**ANALYSIS OF BASE**

VOLUME = 2.2842698e+05 MM^3

SURFACE AREA = 5.9213188e+04 MM^2

DENSITY = 7.7437242e-09 TONNE / MM^3

MASS = 1.7688755e-03 TONNE

CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame:

X Y Z -5.0000001e+01 7.7251472e+00 5.4508487e+00 MM

INERTIA with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 6.0552443e+00 6.8324123e-01 4.8209358e-01

Iyx Iyy Iyz 6.8324123e-01 1.1610914e+01 -2.0281228e-01

Izx Izy Izz 4.8209358e-01 -2.0281228e-01 6.3579854e+00

INERTIA at CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 5.8971251e+00 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 7.1361687e+00 -1.2832739e-01

Izx Izy Izz 0.0000000e+00 -1.2832739e-01 1.8302335e+00

PRINCIPAL MOMENTS OF INERTIA: (TONNE \* MM^2)

I1 I2 I3 1.8271316e+00 5.8971251e+00 7.1392706e+00

ROTATION MATRIX from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES:

0.00000 1.00000 0.00000

0.02416 0.00000 0.99971

0.99971 0.00000 -0.02416

ROTATION ANGLES from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES (degrees):

angles about x y z -91.385 0.000 -90.000

RADII OF GYRATION with respect to PRINCIPAL AXES:

R1 R2 R3 3.2139290e+01 5.7739303e+01 6.3529916e+01 MM

**ANALYSIS OF BEARING HUB**

VOLUME = 1.0094583e+03 MM^3

SURFACE AREA = 1.2051169e+03 MM^2

DENSITY = 2.7975979e-01 TONNE / MM^3

MASS = 2.8240583e+02 TONNE

CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame:

X Y Z 0.0000000e+00 0.0000000e+00 0.0000000e+00 MM

INERTIA with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 1.6747564e+04 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 1.0757795e+04 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 1.0757800e+04

INERTIA at CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 1.6747564e+04 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 1.0757795e+04 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 1.0757800e+04

PRINCIPAL MOMENTS OF INERTIA: (TONNE \* MM^2)

I1 I2 I3 1.0757790e+04 1.0757805e+04 1.6747564e+04

ROTATION MATRIX from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES:

0.00000 0.00000 1.00000

1.00000 0.00000 0.00000

0.00000 1.00000 0.00000

ROTATION ANGLES from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES (degrees):

angles about x y z 0.000 90.000 90.000

RADII OF GYRATION with respect to PRINCIPAL AXES:

R1 R2 R3 6.1719827e+00 6.1719870e+00 7.7008558e+00 MM

**ANALYSIS OF BEARING INNER RACE**

VOLUME = 0.0000000e+00 MM^3

SURFACE AREA = 0.0000000e+00 MM^2

DENSITY = 7.7437242e-09 TONNE / MM^3

MASS = 0.0000000e+00 TONNE

CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame:

X Y Z 0.0000000e+00 0.0000000e+00 0.0000000e+00 MM

INERTIA with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 0.0000000e+00 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 0.0000000e+00 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 0.0000000e+00

INERTIA at CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 0.0000000e+00 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 0.0000000e+00 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 0.0000000e+00

PRINCIPAL MOMENTS OF INERTIA: (TONNE \* MM^2)

I1 I2 I3 0.0000000e+00 0.0000000e+00 0.0000000e+00

ROTATION MATRIX from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES:

1.00000 0.00000 0.00000

0.00000 1.00000 0.00000

0.00000 0.00000 1.00000

ROTATION ANGLES from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES (degrees):

angles about x y z 0.000 0.000 0.000

RADII OF GYRATION with respect to PRINCIPAL AXES:

R1 R2 R3 0.0000000e+00 0.0000000e+00 0.0000000e+00 MM

**ANALYSIS OF BEARING SHOULDERS**

VOLUME = 3.2511245e+01 MM^3

SURFACE AREA = 2.2668490e+02 MM^2

DENSITY = 7.7437242e-09 TONNE / MM^3

MASS = 2.5175812e-07 TONNE

CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame:

X Y Z 0.0000000e+00 0.0000000e+00 0.0000000e+00 MM

INERTIA with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 3.7242953e-06 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 7.0394554e-06 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 3.7242753e-06

INERTIA at CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 3.7242953e-06 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 7.0394554e-06 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 3.7242753e-06

PRINCIPAL MOMENTS OF INERTIA: (TONNE \* MM^2)

I1 I2 I3 3.7242953e-06 3.7242753e-06 7.0394554e-06

ROTATION MATRIX from PRT\_CSYS\_DEF 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 PRT\_CSYS\_DEF 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 3.8461863e+00 3.8461759e+00 5.2878337e+00 MM

**ANALYSIS OF BEARING BALL**

VOLUME = 8.1812309e+00 MM^3

SURFACE AREA = 1.9634954e+01 MM^2

DENSITY = 1.0000000e+00 TONNE / MM^3

MASS = 8.1812309e+00 TONNE

CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame:

X Y Z 0.0000000e+00 0.0000000e+00 0.0000000e+00 MM

INERTIA with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 5.1132684e+00 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 5.1132702e+00 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 5.1132693e+00

INERTIA at CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 5.1132684e+00 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 5.1132702e+00 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 5.1132693e+00

PRINCIPAL MOMENTS OF INERTIA: (TONNE \* MM^2)

I1 I2 I3 5.1132665e+00 5.1132693e+00 5.1132721e+00

ROTATION MATRIX from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES:

1.00000 0.00000 0.00000

0.00000 1.00000 0.00000

0.00000 0.00000 1.00000

ROTATION ANGLES from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES (degrees):

angles about x y z 0.000 0.000 0.000

RADII OF GYRATION with respect to PRINCIPAL AXES:

R1 R2 R3 7.9056920e-01 7.9056942e-01 7.9056963e-01 MM

**ANALYSIS OF BELL PLATE**

VOLUME = 1.6335888e+03 MM^3

SURFACE AREA = 6.8450198e+03 MM^2

DENSITY = 8.8508866e-09 TONNE / MM^3

MASS = 1.4458709e-05 TONNE

CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame:

X Y Z 0.0000000e+00 0.0000000e+00 5.5446130e+00 MM

INERTIA with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 4.1271893e-03 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 4.1271890e-03 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 7.1576391e-03

INERTIA at CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 3.6826891e-03 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 3.6826887e-03 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 7.1576391e-03

PRINCIPAL MOMENTS OF INERTIA: (TONNE \* MM^2)

I1 I2 I3 3.6826883e-03 3.6826894e-03 7.1576391e-03

ROTATION MATRIX from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES:

1.00000 0.00000 0.00000

0.00000 1.00000 0.00000

0.00000 0.00000 1.00000

ROTATION ANGLES from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES (degrees):

angles about x y z 0.000 0.000 0.000

RADII OF GYRATION with respect to PRINCIPAL AXES:

R1 R2 R3 1.5959443e+01 1.5959445e+01 2.2249494e+01 MM

**ANALYSIS OF CONNECTING ROD**

VOLUME = 2.1227299e+03 MM^3

SURFACE AREA = 1.9644716e+03 MM^2

DENSITY = 2.7101966e-09 TONNE / MM^3

MASS = 5.7530153e-06 TONNE

CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame:

X Y Z -7.1891560e+00 0.0000000e+00 0.0000000e+00 MM

INERTIA with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 4.8830357e-05 0.0000000e+00 -1.1390691e-09

Iyx Iyy Iyz 0.0000000e+00 4.4128481e-03 0.0000000e+00

Izx Izy Izz -1.1390691e-09 0.0000000e+00 4.3977677e-03

INERTIA at CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 4.8830357e-05 0.0000000e+00 -1.0816464e-09

Iyx Iyy Iyz 0.0000000e+00 4.1155095e-03 0.0000000e+00

Izx Izy Izz -1.0816464e-09 0.0000000e+00 4.1004290e-03

PRINCIPAL MOMENTS OF INERTIA: (TONNE \* MM^2)

I1 I2 I3 4.8830357e-05 4.1004290e-03 4.1155095e-03

ROTATION MATRIX from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES:

1.00000 0.00000 0.00000

0.00000 0.00001 -1.00000

0.00000 1.00000 0.00001

ROTATION ANGLES from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES (degrees):

angles about x y z 89.999 0.000 0.000

RADII OF GYRATION with respect to PRINCIPAL AXES:

R1 R2 R3 2.9133803e+00 2.6697272e+01 2.6746320e+01 MM

**ANALYSIS OF CRANKSHAFT**

MASS = 6.3406029e+03 TONNE

CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame:

X Y Z -1.3518748e+00 -1.7046486e+00 0.0000000e+00 MM

INERTIA with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 3.0747208e+05 -1.3510618e+05 0.0000000e+00

Iyx Iyy Iyz -1.3510618e+05 1.4220347e+06 -2.0530404e+00

Izx Izy Izz 0.0000000e+00 -2.0530404e+00 1.5632262e+06

INERTIA at CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 2.8904738e+05 -1.2049444e+05 0.0000000e+00

Iyx Iyy Iyz -1.2049444e+05 1.4104468e+06 -2.0749536e+00

Izx Izy Izz 0.0000000e+00 -2.0749536e+00 1.5332136e+06

PRINCIPAL MOMENTS OF INERTIA: (TONNE \* MM^2)

I1 I2 I3 2.7624638e+05 1.4232478e+06 1.5332136e+06

ROTATION MATRIX from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES:

0.99440 -0.10564 0.00000

0.10564 0.99440 -0.00002

0.00000 0.00002 1.00000

ROTATION ANGLES from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES (degrees):

angles about x y z 0.000 0.000 6.064

RADII OF GYRATION with respect to PRINCIPAL AXES:

R1 R2 R3 6.6005940e+00 1.4982179e+01 1.5550203e+01 MM

**ANALYSIS OF HAMMER**

VOLUME = 8.2076967e+03 MM^3

SURFACE AREA = 4.8063543e+03 MM^2

DENSITY = 7.7437242e-09 TONNE / MM^3

MASS = 6.3558140e-05 TONNE

CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame:

X Y Z 0.0000000e+00 2.3016498e+01 0.0000000e+00 MM

INERTIA with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 1.5173675e-01 0.0000000e+00 0.0000000e+00

Iyx Iyy Iyz 0.0000000e+00 1.0762601e-02 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 1.4242456e-01

INERTIA at CENTER OF GRAVITY with respect to PRT\_CSYS\_DEF coordinate frame: (TONNE \* MM^2)

INERTIA TENSOR:

Ixx Ixy Ixz 1.1806624e-01 1.5052071e-08 0.0000000e+00

Iyx Iyy Iyz 1.5052071e-08 1.0762601e-02 0.0000000e+00

Izx Izy Izz 0.0000000e+00 0.0000000e+00 1.0875405e-01

PRINCIPAL MOMENTS OF INERTIA: (TONNE \* MM^2)

I1 I2 I3 1.0762601e-02 1.0875405e-01 1.1806624e-01

ROTATION MATRIX from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES:

0.00000 0.00000 1.00000

1.00000 0.00000 0.00000

0.00000 1.00000 0.00000

ROTATION ANGLES from PRT\_CSYS\_DEF orientation to PRINCIPAL AXES (degrees):

angles about x y z 0.000 90.000 90.000

RADII OF GYRATION with respect to PRINCIPAL AXES:

R1 R2 R3 1.3012868e+01 4.1365391e+01 4.3100001e+01 MM