^2
AVERAGE DENSITY = 5.3724934e-06 KILOGRAM / MM^3
MASS = 2.1651618e+00 KILOGRAM

CENTER OF GRAVITY with respect to ASM_DEF_CSYS coordinate frame:
X Y Z -3.4081174e-03 5.8527877e-04 1.7247336e+02 MM

INERTIA with respect to ASM_DEF_CSYS coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.1012073e+05 1.9752304e-02 1.8706435e+00
Iyx Iyy Iyz 1.9752304e-02 1.1011995e+05 -4.8578901e-01
Izx Izy Izz 1.8706435e+00 -4.8578901e-01 6.0311794e+02

INERTIA at CENTER OF GRAVITY with respect to PENNACCHIO_URDF coordinate frame:
(KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 4.5713534e+04 1.9747985e-02 5.9794097e-01
Iyx Iyy Iyz 1.9747985e-02 4.5712755e+04 -2.6722676e-01
Izx Izy Izz 5.9794097e-01 -2.6722676e-01 6.0311791e+02

PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 6.0311791e+02 4.5712755e+04 4.5713534e+04

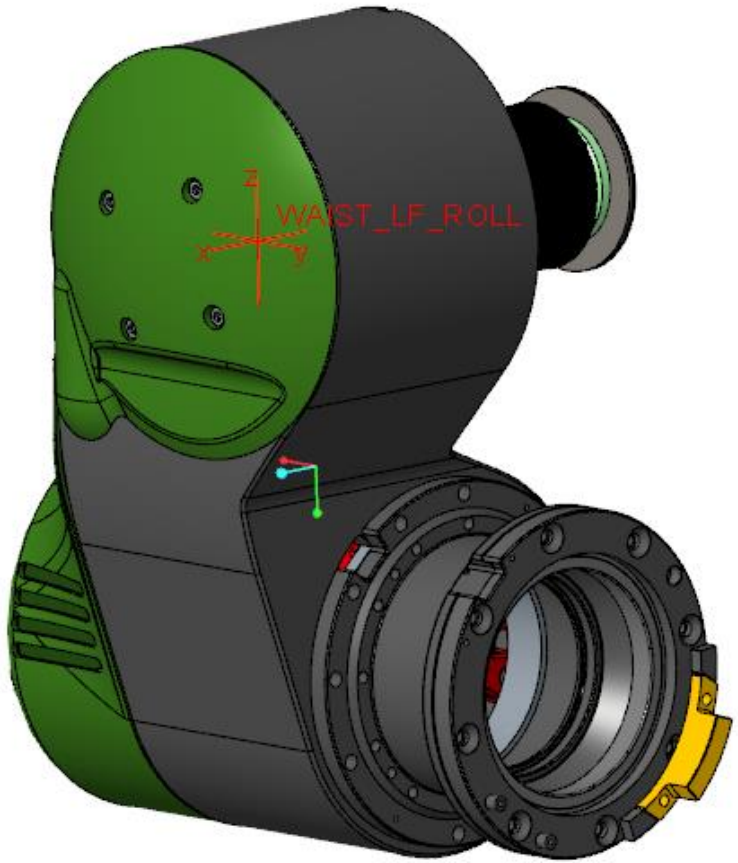
ROTATION MATRIX from ASM_DEF_CSYS orientation to PRINCIPAL AXES:

0.00000	1.00000	0.00000
0.00000	0.00000	1.00000
1.00000	0.00000	0.00000

ROTATION ANGLES from ASM_DEF_CSYS orientation to PRINCIPAL AXES (degrees):
angles about x y z -90.000 0.000 -90.000

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 1.6689985e+01 1.4530265e+02 1.4530388e+02 MM

Hip roll



VOLUME = 6.2706035e+05 MM^3
SURFACE AREA = 4.5812857e+05 MM^2
AVERAGE DENSITY = 3.3388281e-06 KILOGRAM / MM^3
MASS = 2.0936467e+00 KILOGRAM

CENTER OF GRAVITY with respect to WAIST_LF_ROLL coordinate frame:
X Y Z -4.1435899e+01 -2.4099021e-01 -6.7437774e+01 MM

INERTIA with respect to WAIST_LF_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 2.0328644e+04 1.2836757e+01 -7.1832791e+03
Iyx Iyy Iyz 1.2836757e+01 2.4404941e+04 2.2892687e+01
Izx Izy Izz -7.1832791e+03 2.2892687e+01 8.9864540e+03

INERTIA at CENTER OF GRAVITY with respect to WAIST_LF_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.0806924e+04 3.3743172e+01 -1.3329083e+03
Iyx Iyy Iyz 3.3743172e+01 1.1288691e+04 5.6918305e+01
Izx Izy Izz -1.3329083e+03 5.6918305e+01 5.3916798e+03

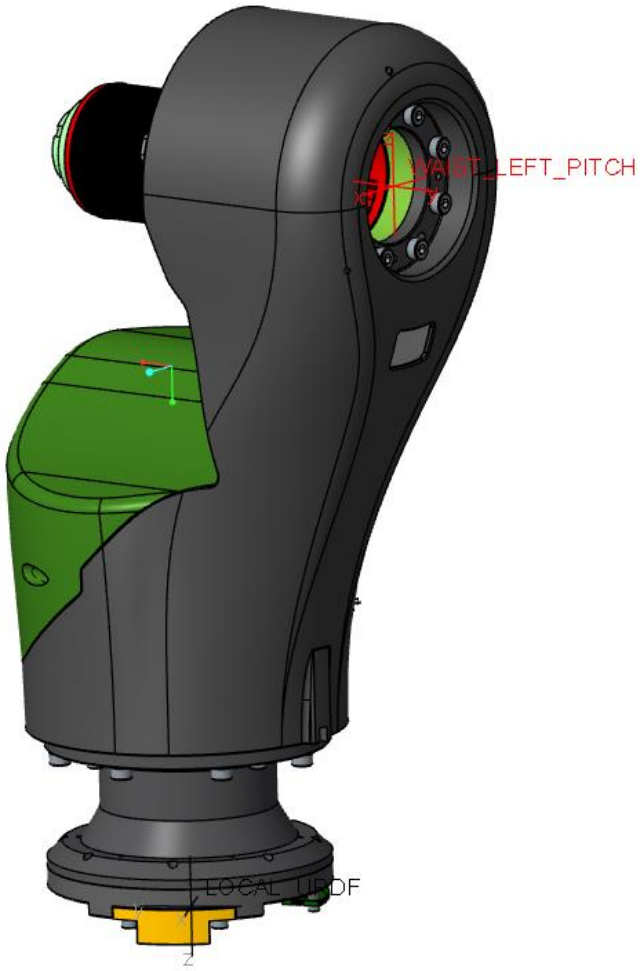
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 5.0807373e+03 1.1114941e+04 1.1291616e+04

ROTATION MATRIX from WAIST_LF_ROLL orientation to PRINCIPAL AXES:
0.22676 0.96737 0.11303
-0.01016 -0.11370 0.99346
0.97390 -0.22642 -0.01595

ROTATION ANGLES from WAIST_LF_ROLL orientation to PRINCIPAL AXES (degrees):
angles about x y z -90.920 6.490 -76.808

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 4.9261958e+01 7.2862135e+01 7.3438931e+01 MM

Hip - Pitch



VOLUME = 4.8843228e+05 MM^3
SURFACE AREA = 4.0853707e+05 MM^2
AVERAGE DENSITY = 3.2994721e-06 KILOGRAM / MM^3
MASS = 1.6115687e+00 KILOGRAM

CENTER OF GRAVITY with respect to WAIST_LEFT_PITCH coordinate frame:
X Y Z 5.8688639e-01 -6.2440385e+01 -8.5057072e+01 MM

INERTIA with respect to WAIST_LEFT_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 3.4111563e+04 3.7170469e+01 1.4050574e+02
Iyx Iyy Iyz 3.7170469e+01 2.6097579e+04 -1.1276358e+04
Izx Izy Izz 1.4050574e+02 -1.1276358e+04 1.0209192e+04

INERTIA at CENTER OF GRAVITY with respect to WAIST_LEFT_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.6169151e+04 -2.1886129e+01 6.0058109e+01
Iyx Iyy Iyz -2.1886129e+01 1.4437800e+04 -2.7173225e+03
Izx Izy Izz 6.0058109e+01 -2.7173225e+03 3.9254506e+03

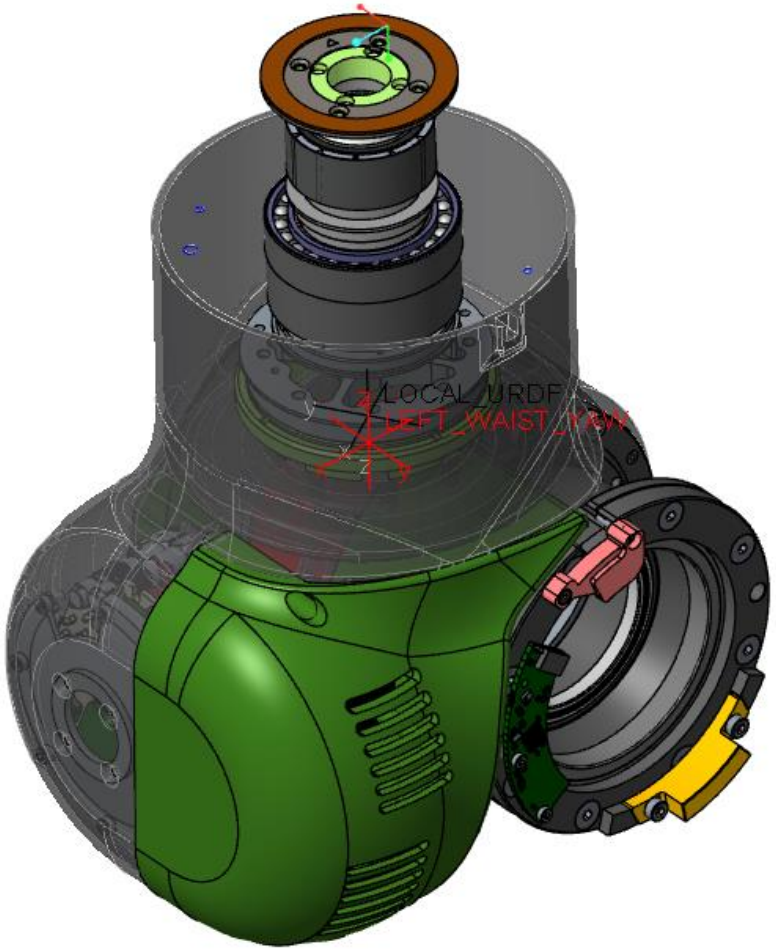
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 3.2643786e+03 1.5097479e+04 1.6170543e+04

ROTATION MATRIX from WAIST_LEFT_PITCH orientation to PRINCIPAL AXES:
-0.00412 0.03306 -0.99944
0.23630 0.97118 0.03115
0.97167 -0.23604 -0.01182

ROTATION ANGLES from WAIST_LEFT_PITCH orientation to PRINCIPAL AXES (degrees):
angles about x y z-110.770 -88.091 -97.106

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 4.5006563e+01 9.6789404e+01 1.0017005e+02 MM

Hip Yaw



VOLUME = 5.8731346e+05 MM^3
SURFACE AREA = 4.3905301e+05 MM^2
AVERAGE DENSITY = 2.9719531e-06 KILOGRAM / MM^3
MASS = 1.7454681e+00 KILOGRAM

CENTER OF GRAVITY with respect to LEFT_WAIST_YAW coordinate frame:
X Y Z -2.1136410e+01 -4.2862386e+00 -3.8232267e+01 MM

INERTIA with respect to LEFT_WAIST_YAW coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 8.5691728e+03 -1.9828734e+02 -2.2121863e+03
Iyx Iyy Iyz -1.9828734e+02 9.9794948e+03 -4.0039407e+02
Izx Izy Izz -2.2121863e+03 -4.0039407e+02 5.2783547e+03

INERTIA at CENTER OF GRAVITY with respect to LEFT_WAIST_YAW coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 5.9857438e+03 -4.0155441e+01 -8.0168603e+02
Iyx Iyy Iyz -4.0155441e+01 6.6483492e+03 -1.1435964e+02
Izx Izy Izz -8.0168603e+02 -1.1435964e+02 4.4665032e+03

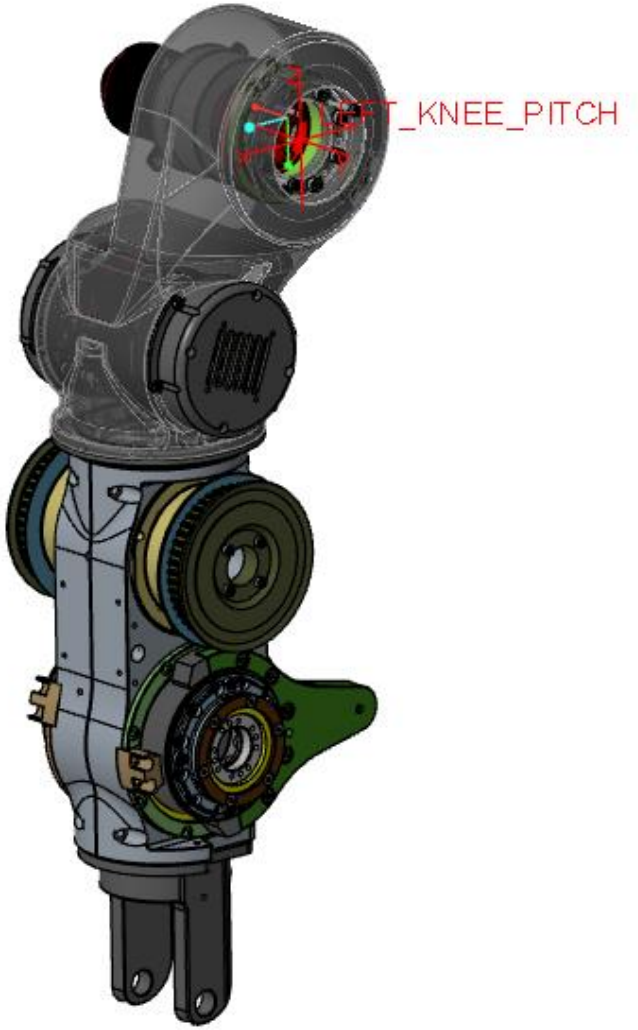
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 4.1159386e+03 6.3303225e+03 6.6543350e+03

ROTATION MATRIX from LEFT_WAIST_YAW orientation to PRINCIPAL AXES:
0.39448 0.91889 0.00466
0.04770 -0.02554 0.99854
0.91767 -0.39368 -0.05390

ROTATION ANGLES from LEFT_WAIST_YAW orientation to PRINCIPAL AXES (degrees):
angles about x y z -93.090 0.267 -66.766

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 4.8559979e+01 6.0222248e+01 6.1744229e+01 MM

Knee Pitch



VOLUME = 1.2595184e+06 MM^3
SURFACE AREA = 8.5214192e+05 MM^2
AVERAGE DENSITY = 2.9388146e-06 KILOGRAM / MM^3
MASS = 3.7014912e+00 KILOGRAM

CENTER OF GRAVITY with respect to LEFT_KNEE_PITCH coordinate frame:
X Y Z 2.7363015e+01 -5.7802070e+01 -1.9306454e+02 MM

INERTIA with respect to LEFT_KNEE_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 2.1500581e+05 6.2235688e+03 2.4925435e+04
Iyx Iyy Iyz 6.2235688e+03 2.0406399e+05 -4.4038890e+04
Izx Izy Izz 2.4925435e+04 -4.4038890e+04 2.3322675e+04

INERTIA at CENTER OF GRAVITY with respect to LEFT_KNEE_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 6.4669769e+04 3.6914631e+02 5.3710941e+03
Iyx Iyy Iyz 3.6914631e+02 6.3323486e+04 -2.7319883e+03
Izx Izy Izz 5.3710941e+03 -2.7319883e+03 8.1842652e+03

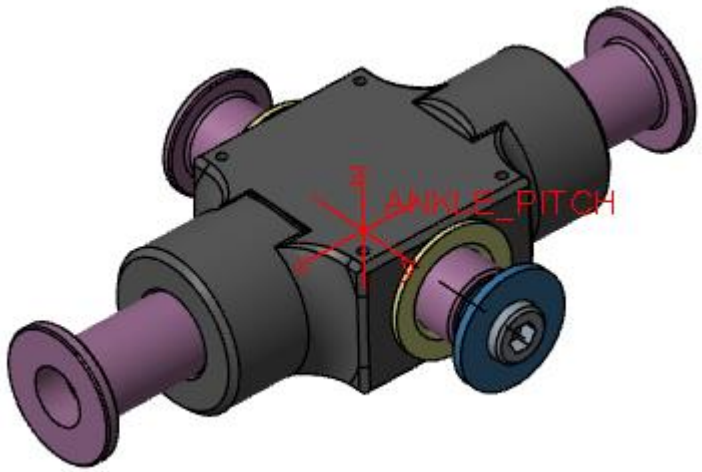
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 7.5420492e+03 6.3452356e+04 6.5183114e+04

ROTATION MATRIX from LEFT_KNEE_PITCH orientation to PRINCIPAL AXES:
-0.09381 -0.05939 -0.99382
0.04932 0.99672 -0.06422
0.99437 -0.05504 -0.09057

ROTATION ANGLES from LEFT_KNEE_PITCH orientation to PRINCIPAL AXES (degrees):
angles about x y z 144.661 -83.625 147.662

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 4.5139456e+01 1.3092890e+02 1.3270253e+02 MM

Ankle pitch



VOLUME = 4.2947161e+04 MM^3
SURFACE AREA = 2.1304412e+04 MM^2
AVERAGE DENSITY = 4.1268900e-06 KILOGRAM / MM^3
MASS = 1.7723821e-01 KILOGRAM

CENTER OF GRAVITY with respect to ANKLE_PITCH coordinate frame:
X Y Z 1.1213007e+00 4.6152281e-01 -1.1449670e-03 MM

INERTIA with respect to ANKLE_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 2.8179788e+01 0.0000000e+00 0.0000000e+00
Iyx Iyy Iyz 0.0000000e+00 9.7601246e+01 4.6669685e-04
Izx Izy Izz 0.0000000e+00 4.6669685e-04 1.1596643e+02

INERTIA at CENTER OF GRAVITY with respect to ANKLE_PITCH coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 2.8142035e+01 9.1715528e-02 -2.1701012e-04
Iyx Iyy Iyz 9.1715528e-02 9.7378402e+01 3.7303915e-04
Izx Izy Izz -2.1701012e-04 3.7303915e-04 1.1570584e+02

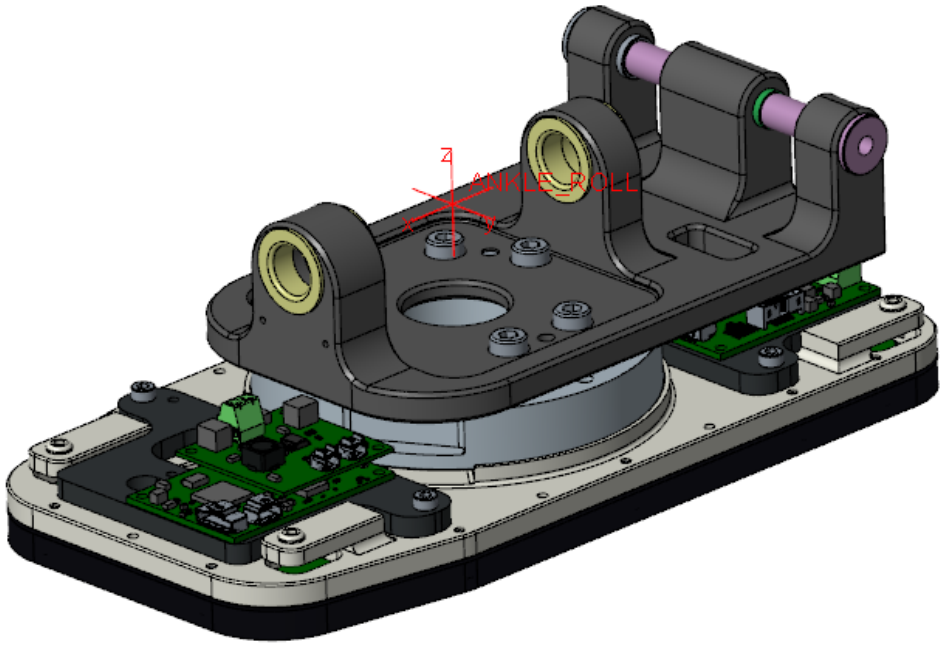
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 2.8141914e+01 9.7378523e+01 1.1570584e+02

ROTATION MATRIX from ANKLE_PITCH orientation to PRINCIPAL AXES:
1.00000 0.00132 0.00000
-0.00132 1.00000 0.00002
0.00000 -0.00002 1.00000

ROTATION ANGLES from ANKLE_PITCH orientation to PRINCIPAL AXES (degrees):
angles about x y z 0.000 0.000 -0.076

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 1.2600801e+01 2.3439747e+01 2.5550474e+01 MM

Ankle Roll



VOLUME = 4.6845665e+05 MM^3
SURFACE AREA = 1.9526772e+05 MM^2
AVERAGE DENSITY = 3.8038939e-06 KILOGRAM / MM^3
MASS = 1.7819594e+00 KILOGRAM

CENTER OF GRAVITY with respect to ANKLE_ROLL coordinate frame:
X Y Z -8.6960323e+00 -6.6741928e-02 -4.1675435e+01 MM

INERTIA with respect to ANKLE_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 5.0132587e+03 4.7584269e+00 -3.1743614e+02
Iyx Iyy Iyz 4.7584269e+00 8.5816087e+03 -8.0083189e+00
Izx Izy Izz -3.1743614e+02 -8.0083189e+00 6.5411533e+03

INERTIA at CENTER OF GRAVITY with respect to ANKLE_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 1.9182691e+03 5.7926583e+00 3.2836542e+02
Iyx Iyy Iyz 5.7926583e+00 5.3518735e+03 -3.0518008e+00
Izx Izy Izz 3.2836542e+02 -3.0518008e+00 6.4063918e+03

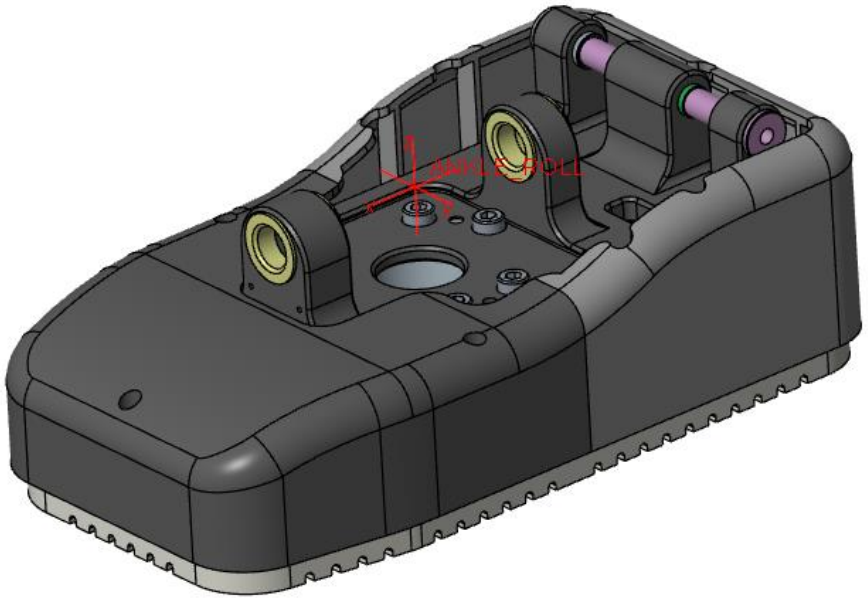
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 1.8943616e+03 5.3518775e+03 6.4302952e+03

ROTATION MATRIX from ANKLE_ROLL orientation to PRINCIPAL AXES:
0.99736 0.00191 0.07258
-0.00174 1.00000 -0.00243
-0.07258 0.00230 0.99736

ROTATION ANGLES from ANKLE_ROLL orientation to PRINCIPAL AXES (degrees):
angles about x y z 0.140 4.162 -0.110

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 3.2604875e+01 5.4802981e+01 6.0071234e+01 MM

Ankle Roll (with cover and new sole)



VOLUME = 6.7155953e+05 MM^3
SURFACE AREA = 3.4016852e+05 MM^2
AVERAGE DENSITY = 3.0769114e-06 KILOGRAM / MM^3
MASS = 2.0663292e+00 KILOGRAM

CENTER OF GRAVITY with respect to ANKLE_ROLL coordinate frame:
X Y Z -7.7094563e+00 -6.5520742e-02 -4.3453782e+01 MM

INERTIA with respect to ANKLE_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 6.5949276e+03 3.2415013e+00 -3.2221901e+02
Iyx Iyy Iyz 3.2415013e+00 1.1153896e+04 -8.4787565e+00
Izx Izy Izz -3.2221901e+02 -8.4787565e+00 8.8036048e+03

INERTIA at CENTER OF GRAVITY with respect to ANKLE_ROLL coordinate frame: (KILOGRAM * MM^2)

INERTIA TENSOR:
Ixx Ixy Ixz 2.6932116e+03 4.2852647e+00 3.7001167e+02
Iyx Iyy Iyz 4.2852647e+00 7.1293752e+03 -2.5956611e+00
Izx Izy Izz 3.7001167e+02 -2.5956611e+00 8.6807822e+03

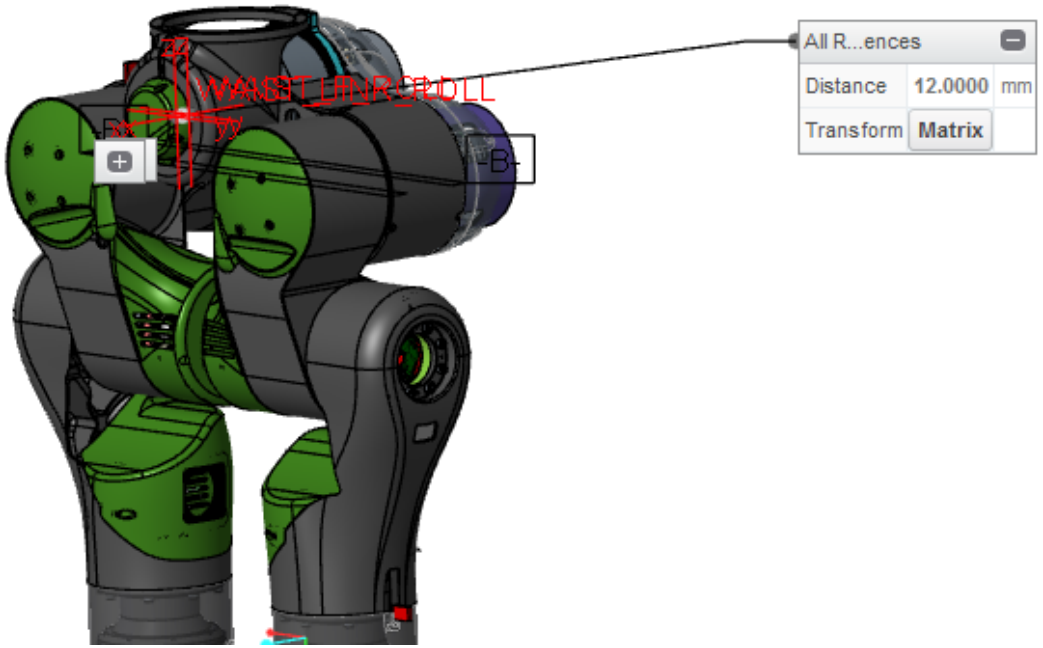
PRINCIPAL MOMENTS OF INERTIA: (KILOGRAM * MM^2)
I1 I2 I3 2.6704284e+03 7.1293761e+03 8.7035645e+03

ROTATION MATRIX from ANKLE_ROLL orientation to PRINCIPAL AXES:
0.99811 0.00108 0.06144
-0.00100 1.00000 -0.00148
-0.06145 0.00141 0.99811

ROTATION ANGLES from ANKLE_ROLL orientation to PRINCIPAL AXES (degrees):
angles about x y z 0.085 3.523 -0.062

RADII OF GYRATION with respect to PRINCIPAL AXES:
R1 R2 R3 3.5949323e+01 5.8738927e+01 6.4900616e+01 MM

From waist to waist-roll link



All R...ences
Distance 12.0000 mm
Transform Matrix

Measure: Summary

Analysis Feature

Setup

Reference	Options
WAIST_F_ROLL:F11(CSYS)	
WAIST_LINK_ROLL:F20(CSYS)	

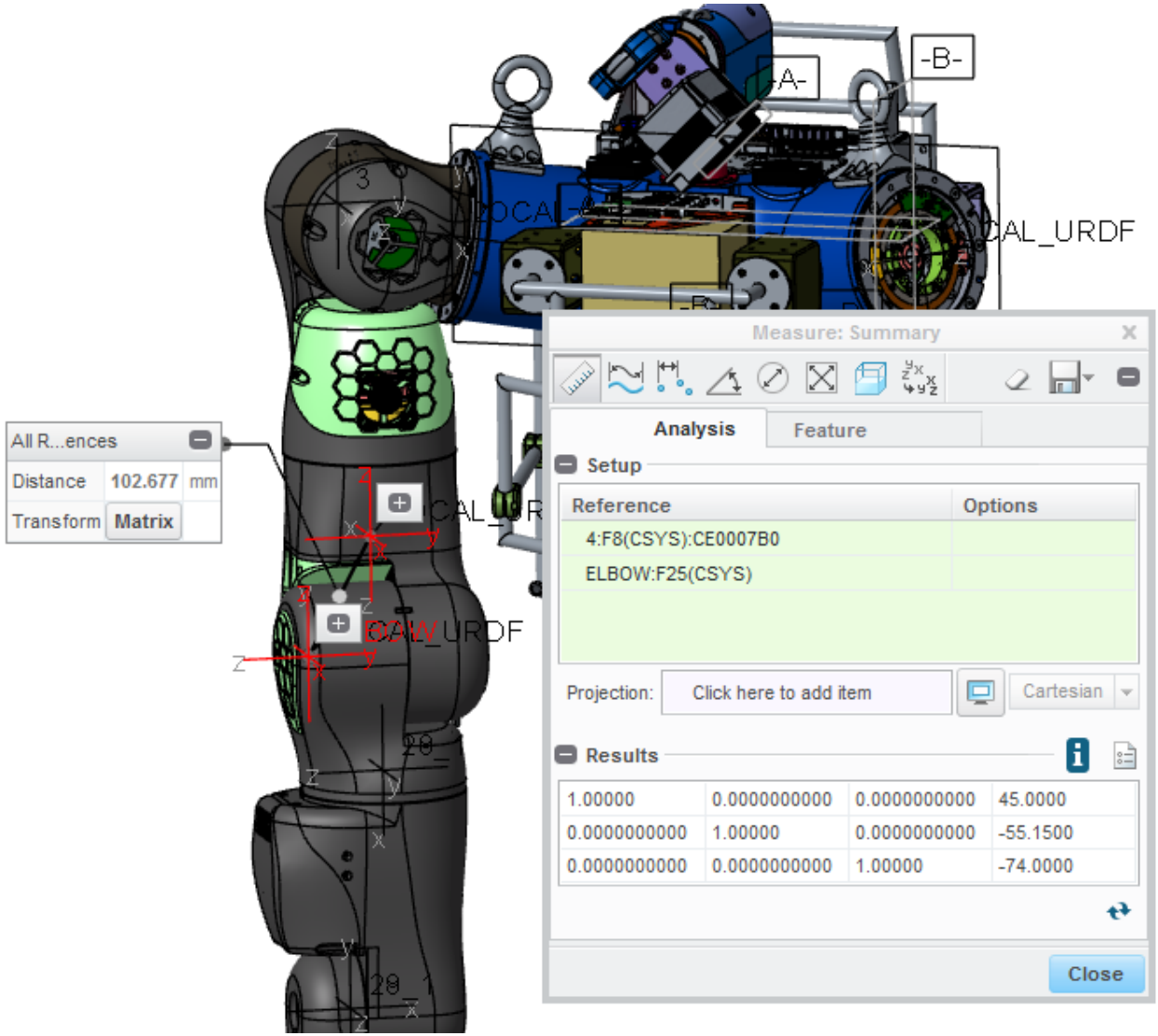
Projection: Click here to add item Cartesian

Results

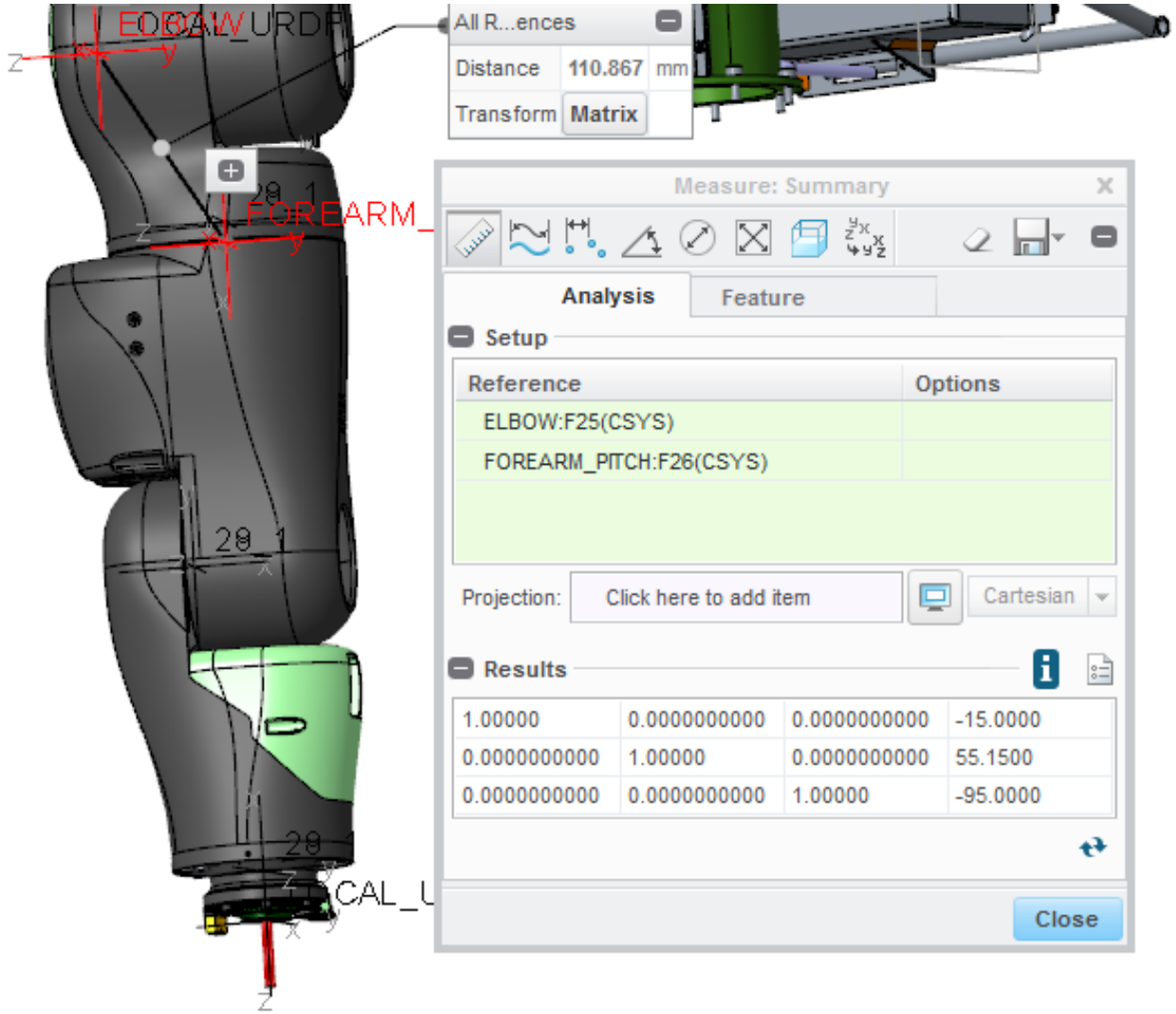
1.00000	0.0000000000	0.0000000000	12.0000
0.0000000000	1.00000	0.0000000000	0.0000000000
0.0000000000	0.0000000000	1.00000	0.0000000000

Close

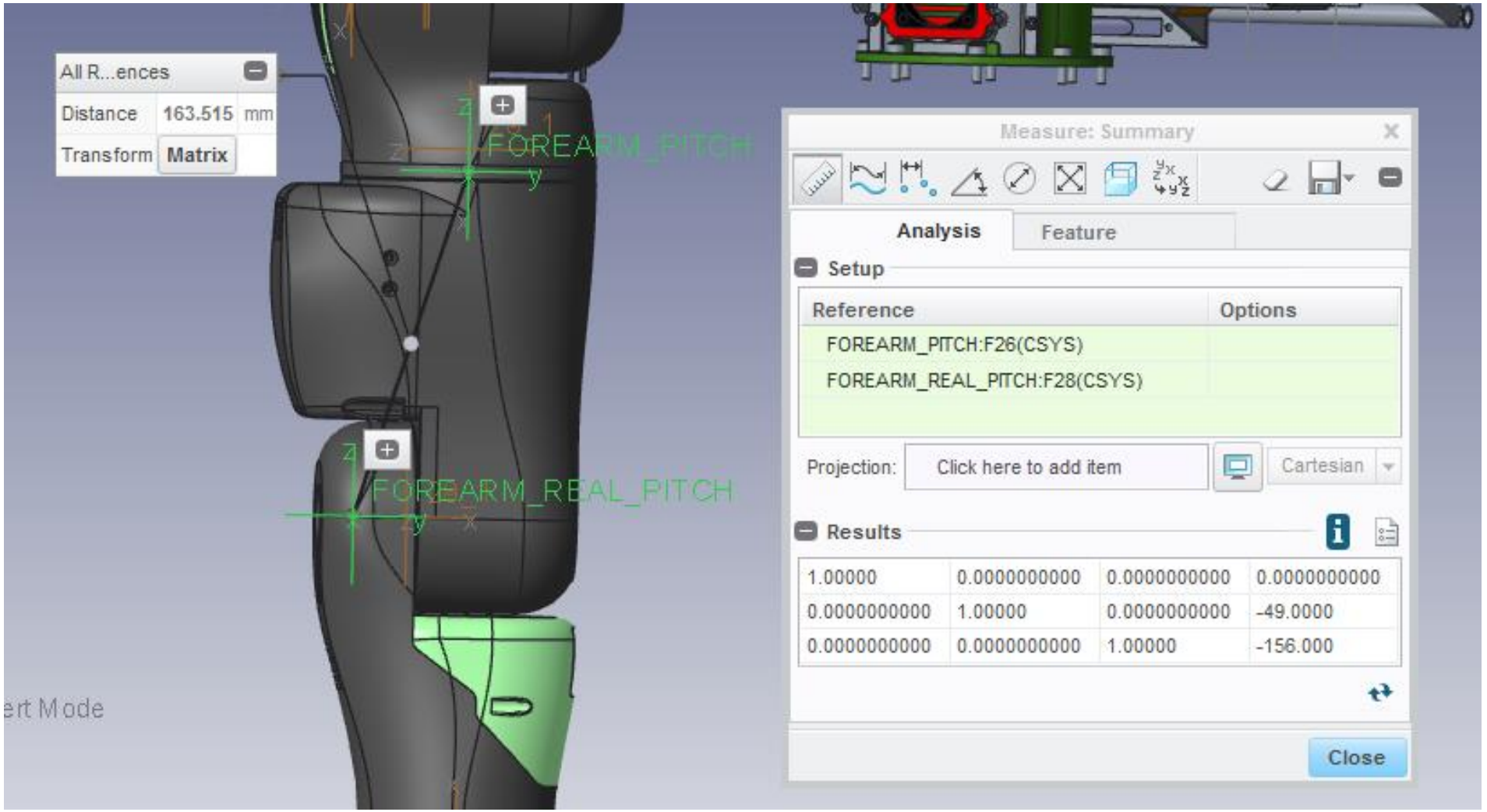
From shoulder-yaw link elbow



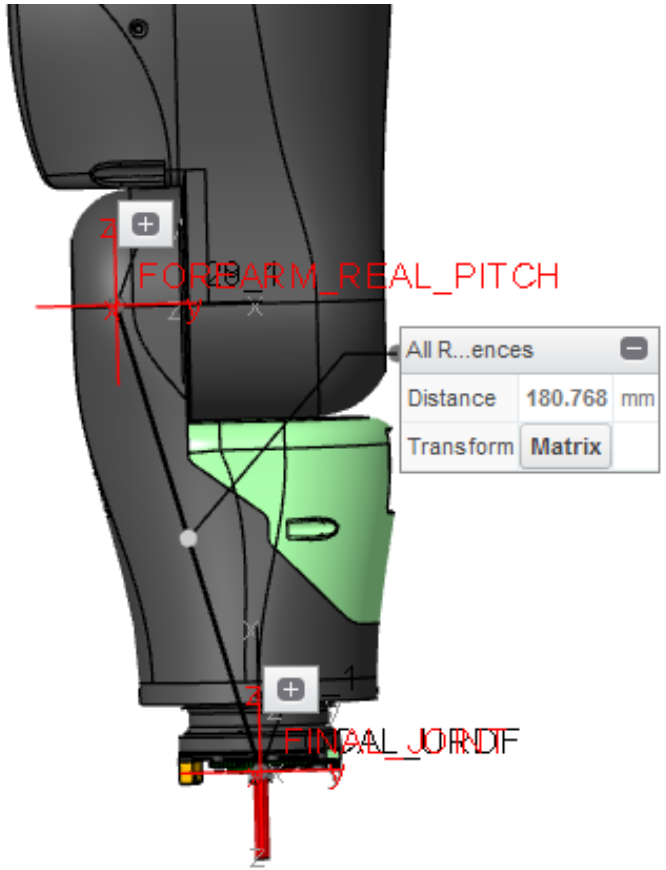
From elbow to forearm yaw

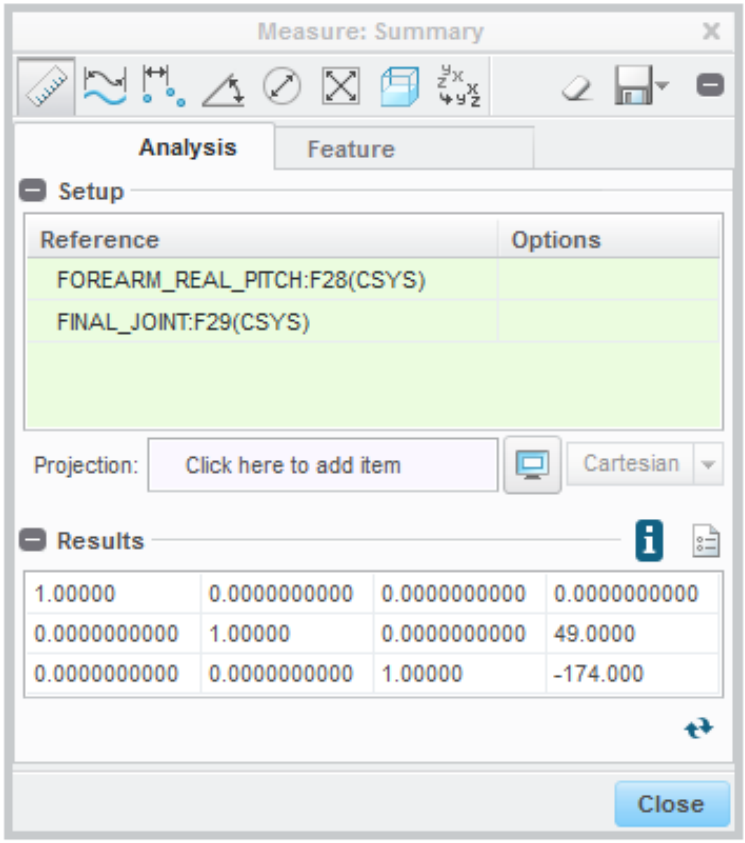


From forearm yaw to forearm pitch

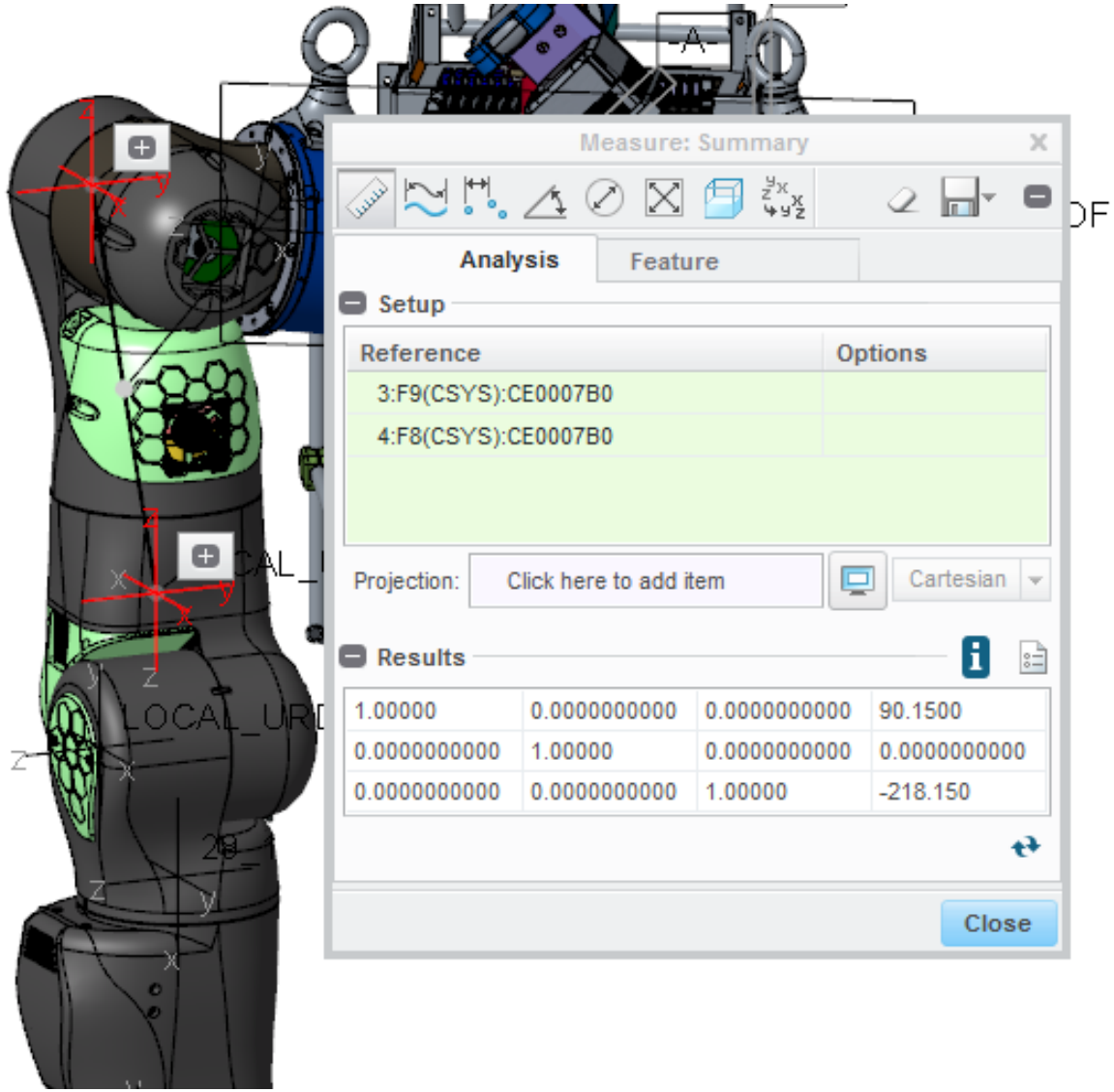


From forearm pitch to last arm yaw

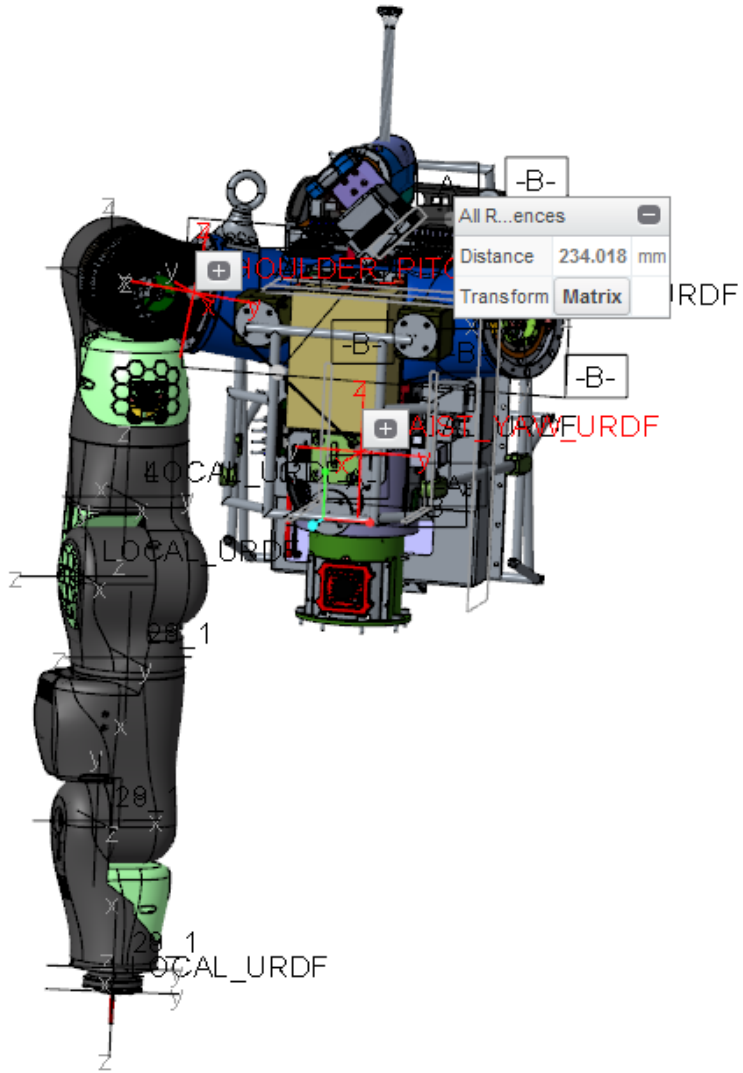


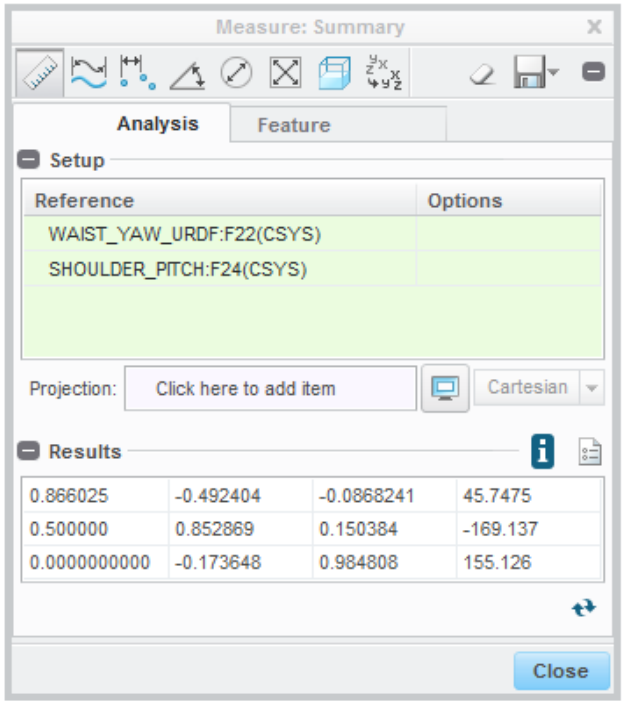


From shoulder_roll to shoulder_yaw

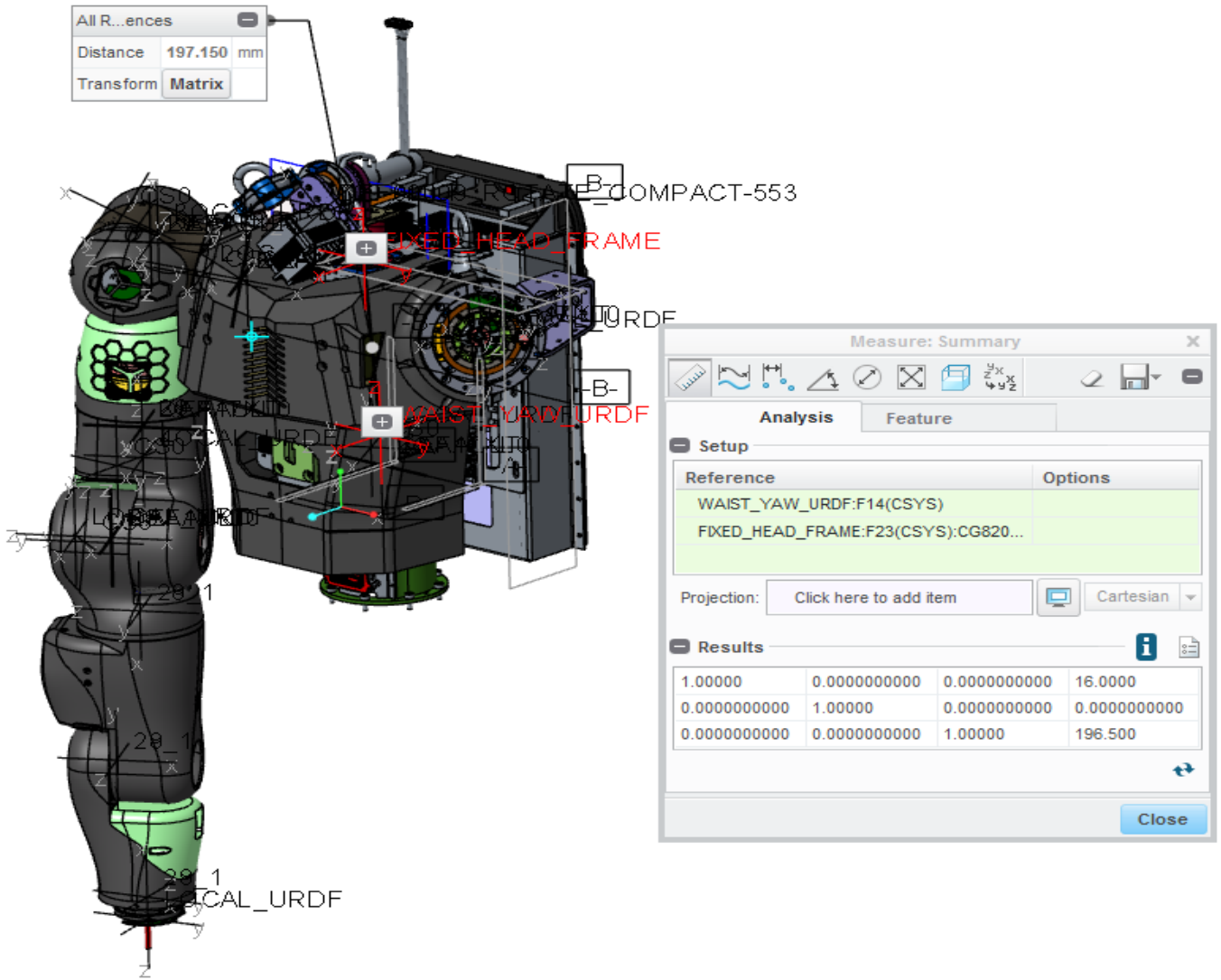


From waist-yaw link to shoulder_pitch

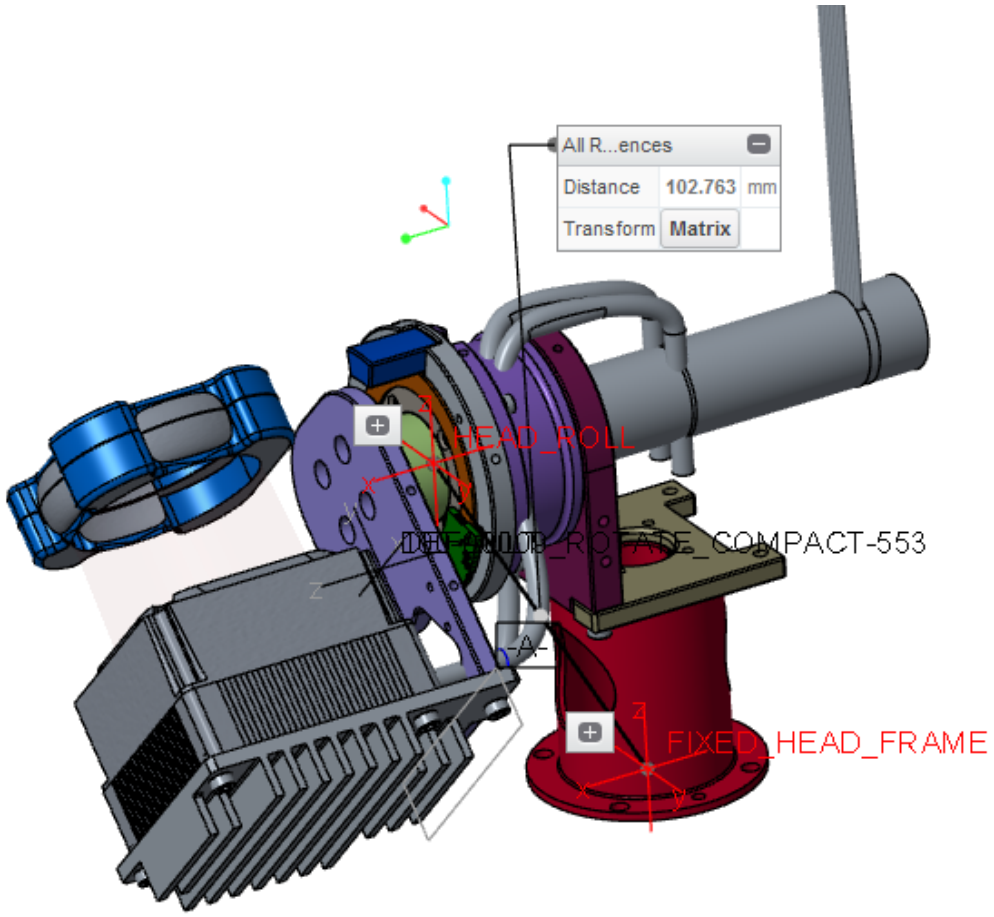


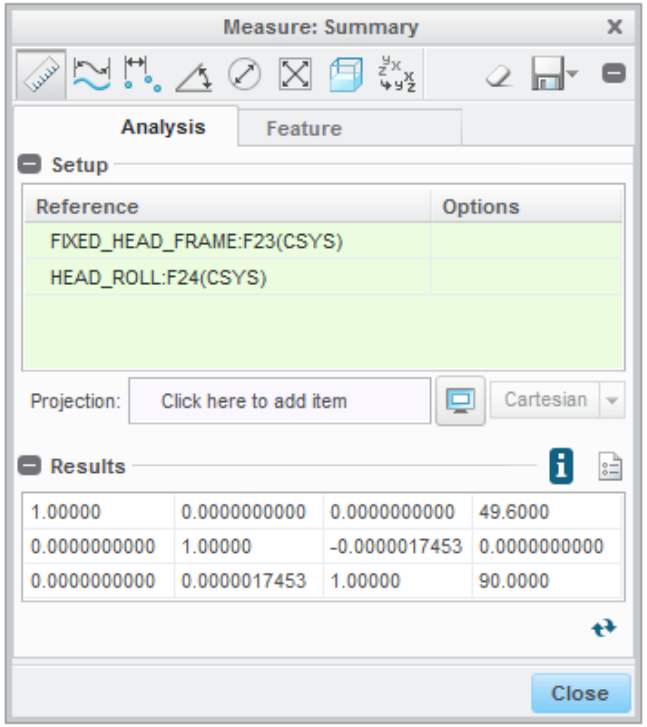


From waist-yaw link to fixed head frame

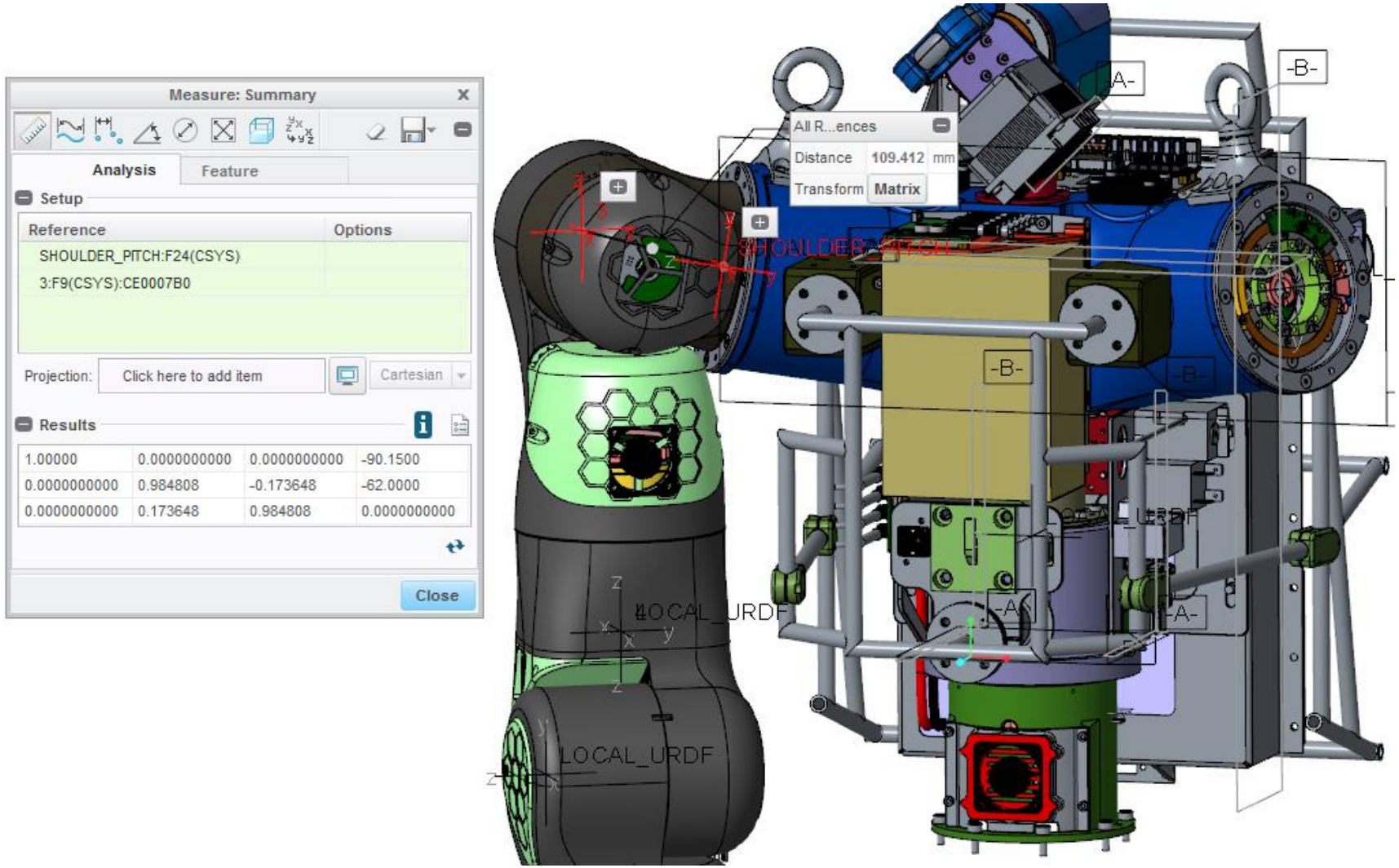


From fixed head frame to head roll

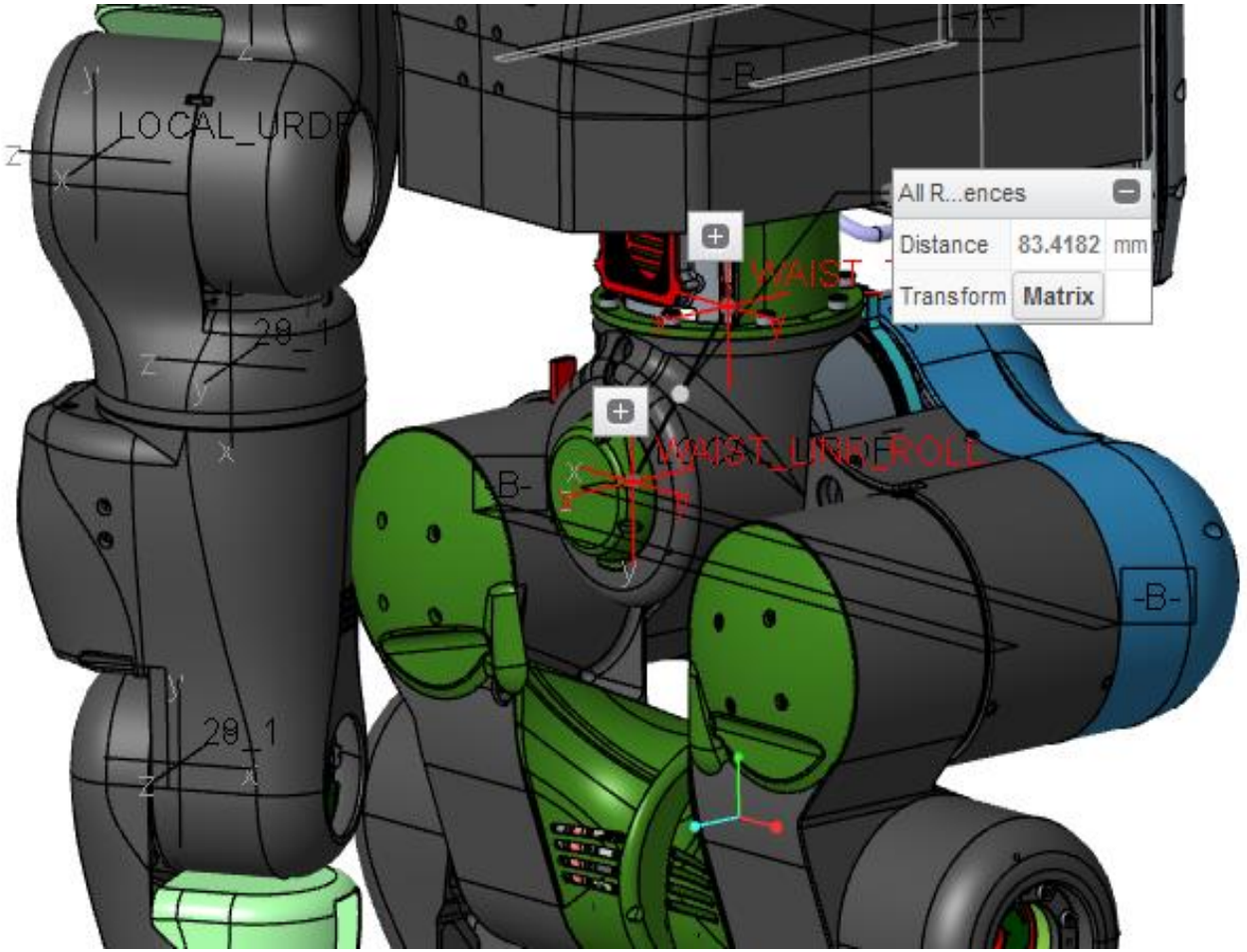


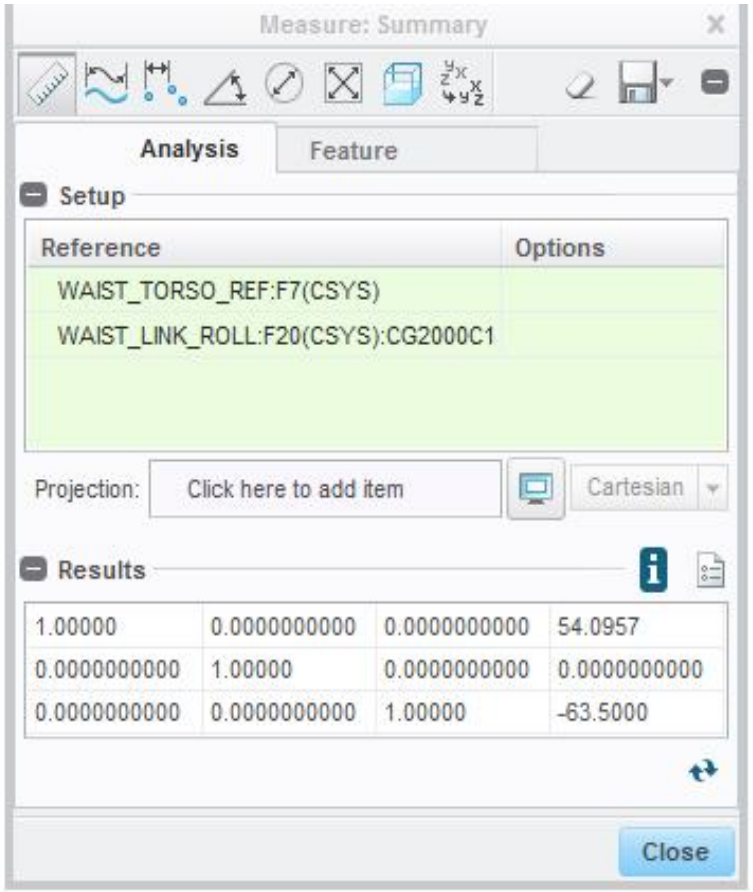


From shoulder_pitch to shoulder_roll

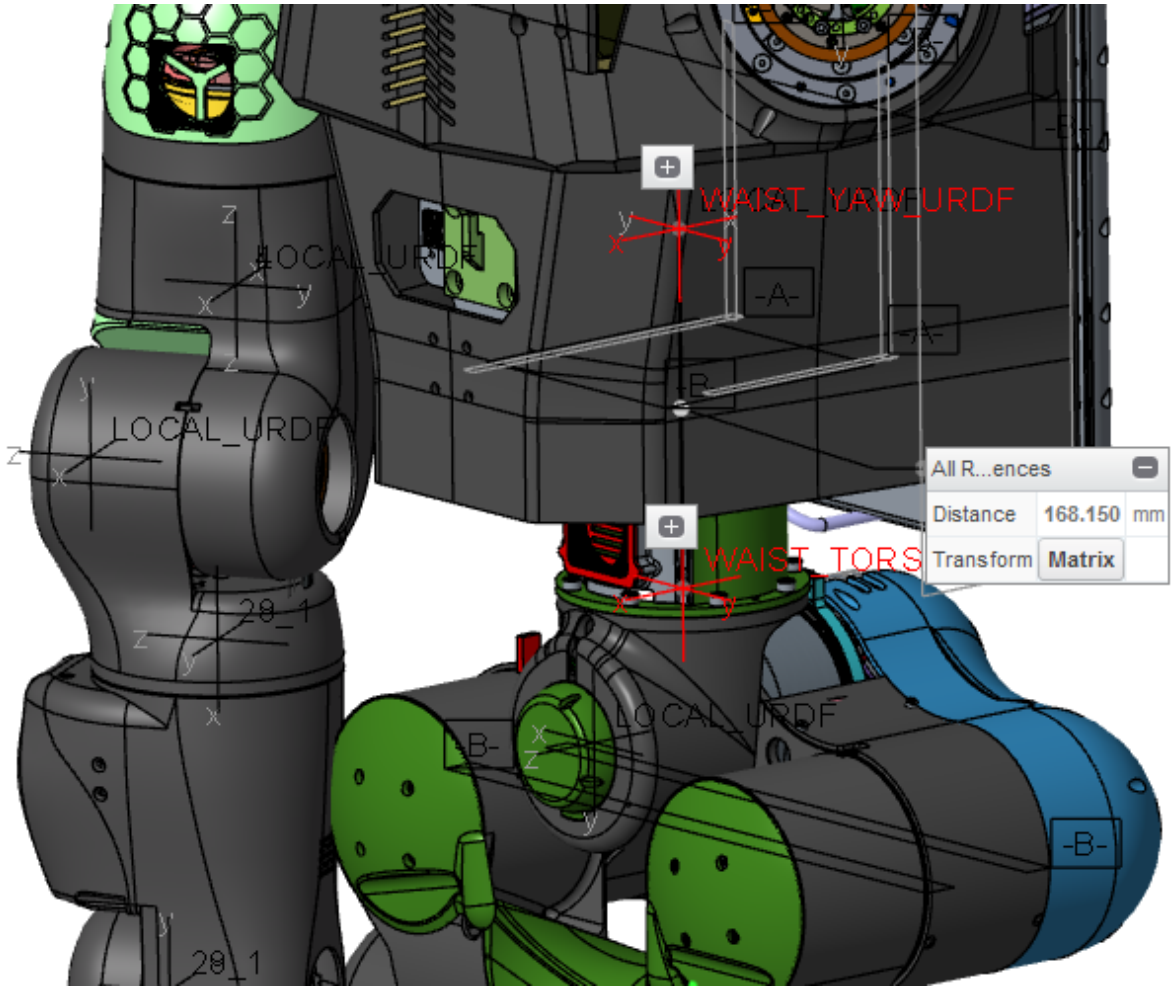


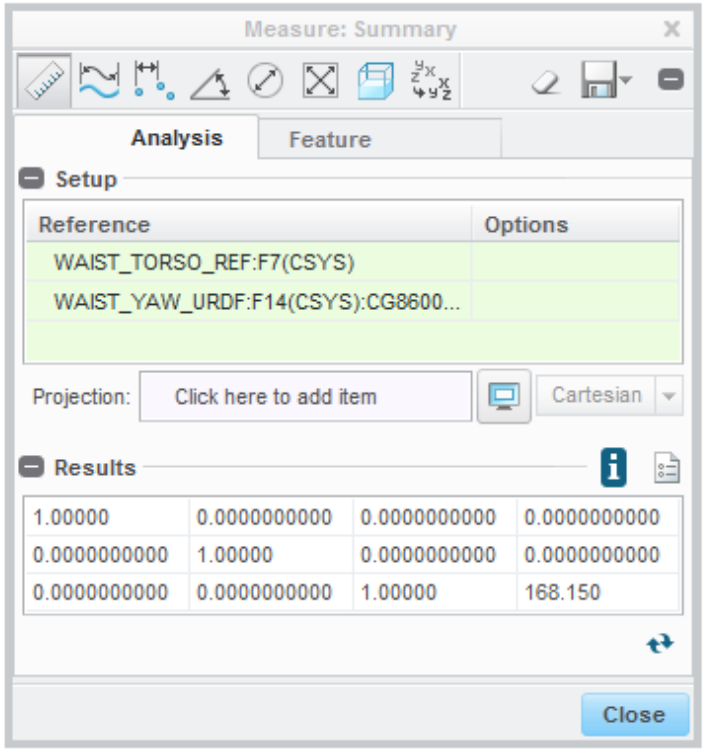
From Waist_link_roll to waist_yaw_ref



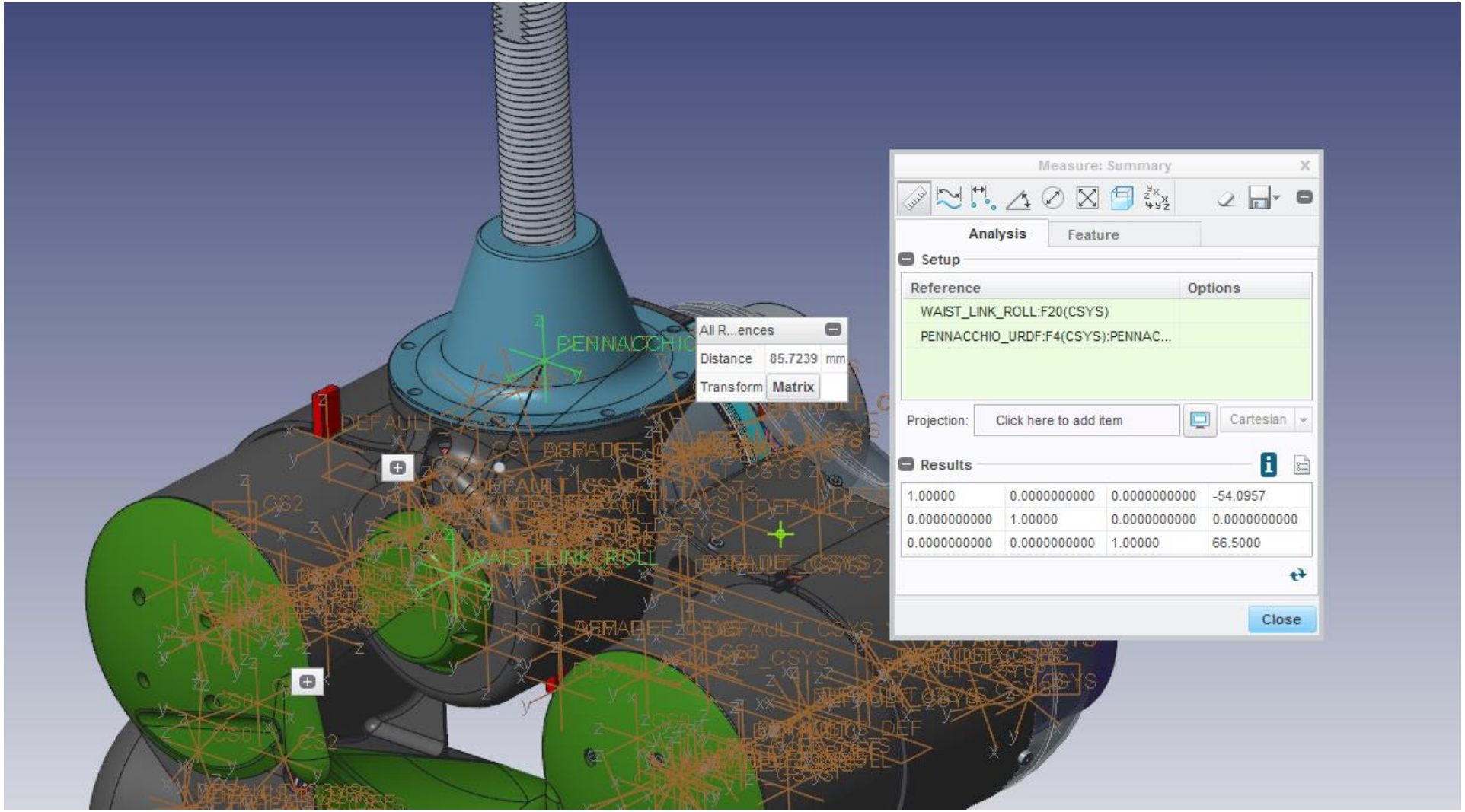


From waist_torso_ref to

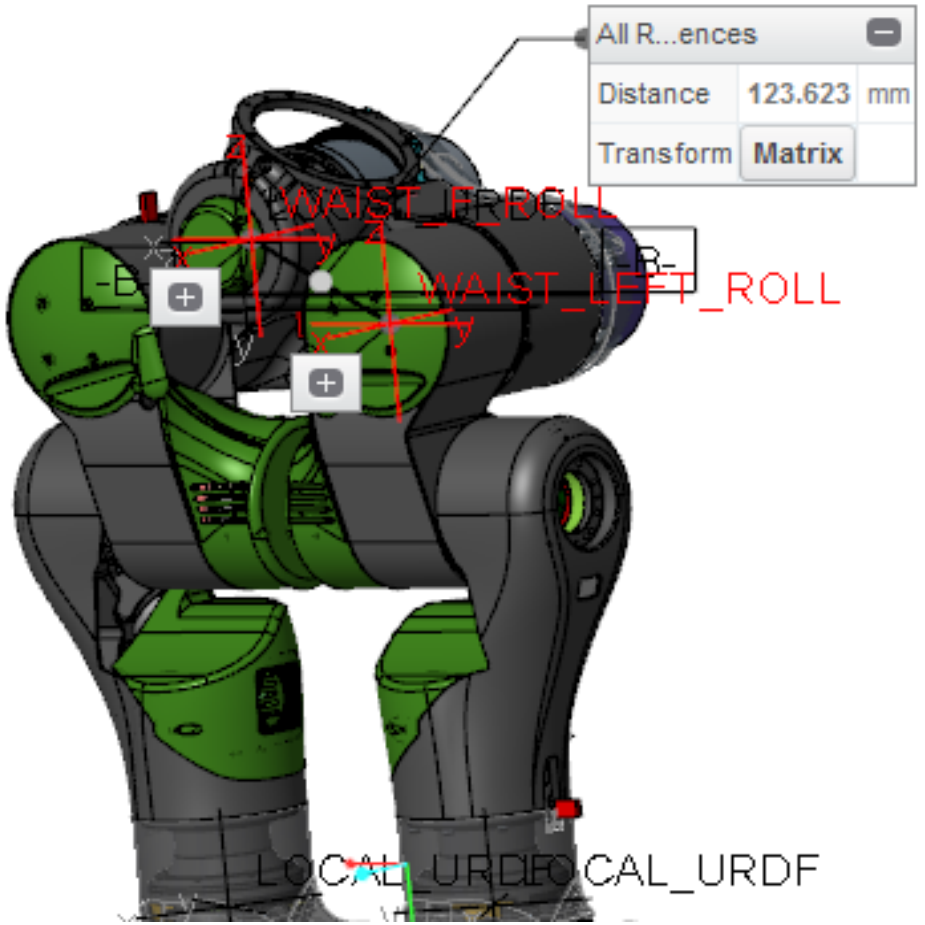




From waist-roll link to pennacchio



From waist to hip roll



Measure: Summary

Analysis | Feature

Setup

Reference	Options
WAIST_F_ROLL:F11(CSYS)	
WAIST_LEFT_ROLL:F14(CSYS)	

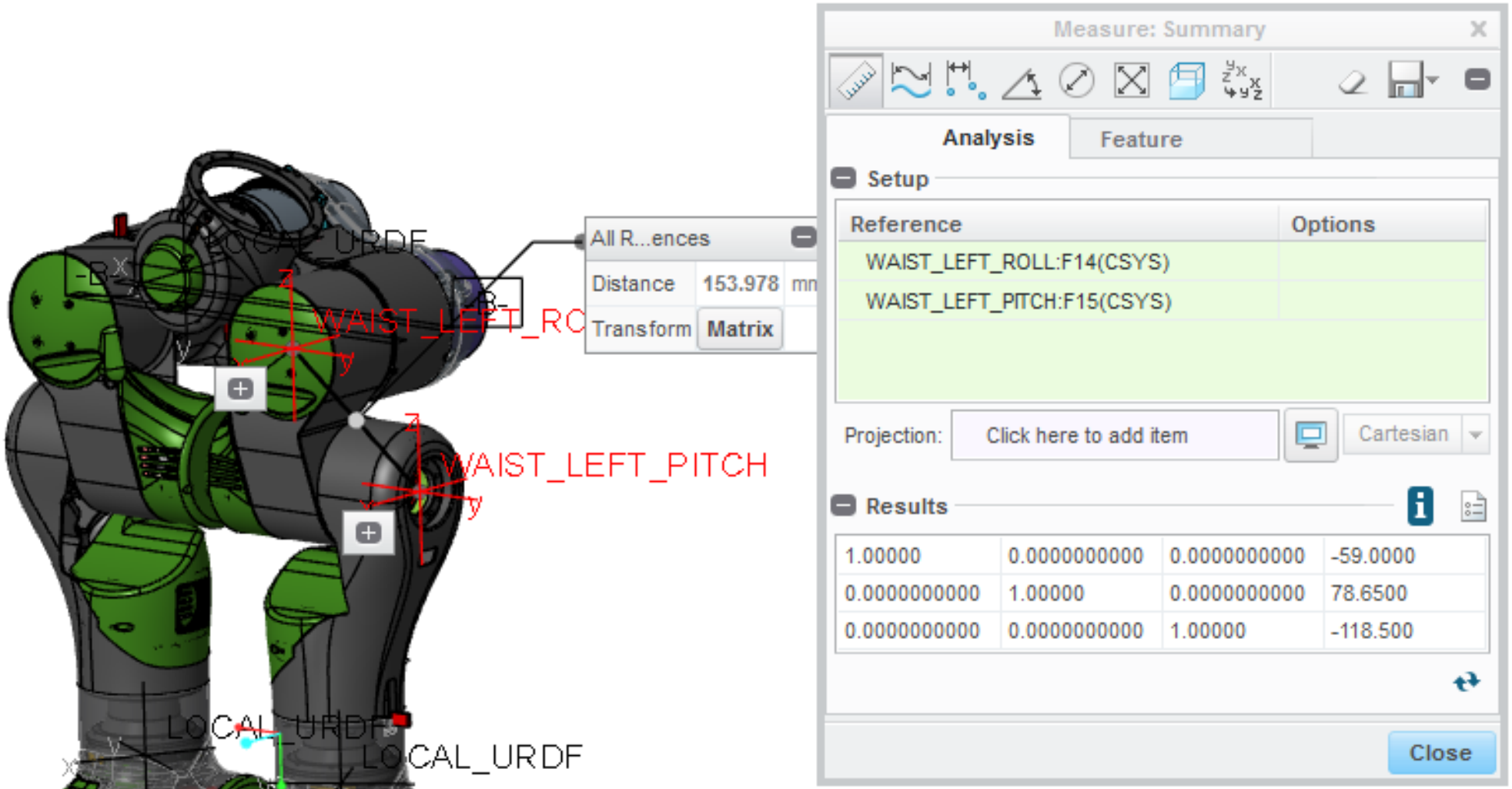
Projection: Click here to add item — Cartesian

Results

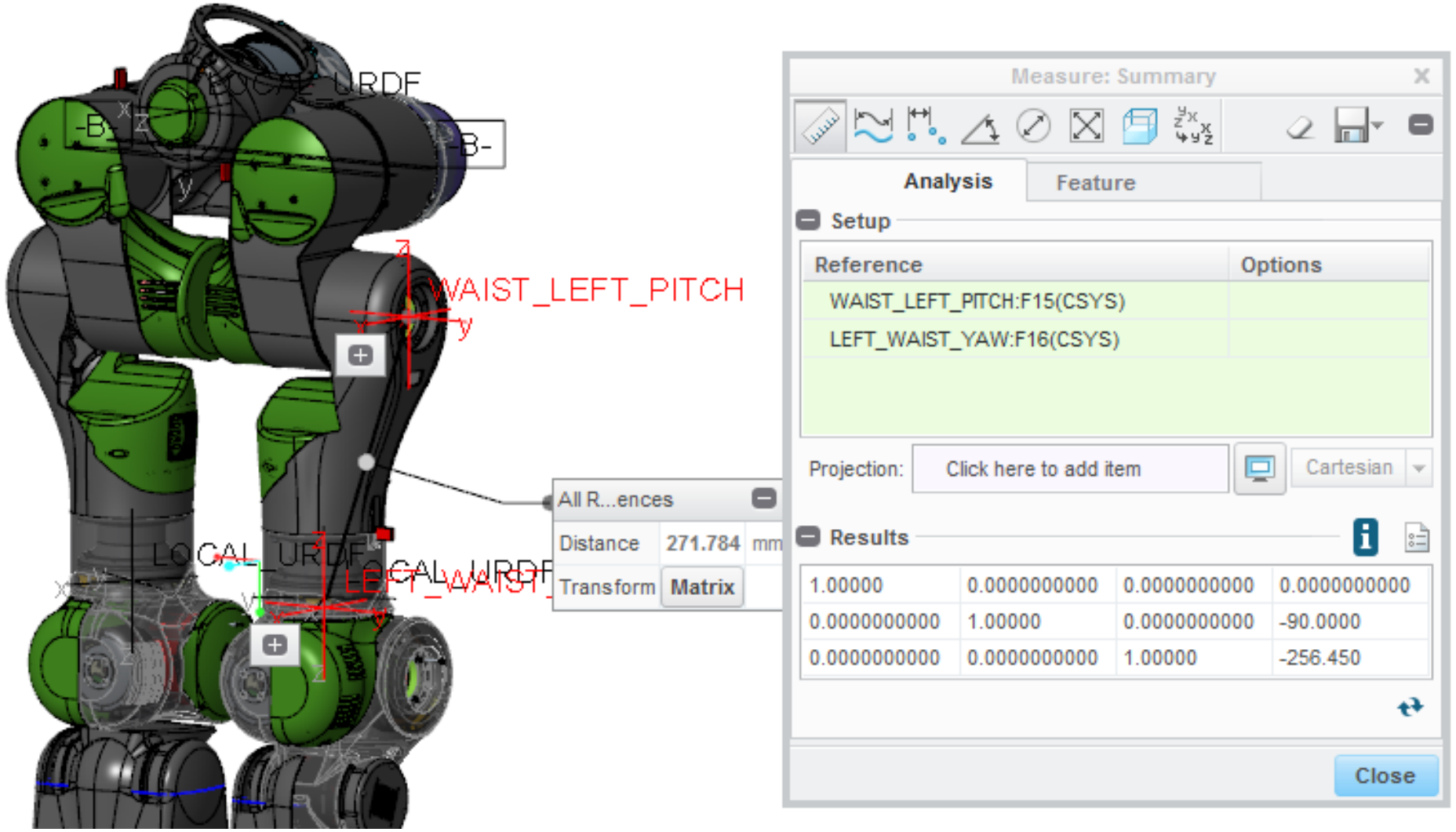
1.00000	0.0000000000	0.0000000000	15.4500
0.0000000000	1.00000	0.0000000000	112.000
0.0000000000	0.0000000000	1.00000	-50.0000

Close

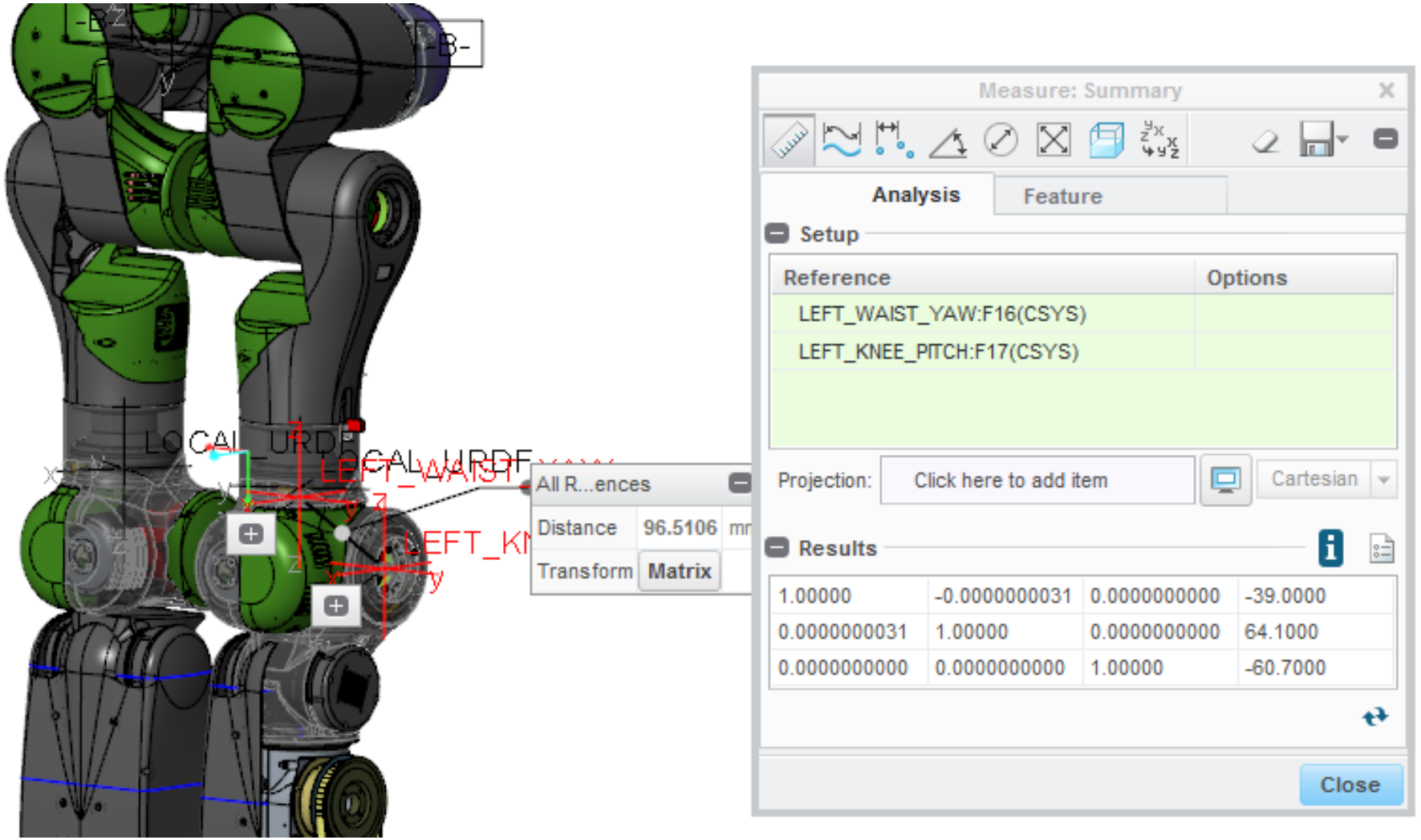
From hip-roll 2 hip-pitch



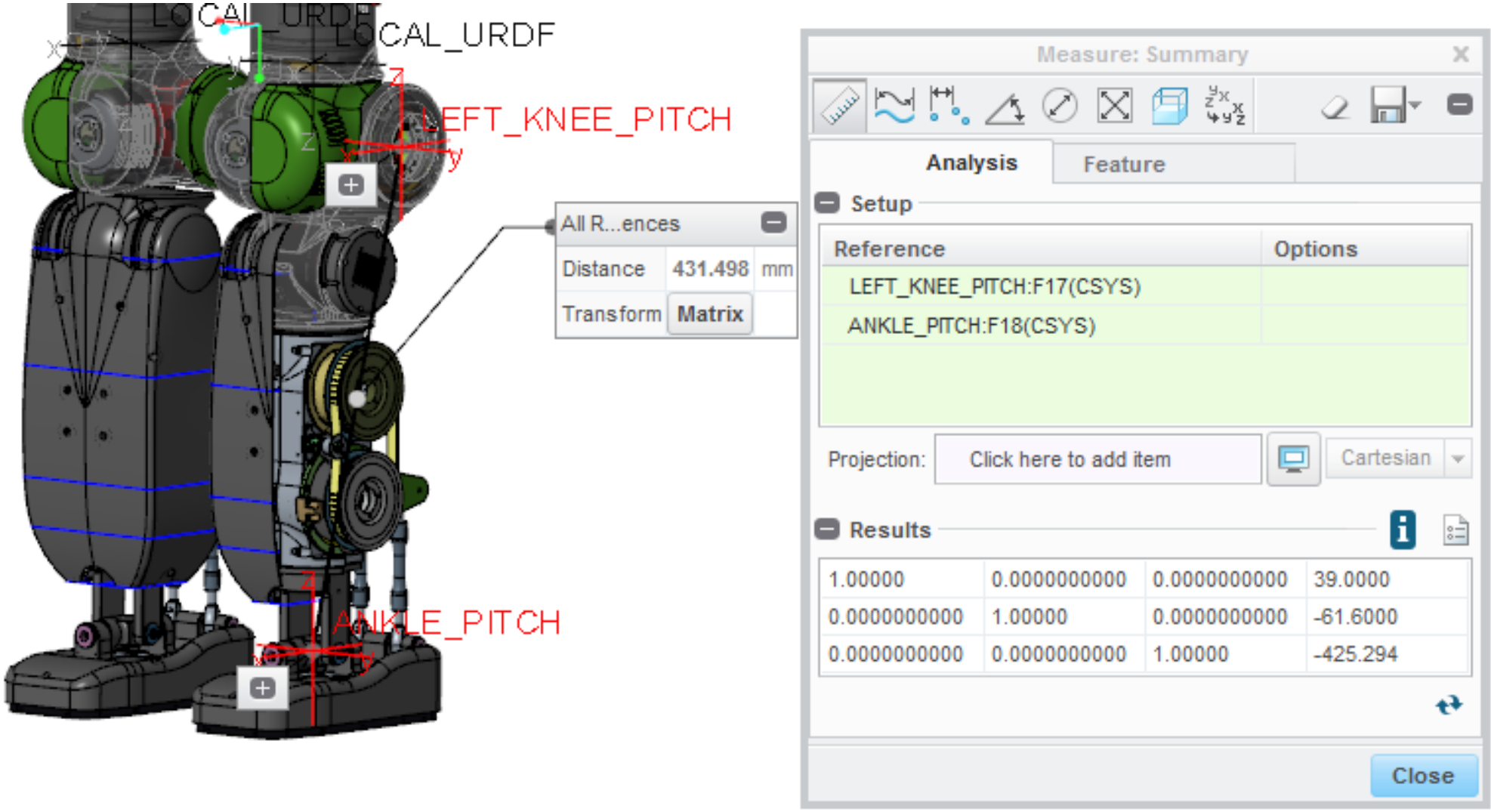
From hip-pitch 2 hip-yaw



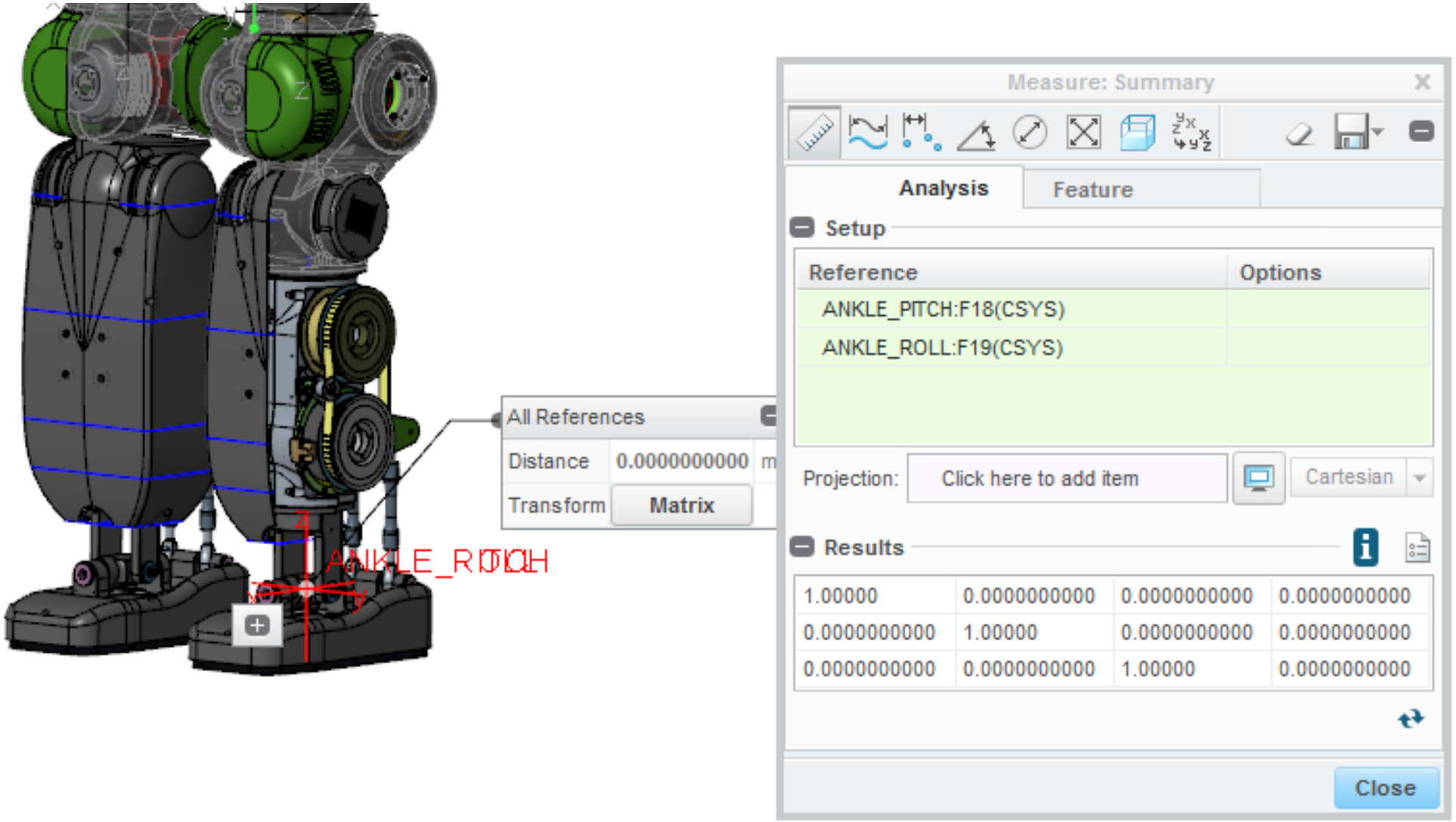
From hip-yaw 2 knee-pitch



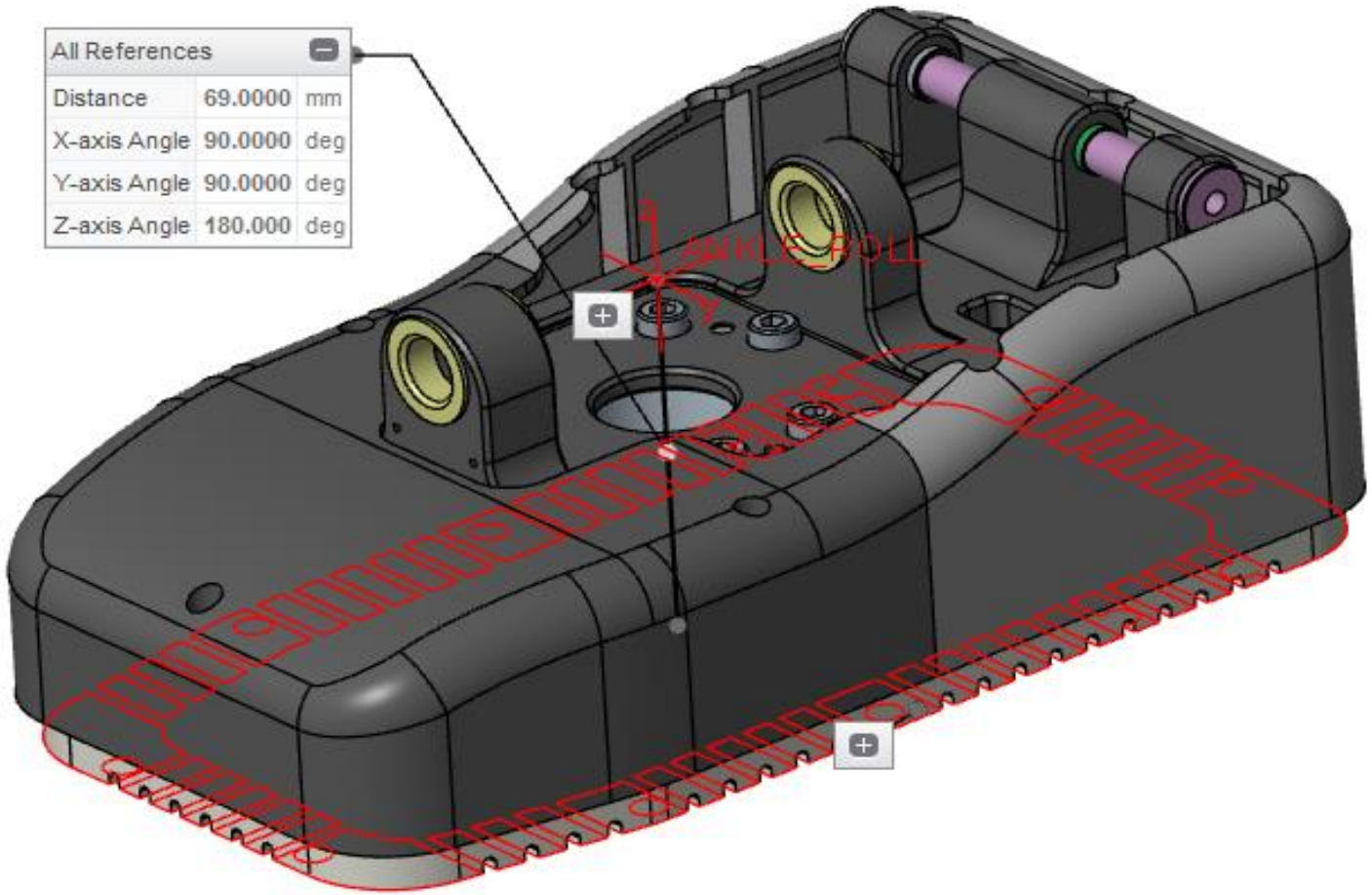
from Knee-pitch 2 ankle pitch



From ankle pitch 2 ankle roll



From ankle roll to floor



From ATI ref. To foot ref.