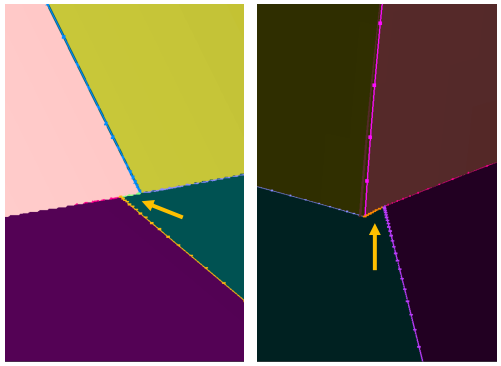
EPOGS WORKFLOW

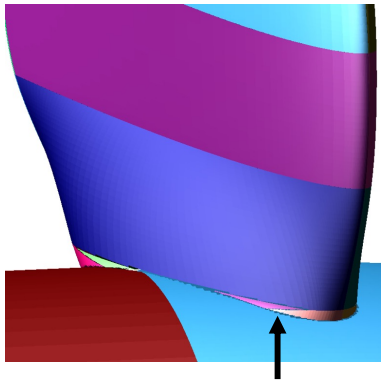
William M. Chan
Computational Aerosciences Branch (TNA)
NASA Ames Research Center

April, 2026

BREP SOLID GEOMETRY BEST PRACTICES

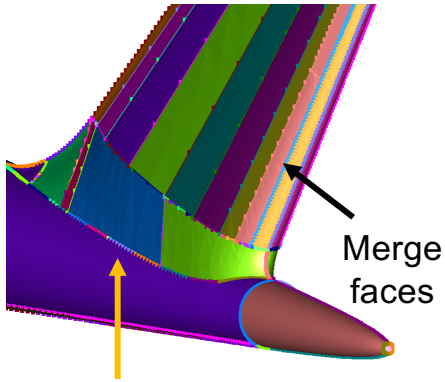


Remove tiny edges caused by tolerance settings



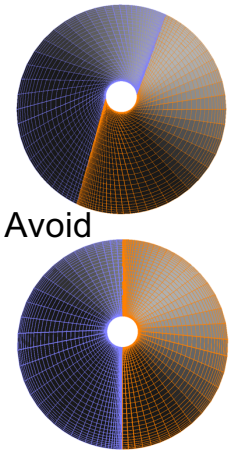
Remove sliver faces

- No spurious nodes
- Merge as many edges and faces as possible (total number of output grids ~ #faces + #edges + #nodes)
- Minimize use of trimming on the faces
- Merge tiny/sliver faces with adjacent faces
- Use symmetric faces/edges on symmetric geometry
- Use curvature-aligned face u/v parameters as much as possible
- Use hard edge to define leading edges of wings, flaps, slats, tails
- A face adjacent to the symmetry plane should have a hard edge along the symmetry plane
- No periodic faces (split into halves)



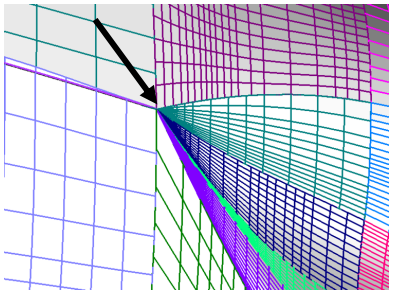
Merge faces

Remove spurious nodes

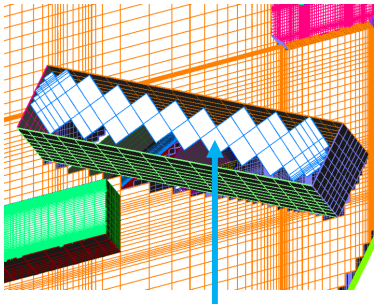


Avoid

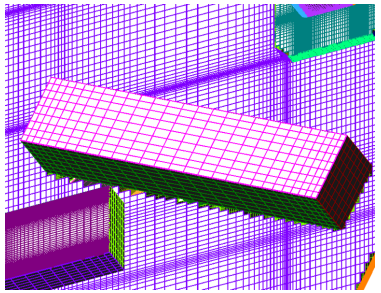
Do this



Avoid collapsed edge on smooth surface

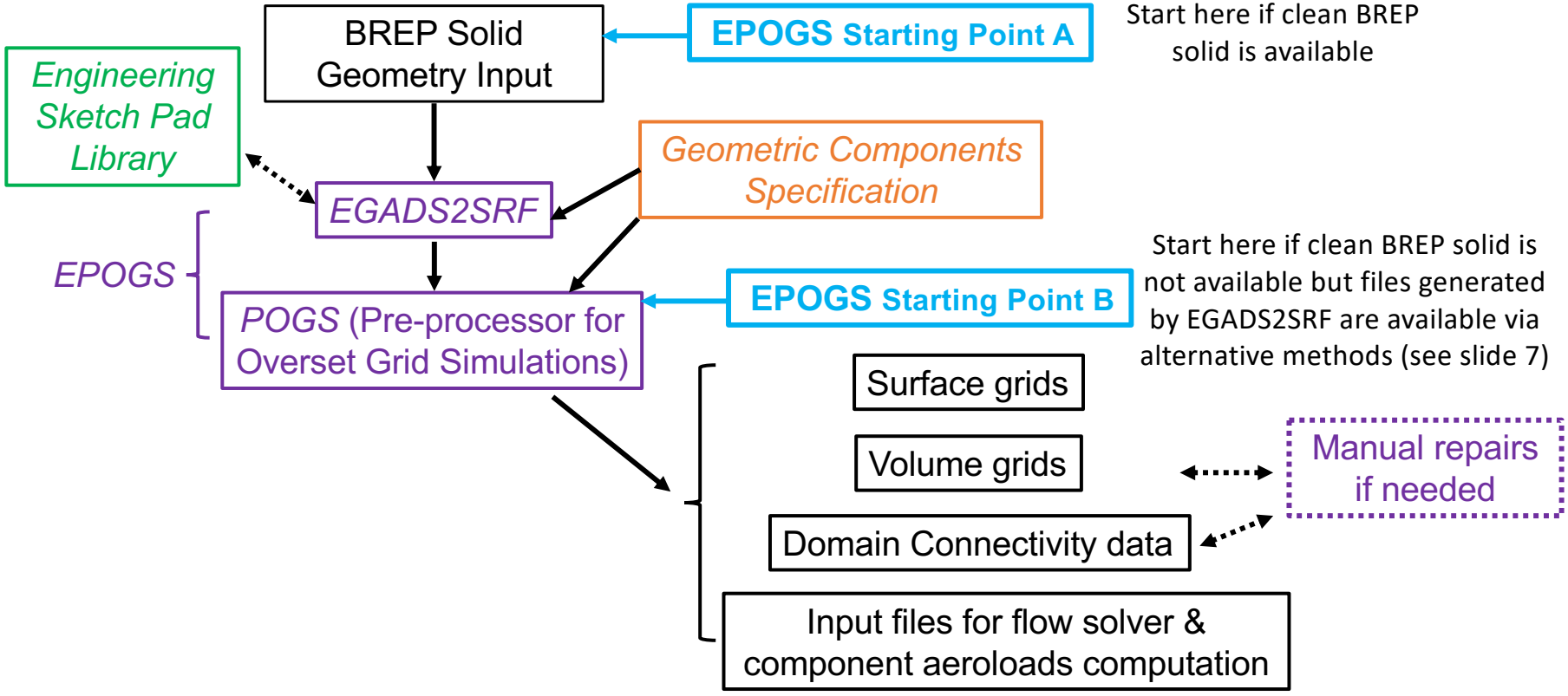


Avoid excessive trimming



Aim for boundary-aligned u/v

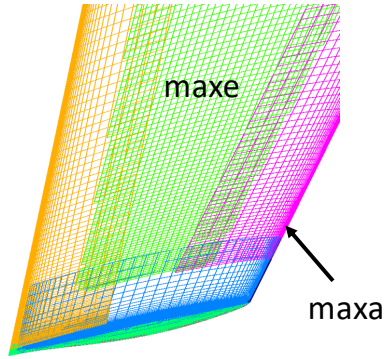
EPOGS MESHING AUTOMATION MODULES & TASKS



GLOBAL PARAMETERS

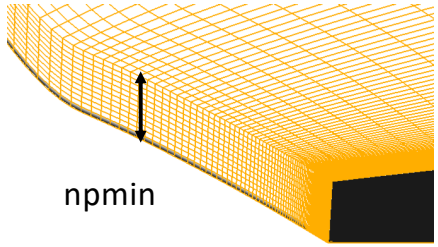
EGADS2SRF

isym	Symmetry 0 = no symmetry 1/2/3 = half-body in +x/+y/+z 11/12/13 = full-body symmetric about x=0/y=0/z=0
maxe	Max cell-size / grid spacing (grid unit)
maxa	Max dihedral angle (degrees)
maxc	Max chordal deviation
maxsr	Max stretching ratio
npmin	Min # points on shortest edge (finite thickness t.e.)
dswall	Wall normal spacing in volume grids (grid unit)



POGS

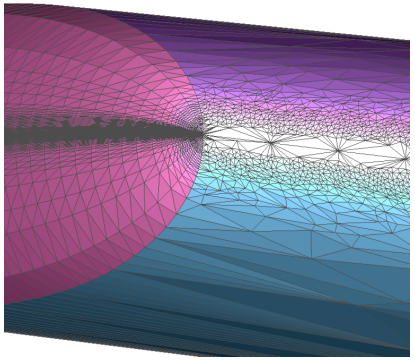
nfringe	Number of fringe points layers at outer and hole boundaries
stenqual	Min acceptable stencil quality for orphan pts flagging
dobnd	Distance to far field boundary (grid unit or rel. near-body bbox)



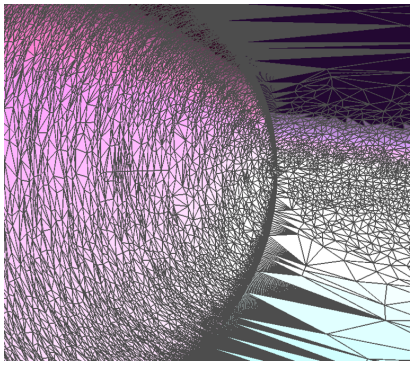
CHOICE OF MAX CHORDAL DEVIATION (maxc)

- Default value is sometimes too high
- Examine the triangulation for anomalies and reduce if necessary

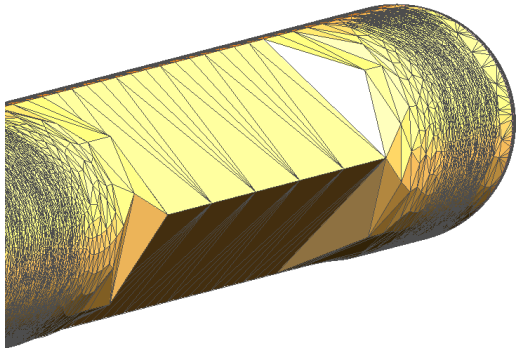
maxc = 0.05

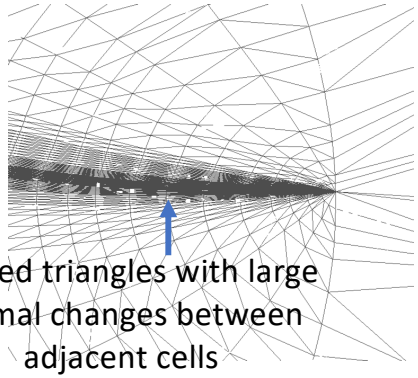


maxc = 0.002

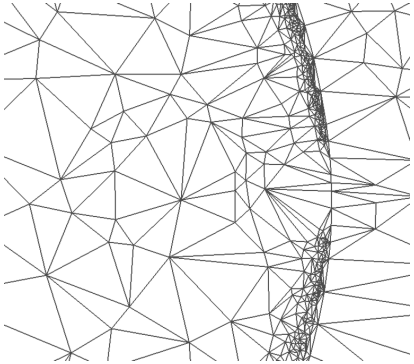


maxc = 0.1

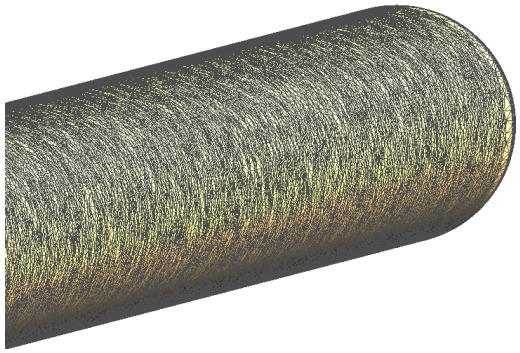




Skewed triangles with large normal changes between adjacent cells

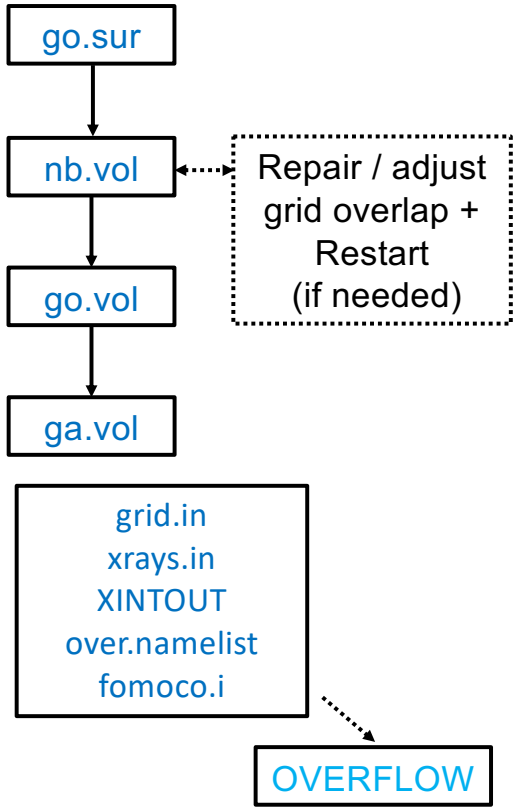


maxc = 0.01



EPOGS WORKFLOW

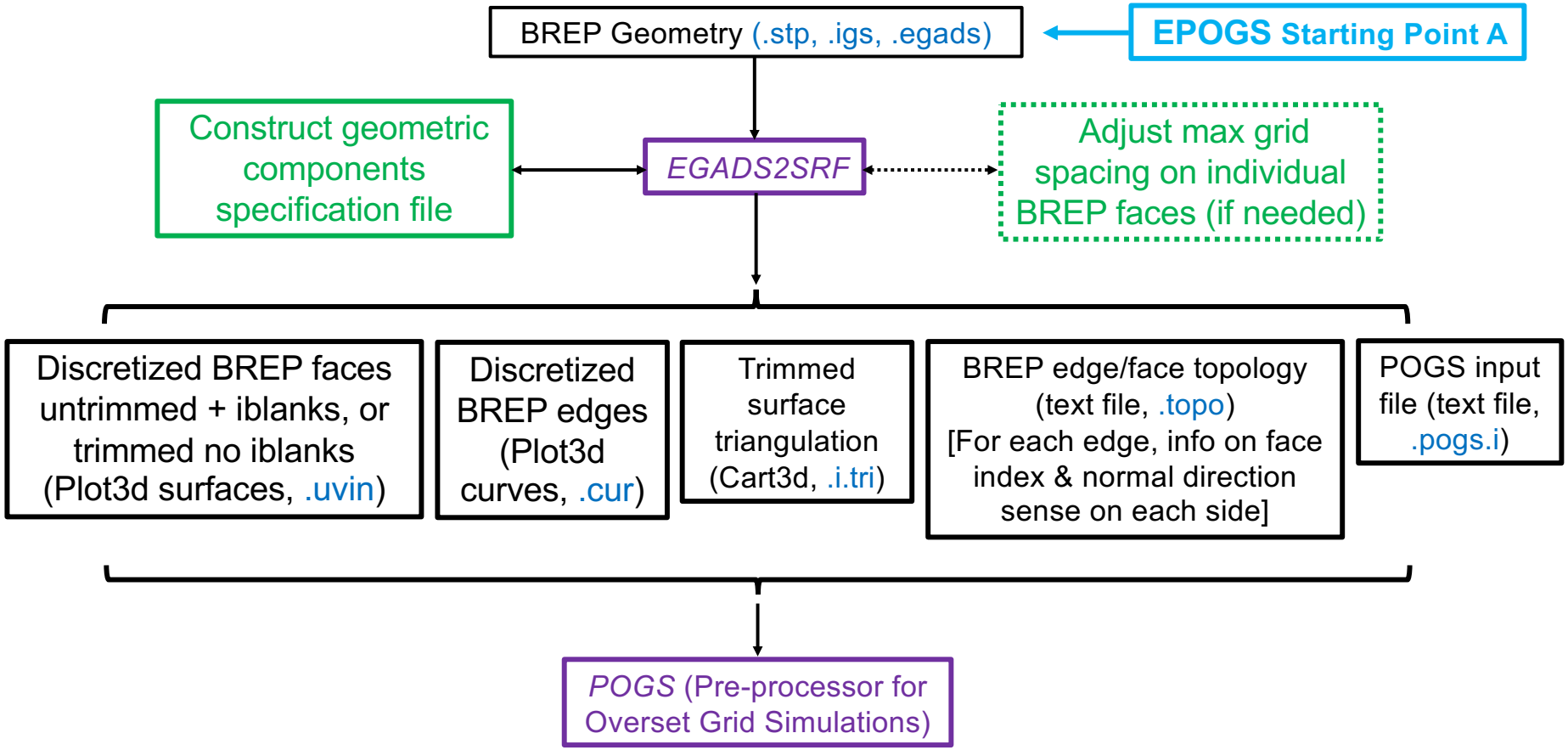
	Action/Command	Output File(s)	Output Type
1	*egads2srf -i root.stp -stop faces*	guvo.sur	Prelim discretized BREP faces
2	Construct components data file manually	root.001.gcomp	List of faces in each component
3	*egads2srf -i root.stp [args]*	root.001.{i.tri, uvin,cur,topo}	Discretized faces & edges, edge/face topology data
4	*pogs [args] -stop go.sur* < pogs.i	go.sur	Surface grids with connectivity data
5	*pogs [args] -start volgen -stop nb.vol* < pogs.i	nb.vol	Near-body volume grids
6	*pogs [args] -start boxgen -stop go.vol* < pogs.i	go.vol	Near & off-body volume grids
7	*pogs [args] -start vdocona -stop ga.vol* < pogs.i	ga.vol	Volume grids with domain connectivity data



root = rootname of geometry file

[args] = optional arguments

EGADS2SRF WORKFLOW



POGS WORKFLOW: SURFACE & VOLUME GRIDS

Discretized untrimmed faces with iblanks or trimmed faces without iblanks, Surface triangulation, Discretized edges, Edge/Face topology (generated by egads2srf or some other method)

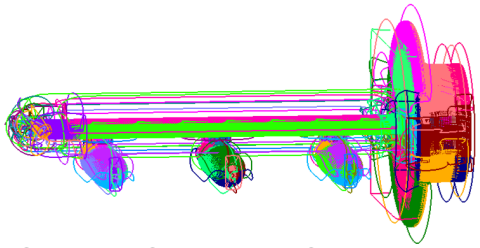
POGS

EPOGS Starting Point B

Surface grids (go.sur)

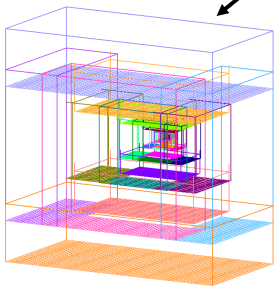
Near-body volume grids (nb.vol)

Repair & restart if needed:
- Negative Jacobians
- Improve mesh overlap

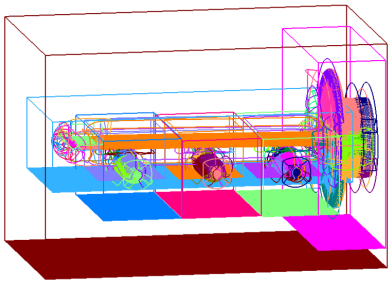


OVF = OVERFLOW

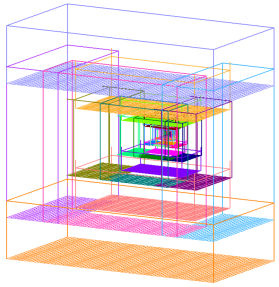
Off-body box grids	OVF	POGS	POGS + OVF



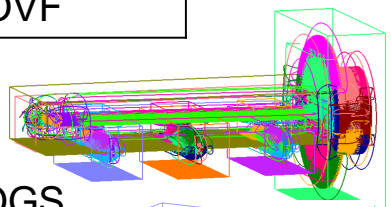
OVF



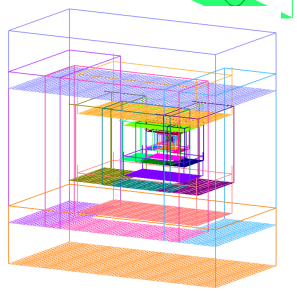
POGS



POGS



POGS

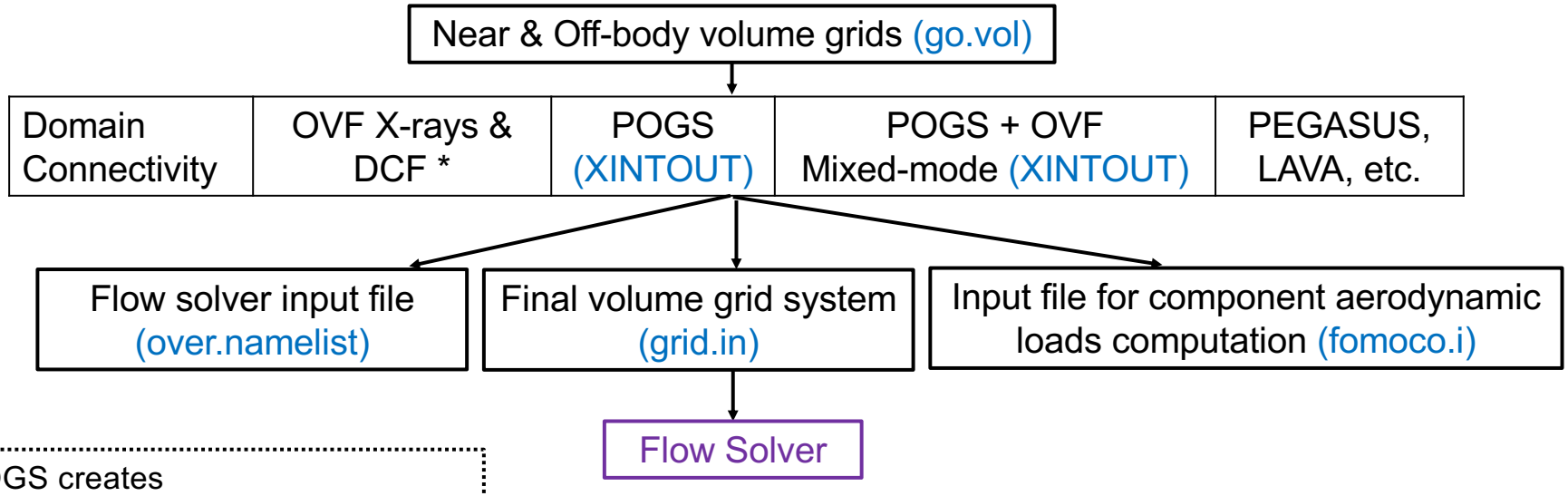


OVF

POGS WORKFLOW: DOMAIN CONNECTIVITY

OVF = OVERFLOW

If needed:
- Improve mesh overlap
- Restart



* POGS creates
- Component surfaces for X-ray map construction
- First guess at hole-cut instructions

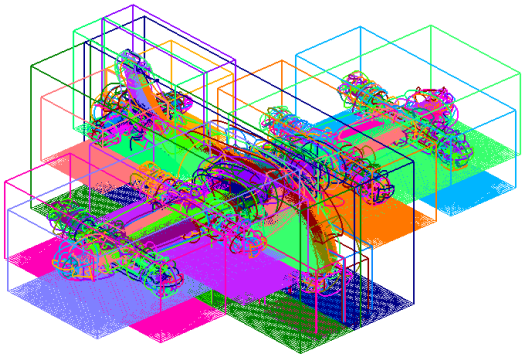
FILES NEEDED TO RUN OVERFLOW (MIXED-MODE)

POGS

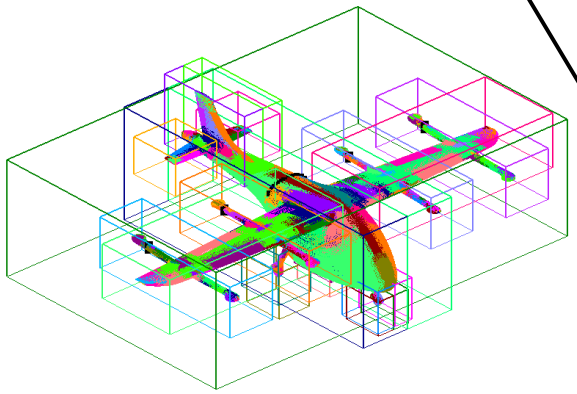
Forces/moments computation input file (default components defined in Geometric Components Spec file)
fomoco.i

OVERFLOW input file with auto-filled boundary conditions for each grid
over.namelist

Domain connectivity data (fringe points, donor stencils, hole-cut iblanks)
CINTOUT_NOGBOX -> CINTOUT



Near-body curvilinear & component box volume grids
go.vol with enclosing outer box grid(s) removed
-> grid.in



X-ray maps for entire geometry & X-ray maps for component box grids
go.xry -> xrays.in