```
//Exported using: GeniE V7.9-04 started 12-Aug-2019 17:59:49
//Units
GenieRules.Units.setOutputUnits("m", "kN", "delC");
GenieRules.Units.setInputUnit(Angle, "deg");
GenieRules.Units.setInputUnit(Force, "kN");
GenieRules.Units.setInputUnit(Length, "m");
GenieRules.Units.setInputUnit(TempDiff, "delC");

//***** PROPERTIES *****//
//Sections
AutoCone = ConeSection(1, true);
Cono = ConeSection(1, true);
OD101_6x5_2 = PipeSection(0.1016 m, 0.0052 m);
OD101_6x6_4 = PipeSection(0.1016 m, 0.0064 m);
OD114_3_2x7_9 = PipeSection(0.1143 m, 0.0079 m);
OD133x8 = PipeSection(0.133 m, 0.008 m);
OD1500x20 = PipeSection(1.5 m, 0.02 m);
OD1500x30 = PipeSection(1.5 m, 0.03 m);
OD1500x40 = PipeSection(1.5 m, 0.04 m);
OD1650x40 = PipeSection(1.65 m, 0.04 m);
OD1800x20 = PipeSection(1.8 m, 0.02 m);
OD1800x30 = PipeSection(1.8 m, 0.03 m);
OD1800x40 = PipeSection(1.8 m, 0.04 m);
OD193_7x8 = PipeSection(0.1937 m, 0.008 m);
OD2000x20 = PipeSection(2 m, 0.02 m);
OD2000x40 = PipeSection(2 m, 0.04 m);
OD2500x20 = PipeSection(2.5 m, 0.02 m);
OD2500x25 = PipeSection(2.5 m, 0.025 m);
OD2500x30 = PipeSection(2.5 m, 0.03 m);
OD508_6x19_1 = PipeSection(0.5086 m, 0.0191 m);
OD610x19_1 = PipeSection(0.61 m, 0.0191 m);
OD762x25_4 = PipeSection(0.762 m, 0.0254 m);
OD76_2x5_5 = PipeSection(0.0762 m, 0.0055 m);
ODslings50 = PipeSection(0.05 m, 0.024 m);

//Materials
steel_cond = MaterialLinear(265000 kPa, 7.85 tonne/m^3, 210000000 kPa, 0.3, 1.2e-05 delC^-1, 3e-05 kN*s/m, 410000 kPa);
steel_cond_12_1015 = MaterialLinear(265000 kPa, 94.996775 tonne/m^3, 210000000 kPa, 0.3, 1.2e-05 delC^-1, 3e-05 kN*s/m, 410000 kPa);
steel_cond_19_6251 = MaterialLinear(265000 kPa, 154.057035 tonne/m^3, 210000000 kPa, 0.3, 1.2e-05 delC^-1, 3e-05 kN*s/m, 410000 kPa);
steel_cond_6_28001 = MaterialLinear(265000 kPa, 49.2980785 tonne/m^3, 210000000 kPa, 0.3, 1.2e-05 delC^-1, 3e-05 kN*s/m, 410000 kPa);
steel_Monopalo = MaterialLinear(345000 kPa, 16.417996 tonne/m^3, 210000000 kPa, 0.3, 1.2e-05 delC^-1, 3e-05 kN*s/m, 470000 kPa);
steel_Trunnions = MaterialLinear(345000 kPa, 7.85 tonne/m^3, 210000000 kPa, 0.3, 1.2e-05 delC^-1, 3e-05 kN*s/m, 470000 kPa);

//Reinforcements (can/stub - properties)
AutoCan = Reinforcement(0.25, 0.3 m, true);
AutoFixedLength = Reinforcement(0, 0 m, false);
AutoStub = Reinforcement(1, 0.6 m, true);
JointCan = Reinforcement(0.25, 0.3 m, false);

//Hinges
Hinge1 = Hinge(1, 1, 1, 1, 0, 0);

//Hydro Properties
BuoyancyArea1 = HydroBuoyancyArea(0.232792 m^2, 0.232792 m^2);
BuoyancyArea10 = HydroBuoyancyArea(1.6286 m^2, 1.23134 m^2);
BuoyancyArea11 = HydroBuoyancyArea(0.183469 m^2, 0.183469 m^2);
BuoyancyArea12 = HydroBuoyancyArea(1.58368 m^2, 1.18642 m^2);
BuoyancyArea13 = HydroBuoyancyArea(0.202319 m^2, 0.202319 m^2);
BuoyancyArea14 = HydroBuoyancyArea(1.93593 m^2, 1.53867 m^2);
BuoyancyArea15 = HydroBuoyancyArea(0.246301 m^2, 0.246301 m^2);
BuoyancyArea16 = HydroBuoyancyArea(2.89529 m^2, 2.49803 m^2);
BuoyancyArea17 = HydroBuoyancyArea(0.0929911 m^2, 0.0929911 m^2);
BuoyancyArea18 = HydroBuoyancyArea(1.67415 m^2, 1.2769 m^2);
BuoyancyArea19 = HydroBuoyancyArea(0.124407 m^2, 0.124407 m^2);
BuoyancyArea2 = HydroBuoyancyArea(4.67595 m^2, 4.27869 m^2);
BuoyancyArea20 = HydroBuoyancyArea(3.01719 m^2, 2.61993 m^2);
BuoyancyArea21 = HydroBuoyancyArea(0.155823 m^2, 0.155823 m^2);
BuoyancyArea22 = HydroBuoyancyArea(4.75292 m^2, 4.35566 m^2);
BuoyancyArea3 = HydroBuoyancyArea(0.111841 m^2, 0.111841 m^2);
BuoyancyArea4 = HydroBuoyancyArea(2.43285 m^2, 2.03559 m^2);
BuoyancyArea5 = HydroBuoyancyArea(0.166819 m^2, 0.166819 m^2);
BuoyancyArea6 = HydroBuoyancyArea(2.37787 m^2, 1.98061 m^2);
BuoyancyArea7 = HydroBuoyancyArea(0.221168 m^2, 0.221168 m^2);
BuoyancyArea8 = HydroBuoyancyArea(2.32352 m^2, 1.92626 m^2);
BuoyancyArea9 = HydroBuoyancyArea(0.138544 m^2, 0.138544 m^2);
```

```
FloodedGrouted = Flooding(1);
HydrodynamicDiameterGroutedInner = HydroDynamicDiameter(1e-05 m);
MarineGrowthGroutedInner = MarineGrowthConstant(0 m, 0 m, 1);
MarineGrowthGroutedInner.useInForceCalculations = false;

MorisonConstantGroutedInner = MorisonCoefficients(0, 0, 0, 0, 0, 0);
NonFloodedGrouted = Flooding(0);

//***** RULES *****//
//Compatibility Rules
GenieRules.Compatibility.version = "V7.9-4";
GenieRules.Compatibility.enable(SetDefaultNames, true);
GenieRules.Compatibility.enable(CaseInsensitiveFunctions, true);
GenieRules.Compatibility.enable(JournalledDefaultPrefix, true);
GenieRules.Compatibility.enable(SimplifyTopologyEnhancedVertexRemoval, true);
GenieRules.Compatibility.enable(PlateSnapping, true);
GenieRules.Compatibility.enable(PlateSortingCOGFirst, true);
GenieRules.Compatibility.enable(CurveSnapping, true);
GenieRules.Compatibility.enable(DefaultLongFemNames, true);
GenieRules.Compatibility.enable(DefaultEccentricHinghes, true);
GenieRules.Compatibility.enable(AutomaticallySaveModelAfterAnalysis, false);
GenieRules.Compatibility.enable(ValidateTransforms, true);
GenieRules.Compatibility.enable(CheckPlatesForErrorsDuringCreation, true);
GenieRules.Compatibility.enable(UseTopologySimplificationVersion7, true);
GenieRules.Compatibility.enable(UseSpliceVersionV, true);
GenieRules.Compatibility.enable(PreferLinearDependencies, true);
GenieRules.Compatibility.enable(PostponeFEMFileWrite, true);
GenieRules.Compatibility.enable(PostponeLoadApplication, true);
GenieRules.Compatibility.enable(UseSestra10, true);
GenieRules.Compatibility.enable(BucklingCapacityForSegmentedMembers, false);
GenieRules.Compatibility.enable(AlternativeJointBraceClassification, false);
GenieRules.Compatibility.enable(UseAutoSegmentation, false);

//Connected Move Rules
GenieRules.ConnectedMove.useStructuralPoints = false;
GenieRules.ConnectedMove.defaultConnected = false;
GenieRules.ConnectedMove.rearrangeXJoints = false;

//Geometry Rules
GenieRules.Geometry.beamTopologySnapping = true;
GenieRules.Geometry.guideCurveTopologySnapping = true;
GenieRules.Geometry.creationGrouping = cgGroupingOff;

//Joint Creation Rules
GenieRules.JointCreation.autoGenerate = false;
GenieRules.JointCreation.selectionAware = false;
GenieRules.JointCreation.exclude(geFreeThroughBeams, true);
GenieRules.JointCreation.exclude(geThroughBeamPure, true);
GenieRules.JointCreation.exclude(geThroughBeams, false);
GenieRules.JointCreation.exclude(geFreeBeamEnds, true);
GenieRules.JointCreation.exclude(ge2BeamAligned, true);
GenieRules.JointCreation.exclude(geBeamEnds, false);

//JointDesign Rules
GenieRules.JointDesign.setDefaultCanRule(0.25, 0.3 m);
GenieRules.JointDesign.setDefaultStubRule(1, 0.6 m);
GenieRules.JointDesign.canReinforcement = AutoCan;
GenieRules.JointDesign.stubReinforcement = AutoStub;
GenieRules.JointDesign.fixedLengthReinforcement = AutoFixedLength;
GenieRules.JointDesign.coneSection = AutoCone;
GenieRules.JointDesign.coneAngle = 9.462322207 deg;
GenieRules.JointDesign.minimumGap = 0.0508 m;
GenieRules.JointDesign.gapTolerance = 0.001 m;
GenieRules.JointDesign.planeTolerance = 1 deg;
GenieRules.JointDesign.braceAngleMoveLimit = 10 deg;
GenieRules.JointDesign.chordAlignmentTolerance = 5 deg;
GenieRules.JointDesign.flushBraces = false;
GenieRules.JointDesign.flushBraces = false;
GenieRules.JointDesign.iterations = 2;
GenieRules.JointDesign.AutoAdjustSegmentLength = true;

//Local Joint Flexibility (LJF) Rules
GenieRules.LJF.method = ljfBuitrago1993;
GenieRules.LJF.setLimit(ljfAxial, 0.1, 5);
GenieRules.LJF.setLimit(ljfIPB, 0.1, 5);
```

```
GenieRules.LJF.setLimit(ljfOPB, 0.1, 5);

//Meshing rules
GenieRules.Meshing.elementType = mp1stOrder;
GenieRules.Meshing.superElementType = 1;
GenieRules.Meshing.autoSimplifyTopology = true;
GenieRules.Meshing.autoSplitPeriodicGeometry = false;
GenieRules.Meshing.repairSplitTopology = false;
GenieRules.Meshing.preference(mpPreferRectangularMesh, false);
GenieRules.Meshing.preference(mpAllowTriangularElements, true);
GenieRules.Meshing.preference(mpPreferPointMassAsNodeMass, true);
GenieRules.Meshing.preference(mpUseDrillingElements, false);
GenieRules.Meshing.preference(mpUseEccentricHinges, true);
GenieRules.Meshing.eliminateInternalEdges = true;
GenieRules.Meshing.eliminateInternalVertices = true;
GenieRules.Meshing.preference(mpIncludeUnusedProperties, false);
GenieRules.Meshing.preference(mpEliminateInternalEccentricities, false);
GenieRules.Meshing.preference(mpIgnoreFilletRadius, false);
GenieRules.Meshing.preference(mpPreferLinearDependencies, true);
GenieRules.Meshing.preference(mpUseLongLoadcaseNames, true);
GenieRules.Meshing.preference(mpUseLongSetNames, true);
GenieRules.Meshing.preference(mpUseLongPropertyNames, true);
GenieRules.Meshing.preference(mpMeshDensityRounded, false);
GenieRules.Meshing.scantlings = msGross;
GenieRules.Meshing.ignoreEccentricities = false;
GenieRules.Meshing.useCocentricBeams = false;
GenieRules.Meshing.faceMeshStrategy = SesamQuadMesher;
GenieRules.Meshing.edgeMeshStrategy = UniformDistributionEdge;
GenieRules.Meshing.activate(mpMaxAngle, mpFail, true);
GenieRules.Meshing.setLimit(mpMaxAngle, mpFail, 179 deg);
GenieRules.Meshing.activate(mpMaxAngle, mpSplit, false);
GenieRules.Meshing.setLimit(mpMaxAngle, mpSplit, 165 deg);
GenieRules.Meshing.activate(mpMinAngle, mpFail, false);
GenieRules.Meshing.setLimit(mpMinAngle, mpFail, 1 deg);
GenieRules.Meshing.activate(mpMinAngle, mpSplit, false);
GenieRules.Meshing.setLimit(mpMinAngle, mpSplit, 15 deg);
GenieRules.Meshing.activate(mpMaxRelativeJacobi, mpFail, false);
GenieRules.Meshing.setLimit(mpMaxRelativeJacobi, mpFail, 10);
GenieRules.Meshing.activate(mpMaxRelativeJacobi, mpSplit, false);
GenieRules.Meshing.setLimit(mpMaxRelativeJacobi, mpSplit, 5);
GenieRules.Meshing.activate(mpMinNormalizedJacobi, mpFail, false);
GenieRules.Meshing.setLimit(mpMinNormalizedJacobi, mpFail, 0);
GenieRules.Meshing.activate(mpMinNormalizedJacobi, mpSplit, false);
GenieRules.Meshing.setLimit(mpMinNormalizedJacobi, mpSplit, 0.2);
GenieRules.Meshing.activate(mpMinEdge, false);
GenieRules.Meshing.setLimit(mpMinEdge, 0.1);
GenieRules.Meshing.activate(mpMinEdgeByLength, false);
GenieRules.Meshing.setLimit(mpMinEdgeByLength, 0 m);
GenieRules.Meshing.activate(mpMinNonConceptualEdge, false);
GenieRules.Meshing.setLimit(mpMinNonConceptualEdge, 1);
GenieRules.Meshing.activate(mpMaxChord, false);
GenieRules.Meshing.setLimit(mpMaxChord, 0.2);
GenieRules.Meshing.activate(mpMaxTwistAngle, mpFail, false);
GenieRules.Meshing.setLimit(mpMaxTwistAngle, mpFail, 30 deg);
GenieRules.Meshing.activate(mpMaxTwistAngle, mpSplit, false);
GenieRules.Meshing.setLimit(mpMaxTwistAngle, mpSplit, 10 deg);
GenieRules.Meshing.activate(mpMinMaxDensityRatio, false);
GenieRules.Meshing.setLimit(mpMinMaxDensityRatio, 0.1);
GenieRules.Meshing.basicLCfactor = 1;
GenieRules.Meshing.analysisFolders = true;
GenieRules.Meshing.preference(mpAdjustNumberOfElements, true);
GenieRules.Meshing.useUniformizedFaceParameterization = false;
GenieRules.Meshing.longitudinalMassOnNonStructuralElements = true;

//Tolerances Rules
GenieRules.Tolerances.angleTolerance = 2 deg;
GenieRules.Tolerances.pointTolerance = 0.01 m;
GenieRules.Tolerances.useTolerantModelling = true;

//Set Rules
GenieRules.Sets.scriptCompact = true;

//Beam Creation Rules

//Beam Creation Rules
```

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GenieRules.Transformation.CopyTransformerMethod = tmUseModelTransformer;

//***** STRUCTURE *****//
GenieRules.JointDesign.AutoAdjustSegmentLength = false;
//Beams
steel_Trunnions.setDefault();
OD610x19_1.setDefault();
Bm1 = Beam(Point(0 m,0 m,4 m), Point(0.95 m,0 m,4 m));
Bm1.CurveOffset = LinearVaryingCurveOffset(ConstantCurveOffsetAtPoint(Vector3d(0.6 m, 0 m, 0 m)), ConstantCurveOffsetAtPoint(Vector3d(0 m, 0 m, 0 m)), false);
Bm2 = Beam(Point(-0.95 m,0 m,4 m), Point(0 m,0 m,4 m));
Bm2.CurveOffset = LinearVaryingCurveOffset(ConstantCurveOffsetAtPoint(Vector3d(0 m, 0 m, 0 m)), ConstantCurveOffsetAtPoint(Vector3d(-0.6 m, 0 m, 0 m)), false);

Bm5 = Beam(Point(0 m,0 m,8.6 m), Point(0 m,0 m,-20 m), geAllowOverlap);
Bm5.flooding = FloodedGrouted;
Bm5.divideSegmentAt(1, 0.4755244755);
Bm5.divideSegmentAt(2, 0.6666666667);
Bm5.material = steel_Monopalo;
Bm5.setSegmentSection(1, OD1500x20);
Bm5.setSegmentSection(2, Cono);
Bm5.setSegmentSection(3, OD2500x20);
Bm5.setSegmentBuoyancyArea(1, BuoyancyArea17);
Bm5.setSegmentBuoyancyArea(2, BuoyancyArea19);
Bm5.setSegmentBuoyancyArea(3, BuoyancyArea21);

Bm5_Inner = Beam(Point(0 m,0 m,8.6 m), Point(0 m,0 m,-20 m), geAllowOverlap);
Bm5_Inner.morison = MorisonConstantGroutedInner;
Bm5_Inner.flooding = FloodedGrouted;
Bm5_Inner.marineGrowth = MarineGrowthGroutedInner;
Bm5_Inner.hydrodynamicDiameter = HydrodynamicDiameterGroutedInner;
Bm5_Inner.divideSegmentAt(1, 0.4755244755);
Bm5_Inner.divideSegmentAt(2, 0.6666666667);
Bm5_Inner.setSegmentMaterial(1, steel_cond_6_28001);
Bm5_Inner.setSegmentMaterial(2, steel_cond_12_1015);
Bm5_Inner.setSegmentMaterial(3, steel_cond_19_6251);
Bm5_Inner.section = OD762x25_4;
Bm5_Inner.setSegmentBuoyancyArea(1, BuoyancyArea18);
Bm5_Inner.setSegmentBuoyancyArea(2, BuoyancyArea20);
Bm5_Inner.setSegmentBuoyancyArea(3, BuoyancyArea22);


//Supports
Sp1 = SupportPoint(Point(-0.95 m,0 m,4 m));
Sp1.boundary = BoundaryCondition(Fixed, Fixed, Fixed, Free, Free, Free);


Sp2 = SupportPoint(Point(0.95 m,0 m,4 m));
Sp2.boundary = BoundaryCondition(Fixed, Fixed, Fixed, Free, Free, Free);


Sp3 = SupportPoint(Point(0 m,0 m,-20 m));
Sp3.boundary = BoundaryCondition(Fixed, Fixed, Free, Free, Free, Free);



//MassPoints
Mass1 = PointMass(Point(0 m,0 m,1 m), 9.1 tonne);

//Joints
Jt1 = Joint(Point(0 m,0 m,4 m));

GenieRules.JointDesign.AutoAdjustSegmentLength = true;
//***** GUIDING GEOMETRY *****//
//***** ENVIRONMENT *****//
//***** EQUIPMENTS *****//
//***** SETS ( Create ) *****//
//Sets
BLeCamicia = Set();
cond_pipe = Set();
ext_pipe = Set();
Monopalo = Set();
nodo = Set();
Trunnions = Set();

//***** LOAD MODELLING AND ANALYSIS *****//
gravity = LoadCase();
```

```
gravity.setFemLoadcase(1);
gravity.designCondition(lcOperating);
gravity.includeSelfWeight();
gravity.excludeStructureMassWithRotationField();
gravity.meshLoadsAsMass(false);

//Analyses
Analysis1 = Analysis(true);
Analysis1.add(MeshActivity());
Analysis1.step(1).beamsAsMembers = true;
Analysis1.step(1).smartLoadCombinations = true;
Analysis1.step(1).writeLoadCombinationsOnFirstLevelAsBSELL = false;
Analysis1.step(1).includeLoadsOnMesh = false;
Analysis1.step(1).needsRemeshLoads = false;
Analysis1.step(1).multithreadedLoadApplier = true;
Analysis1.step(1).multithreadedMesher = false;
Analysis1.step(1).writeFEMFile = false;
Analysis1.step(1).usePartialMesher = true;
Analysis1.step(1).lockMeshedConcepts = true;
Analysis1.step(1).pileBoundaryCondition = pmFixed;
Analysis1.step(1).nodeNumberFromJointName = false;
Analysis1.step(1).elementNumberFromBeamName = false;
Analysis1.step(1).regenerateMeshOption = anAlwaysRegenerateMesh;
Analysis1.add(LinearAnalysis());
Analysis1.step(2).warpCorrection = true;
Analysis1.step(2).continueOnError = false;
Analysis1.step(2).resultFileFormat = SIN_Norsam;
Analysis1.step(2).setStaticAnalysis();
Analysis1.step(2).useSestra10 = false;
Analysis1.step(2).stressStiffening = false;
Analysis1.add(LoadResultsActivity());
LC3_low = LoadCombination(Analysis1);
LC3_low.designCondition(lcOperating);
LC3_low.convertLoadToMass = false;
LC3_low.globalScaleFactor = 1;
LC2_MEDIUM = LoadCombination(Analysis1);
LC2_MEDIUM.designCondition(lcOperating);
LC2_MEDIUM.convertLoadToMass = false;
LC2_MEDIUM.globalScaleFactor = 1;
LC1_HIGH = LoadCombination(Analysis1);
LC1_HIGH.designCondition(lcOperating);
LC1_HIGH.convertLoadToMass = false;
LC1_HIGH.globalScaleFactor = 1;
LC3_low.addCase(gravity, 2.06);
LC3_low.EquipmentRep = EquipmentAsLineLoads;


LC2_MEDIUM.addCase(gravity, 2.36);
LC2_MEDIUM.EquipmentRep = EquipmentAsLineLoads;


LC1_HIGH.addCase(gravity, 2.67);
LC1_HIGH.EquipmentRep = EquipmentAsLineLoads;




//***** LOAD INTERFACES *****//
//***** MODEL VIEWS *****//
//***** SETS ( Fill ) *****//
//Sets
BLeCamicia.add(Mass1);

cond_pipe.add(Bm5_Inner);

ext_pipe.add(Bm5);

Monopalo.add(Bm5);
Monopalo.add(Bm5_Inner);

nodo.add(Jt1);

Trunnions.add(Bm1);
Trunnions.add(Bm2);
```