FreeCAD World

[notes]

Config types

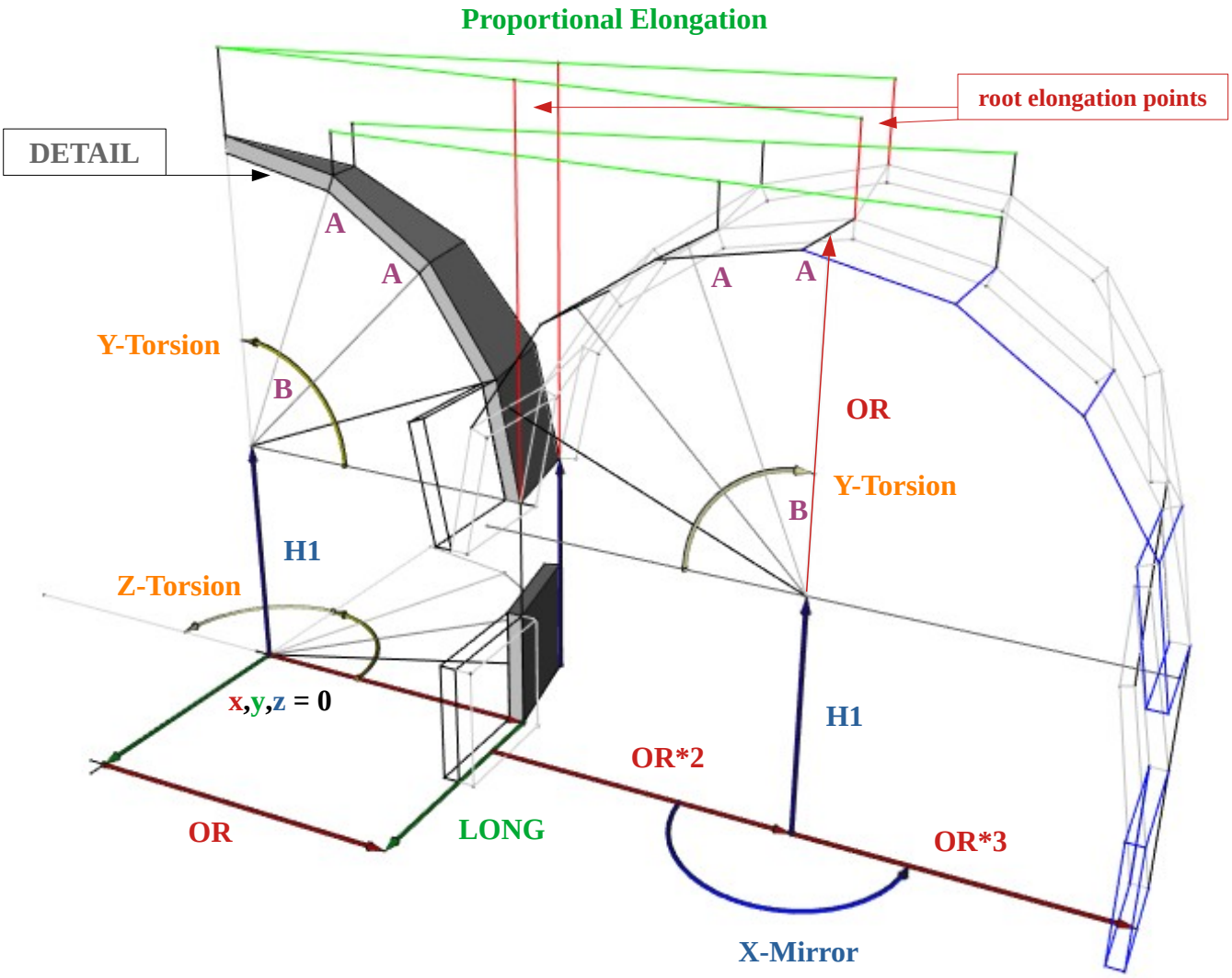
[all types and values (except **str("eg. Value or valUe")**) are **case sensetive**]

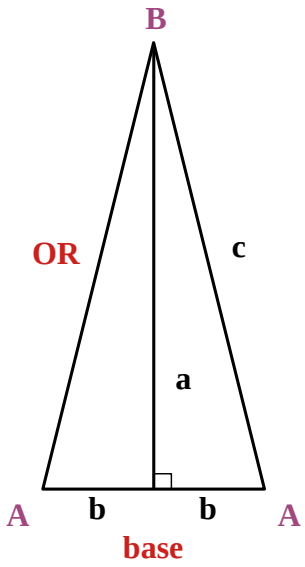
- **int():** integers: (1, 2, 15, 144, 2048, etc);
- **float():** floating point numbers: (1.2, 2.3, 15.123, 144.9, 2048.1024, ¾, ½, etc);
- **bool():** boolean **True** or **False**, 1 or 0. (In real life is **On/Off**);
- **tuple():** in config used as **comma separated** tuple of integers or floats;
- **str():** string as any human readable words, eg **str("CORNER")**;
- **dict():** **comma separated** dictionary of options: str(key) = value, where value may be **one** of described above types;

Semantics

- != not equal;
- == equal;
- [i], [i+1] indexing of sequences;

The Principle





B = 360°/**DETAILS**

A + **B**/2 = 90°

A = (180° - **B**)/2

Isosceles Triangle as base of construction

a = **OR** * sin(**A**) = cathetus

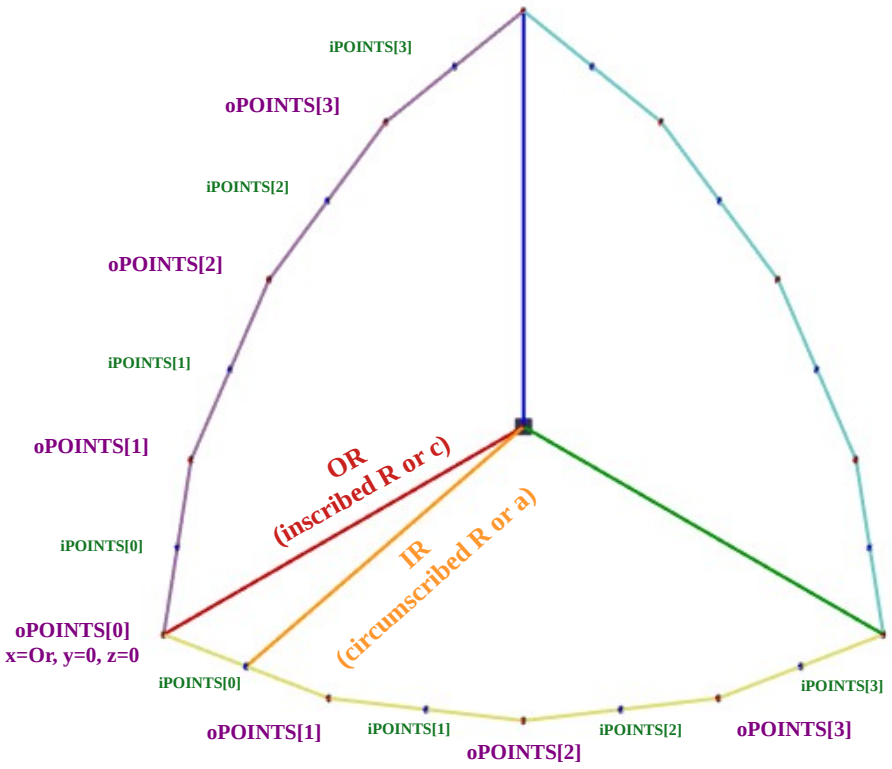
b = **OR** * cos(**A**) = side **b**

OR = **a** / cos(**B**/2) = **c** = hypotenuse

base = **b** * 2 = **OR** * 2 * cos(**A**)

Pointing

- **oPOINTS;**
- **iPOINTS;**

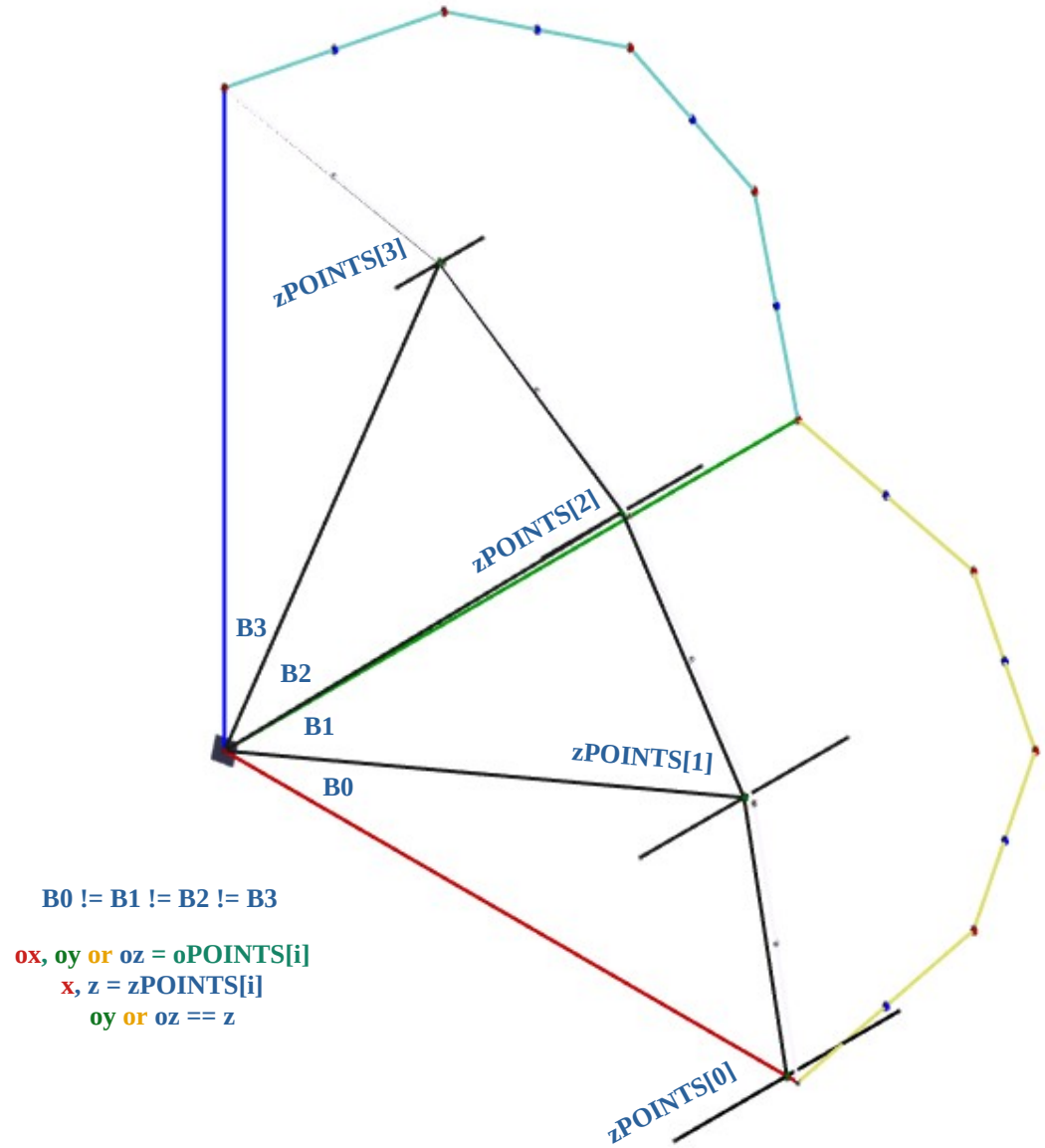


See:

- **oPOINTS or iPOINTS = PairOfCompasses.clockWiseArray(x, y);**
- **oi_pointing.FCStd;**

```
class PairOfCompasses(Trigon):
    _deviation_ = float(0.01)

    def clockWiseArray(self, x, y):
        """
            Clockwise bottom view
        """
        A = self.DETAIL_A
        B = self.DETAIL_B
        """
            Extra solution for thorus to find proportions
            on y axis of higher 'horison poly wireframe'.
            System-wide single deviation is:
                x == 0.01 mm if 0 on x & y axis
                in case of self.DETAILS % 4 == 0
        """
        if x < self.DEVIATION: x = self.DEVIATION
        base = self.isoscelesBase(x)
        points = list( [[ x, y ]] )
        for i in range(self.POLY_QUARTER):
            x -= self.rightSideB_ByA(base, A)
            y += self.rightCathetusA_ByA(base, A)
            points.append([ x, y ])
            A -= B
        return points
```

- **zPOINTS;**

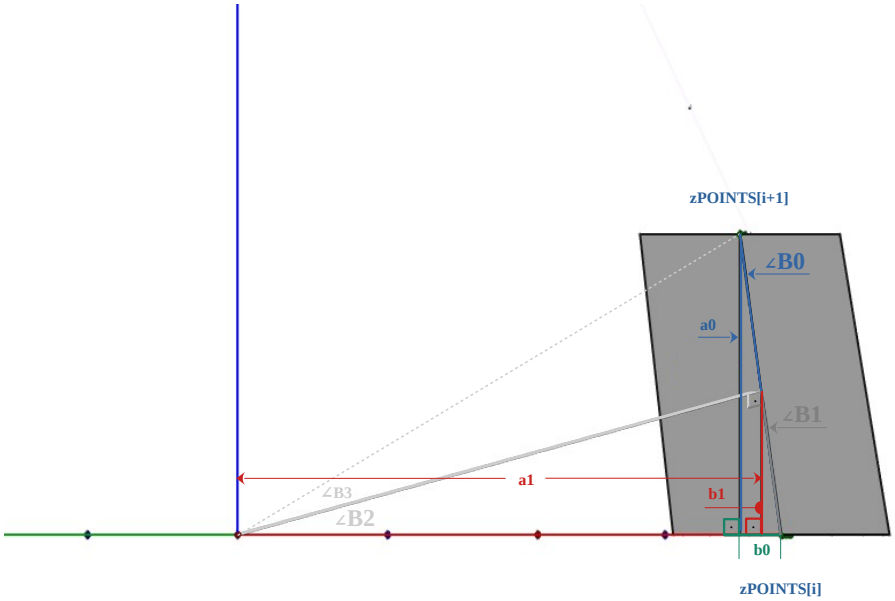


See:

- **TwoPoints.zPolyPoints(Or);**
- **z_pointing.FCStd;**

```
def zPolyPoints(self, Or):
    """
        Receives: OR of inscribed into circle polygon;
        Returns: sequence of mid x, z points of base
        of isosceless triangle on y=0 and ZERO_Z=0;
    """
    oPOINTS = self.oPolyPoints(Or)
    points  = list()
    for x, z in oPOINTS:
        x, y = self.firstSectionToCircumscribed(x, z)
        x, y = self.circumscribedCounterClockWiseOnce(x, y)
        points.append([ x, z ])
    return points
```

- **fPOINTS;**



∠B0 == ∠B1 == ∠B2 ∠B3 != ∠B2 a0 / 2 != b1

a1, b1 = fPOINTS[i]

See:

- (∠B2 + ∠B3), x, a0, b0 = **GraduatedArc.sequenceByGraduatedArc(zPOINTS)[i];**
- a1, b1 or fPOINTS[i] = **MonoGraduatedArc.monoSurfaceMidPoints(Or, manipulator)[i];**
- **f_pointing.FCStd;**

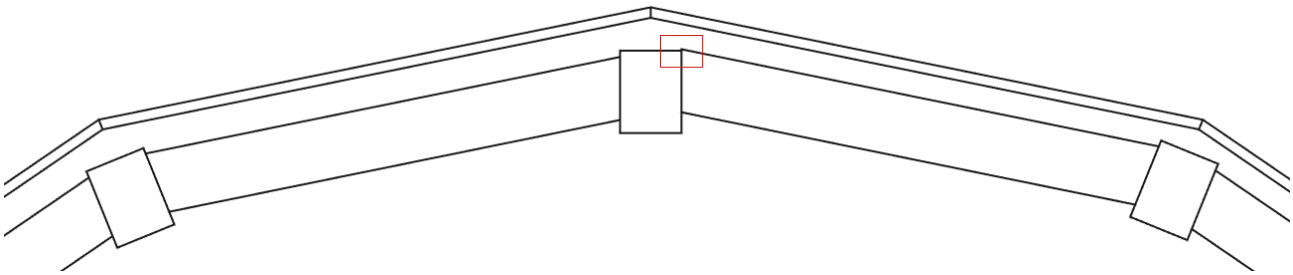
```python
class GraduatedArc(TwoPoints):

    def sequenceByGraduatedArc(self, sequence):
        """
            To work with surface zPOINTS;
        """
        assert isinstance(sequence, list), "TypeError: sequence must be type of list"
        realB = 0
        points = list()
        for x, y in sequence[:-1]:
            next_i = sequence.index([x, y])+1
            next_x, next_y = sequence[next_i]
            next_c = self.rightHypothenuse_ByAB(next_x, next_y)
            B = (self.angleB_ByAB(next_x, next_y) - realB)
            a = self.rightSideB_ByA(next_c, 90-B)
            x = self.rightHypothenuse_ByAB(x, y)
            b = x - self.rightCathetusA_ByBA(a, 90-B)
            realB += B
            points.append([ B, x, a, b ])
        return points
```

```
# returns for each:                +
#                                  |\
#                                  | \
#                                a0|  \
#                                  |   \
# .B_______________________________|_b0_\
# |                x                    |
```

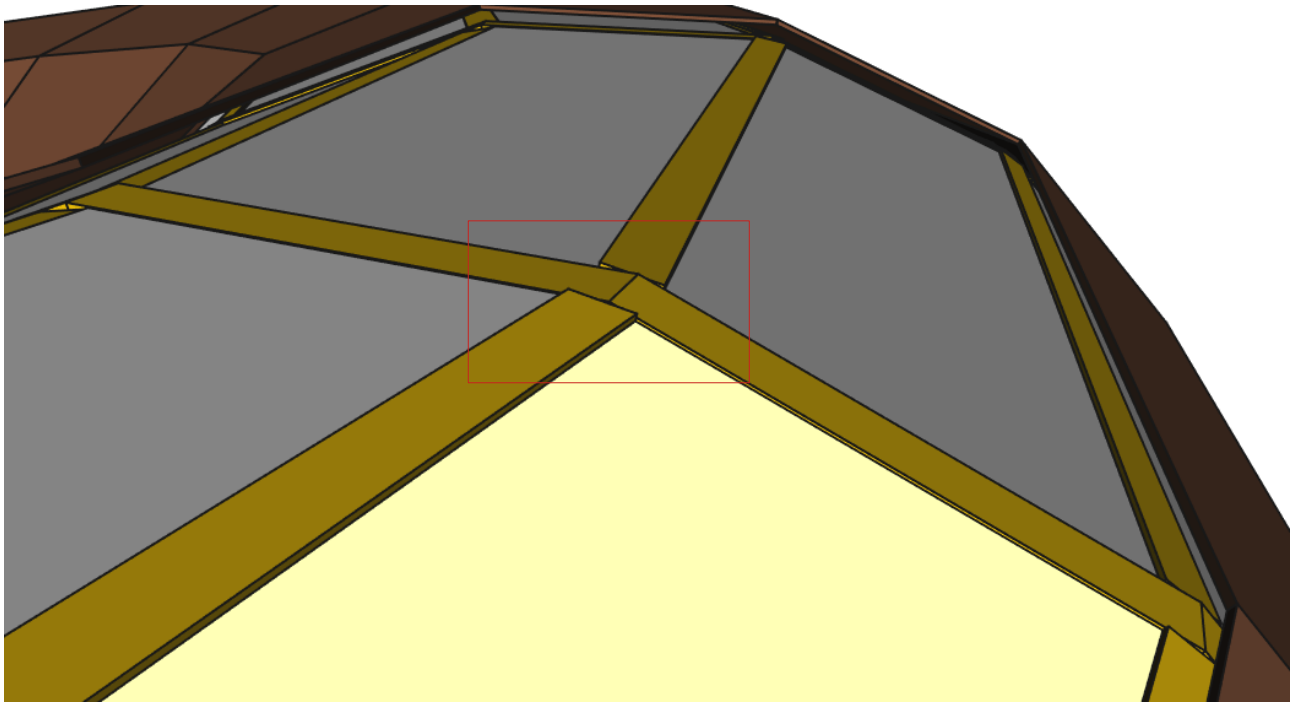
```python
class MonoGraduatedArc(Mono3DPoints):

    def __init__(self, *args, **kwargs):
        super().__init__(*args, **kwargs)
        self.fPOINTS = list()

    def monoSurfaceMidPoints(self, Or, manipulator=0):
        """
            Receives: Or and manipulator;
            Operates with: GraduatedArc.sequenceByGraduatedArc(list);
            Returns: surface mid points, where cathetus lies
            on face at an angle of 90 degrees;
            All _bottom wires_ of faces lies on z=y=0;
        """
        Or += manipulator
        zPOINTS = self.zPolyPoints(Or)
        arc = self.sequenceByGraduatedArc(zPOINTS)
        points  = list()
        for B, x, a, b in arc:
            B = self.angleB_ByAB(a, b)
            c = self.rightCathetusA_ByA(x, 90-B)
            a = self.rightCathetusA_ByA(c, 90-B)
            b = self.rightSideB_ByCA(c, a)
            points.append([ a, b ])
        return points
```

```
# returns for each:                  +
#                                    \
#                           mid point _\
#                                     |\
#                                  b1 | \
# .___________________________________|__\
# |                a1                  |
```

Manipulator issue in thorus mode



Manipulates differences while proportional elongation:



See:

```python
class Mono3DPoints(ModelRoot):

    def mono3DPolyPoints(self, Or, z=0, manipulator=0):
        Or += manipulator
        OPOINTS = self.oPolyPoints(Or)
        points  = list([[ [x, y, z] for x, y in OPOINTS ]])
        for i in range(1, len(OPOINTS)):
            x, y, z = *OPOINTS[i], z
            outer = self._arrange3DPoints(x, y, z)
            points.append(outer)
        return points

class MonoGraduatedArc(Mono3DPoints):

    def __init__(self, *args, **kwargs):
        super().__init__(*args, **kwargs)
        self.fPOINTS = list()

    def monoSurfaceMidPoints(self, Or, manipulator=0):
        """
            Receives: Or and manipulator;
            Operates with: GraduatedArc.sequenceByGraduatedArc(list);
            Returns: surface mid points, where cathetus lies
            on face at an angle of 90 degrees;
            All _bottom wires_ of faces lies on z=y=0;
        """
        Or += manipulator
        zPOINTS = self.zPolyPoints(Or)
        arc = self.sequenceByGraduatedArc(zPOINTS)
        points  = list()
        for B, x, a, b in arc:
            B = self.angleB_ByAB(a, b)
            c = self.rightCathetusA_ByA(x, 90-B)
            a = self.rightCathetusA_ByA(c, 90-B)
            b = self.rightSideB_ByCA(c, a)
            points.append([ a, b ])
        return points
```

```
# returns for each:                 +
#                                    \
#                             mid point _\
#                                       |\
#                                      b| \
# .____________________________________|__\
#                    a
```

```python
class Frame3DPoints(ModelRoot):

    def frame3DConverter(self, x, y, z, **kwargs):
        """
            To align well reduced root 3D points of dome on x,y,z axis
        """
        assert kwargs['reductor'] > 0, "ValueError: zero length of reductor"
        x, y, z = self.first_3D_SectionToCircumscribed(x,y,z, **kwargs)
        x, y, z = self.first_3D_SectionToInscribed(x, y, z)
        points = self.clockWiseArray(x, y)
        return [ [x, y, z] for x, y in points ]

    def frame3DPolyPoints(self, Or, z=0, manipulator=0, **kwargs):
        """
            Receives:
                Or of inscribed polygon;
                global z (or ZERO_Z) of construction;
                z_correct as an additional move in/out frame
                reductor as a material (frame) height;
            Returns:
                list of all 3D points of quarter of dome;
        """
        Or += manipulator
        OPOINTS = self.oPolyPoints(Or)
        IPOINTS = self.iPolyPoints(Or, **kwargs)
        outer   = [ [x, y, z] for x, y in OPOINTS ]
        REDUCED = self.toInscribedConverter(*IPOINTS[0])
        inner   = [ [x, y, z] for x, y in REDUCED ]
        points  = list([[ outer, inner ]])
        for i in range(1, len(OPOINTS)):
            x, y, z = *OPOINTS[i], z
            outer = self._arrange3DPoints(x, y, z)
            x, y, z3d = outer[0]
            inner = self.frame3DConverter(x, y, z3d, z0=z, **kwargs)
            points.append([ outer, inner ])
        return points
```

Definitions in:

- **FrameRoot.wireFrame;**
- **InsulantRoot.wireFrame;**

```python
class FrameRoot(FrameModelLayer):
    """Creator of bar root objects"""
    _mtrl_ = FrameWireFrame._mtl_
    _botm_ = WireFrame._btm_
    _h1ba_ = WireFrame._h1_
    _hdrp_ = str('h1drops')
    _vplb_ = WireFrame._vpl_ + _mtrl_
    _hplb_ = FrameWireFrame._hpl_
    _lnge_ = FrameWireFrame._rof_
    _shte_ = FrameWireFrame._sht_

    def __init__(self, tp, matW, matH, *args, **kwargs):
        self._setMaterial(width=matW, height=matH, RGB=(1.0,0.8,0.0), **kwargs)
        super().__init__(tp, *args, **kwargs)

    def wireFrame(self, ny, nz, marking=True, **kwargs):
        super().wireFrame(ny, nz, **kwargs)
        mnp = (self.MTL.W/2)/self.POLY_QUARTER
        mnp = mnp/self.DETAILS if self.dometic else -mnp
        return self._createFrameWireFrame(
            ny, self.MTL, manipulator=mnp, marking=marking
        )
```

```python
class InsulantRoot(MonoRoot, InsulantModelLayer):
    _mtrl_ = InsulantWireFrame._mtl_

    def __init__(self, tp, thickn, *args,                                  # absolute self __init__
            frame_w=None, RGB=(1.0,1.0,1.0),
            **kwargs):
        assert thickn,  "No Insulant thickness defined"
        assert frame_w, "No Frame width defined"
        self._setMaterial(thickn=thickn, RGB=RGB, frame_w=frame_w, **kwargs)
        MonoGraduatedArc.__init__(self, tp, *args, **kwargs)

    def wireFrame(self, *args, **kwargs):
        mnp = -(self.MTL.FRAME_W/(self.DETAILS/2)) if self.corn else 0   # additional move just for corner
        super().wireFrame(*args, marking=True, manipulator=mnp, **kwargs)
```