SOLIDWORKS SIMULATION CHECKLIST

Disclaimer: This checklist can be followed once you have prepared your model as necessary for analysis. This is just a general process. Your needs may vary based on many different criteria. If you'd like to learn more about how to effectively use SOLIDWORKS Simulation, GSC offers a number of in-person and online training, as well as consulting services to help you reach your business goals faster.

1 SETUP

Work your way through the simulation tree.

- Apply your materials.
- Define element types.
- Add contacts.
- Add connectors.
- Add loads.
- Add fixtures.
- Create a draft quality mesh and run.

2 TROUBLESHOOT (if necessary)

For stability issues:

- Use soft springs or inertial relief in order to get the software to solve.
- Look for missed contacts or fixtures and add them.
- Turn soft springs or inertial relief off and attempt rerun. Repeat if not solved.

For errors:

- Use the SOLIDWORKS knowledge base to look up errors.
- Contact GSC at 800-454-2233.

3 CHECK ASPECT RATIOS

Once your draft run is successful, check the details under the mesh section in the simulation tree.

- Check that the percentage of elements with an aspect ratio < 3 is over 90%. If complex geometry, use 80%.
- Check that the percentage of elements with aspect ratio > 10 is less than 5%.
- If the aspect ratios lie outside of these values, use the mesh plots to determine if you need a global mesh refinement or if you need to apply local mesh controls to improve values.

4 RUN HIGH-QUALITY ANALYSIS

- Run an analysis with high quality elements.
- Create plots as necessary with sensors defined in areas of interest for easy tracking of crticial values during convergence.

5 CHECK CONVERGENCE

We need to check that the problem has become independent of the mesh size.

- Loop through mesh refinements. Successive runs should double the number of nodes as a general rule.
- Calculate the change in values between successive runs, typically 2-5% for a general rule is considered converged and is adequete for design purposes with appropriate factors of safety befitting sound engineering practice.

SOLIDWORKS FLOW SIMULATION CHECKLIST

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SETUP

1

- Work through the wizard to set the project name, units, analysis type, features, default fluid, flow type, default wall conditions, initial conditions, and initial mesh settings.
- Check that your computational domain is adequate.
- Add necessary fluid subdomains.
- Set solid materials as necessary.
- Create appropriate lids if flow is internal.
- Apply necessary boundary conditions.
- Apply remaining features such as heat sources, radiative surfaces, fans, contact resistances, etc.
- Set the goals for the analysis.
- Apply necessary local initial meshes.
- Run the analysis.

TROUBLESHOOT (if necessary)

2

For stability issues:

- Check that the mesh adequately captures geometry and physics. If not, refine globally or locally as needed.
- Make sure model is water tight for internal analysis.
- Check data inputs are correct.
- Check boundary conditions are correct representation of problem.
- Check calculation control options settings.

For errors:

- Use the SOLIDWORKS knowledge base to look up errors.
- Contact GSC at 800-454-2233.

CONVERGENCE ANALYSIS

3

- Perform subsequent mesh refinements to ensure mesh is adequately fine to represent the problem and the solution is independent of mesh size.

RESULTS

4

- Create cut plots, surface plots, flow trajectories, particle studies, point parameters, surface parameters, XY plots, goal plots, and animations as necessary.
- Probe plots for specific values of interest.
- Create report.

SOLIDWORKS MOTION SIMULATION CHECKLIST

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SETUP

1

Make the study match reality as much as possible.

- ■ Modify mates as needed to represent the motion of the system.
- ■ Add local mates, if necessary.
- ■ Add motors.
- ■ Add springs.
- ■ Add dampers.
- ■ Add forces.
- ■ Add gravity.
- ■ Add contacts.

RUNNING

2

- ● Check the study properties to set the desired frame rate for your event. You will need 160 frames for a smoothly animated 5 seconds (the physical time may be different). Start with a frame rate of 160/length of your study.
- ● Choose a solver. GSTIFF is a good general purpose solver to start with. SI2 is a better solver if concerned more specifically with velocities and accelerations.
- ● Run the study.

TROUBLESHOOTING

3

Try these things, then rerun your analysis.

For convergence failure:

- ● Try a different solver.
- ● Lower the required accuracy.
- ● Shrink the maximum integrator time step.

For poor analysis quality:

- ● Review that the inputs (motors, forces, springs, etc.) accurately represent reality.
- ● Increase the frame rate.
- ● Increase the quality of the contact resolution.

For long-running analysis:

- ● Increase the minimum integrator step size.

For analysis missing quick occurring events like impacts:

- ● Increase the frame rate.
- ● Or, decrease the maximum integrator step size to be the same order of magnitude of the events.

CHECK RESULTS

4

Did you get what you want?

- ■ Plot the results you need. If they look discrete rather than continuous and/or seem to be missing the maximums and minimums you were expecting, see troubleshooting for poor analysis quality.
- ■ Look at the motion results and decide if it looks correct. If it doesn't, you may be seeing bad representations of the setup. See troubleshooting for poor analysis quality.

SOLIDWORKS PLASTICS SIMULATION CHECKLIST

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1 SETUP

- Choose a mesh.
  - **Shell mesh** provides the best balance of accuracy and solve time for thin-walled parts.
  - **Solid mesh** is accurate for any type of model, but provides greater accuracy for models with complex geometry.
- Apply polymer.
- Set process parameters (fill, pack, and/or warp settings).
- Add boundary conditions (e.g., injection locations).
- Run desired analysis.

2 TROUBLESHOOTING

- Refine mesh to capture complex geometry.
- Check that you have clean, solid geometry.
- Ensure proper number of mesh groups (one per each solid body).
- Use mesh edits to create a watertight mesh.
- Contact GSC (800-454-2233) for any other error or problems that cannot be resolved by the above steps.

3 CHECK RESULTS

- Ensure the cavity is filled within the appropriate injection pressure limit.
- If multi-cavity mold, check that runner system is balanced.
- Use engineering insight to determine appropriate design changes in order to reduce air traps, weld lines, etc.
- For optimal accuracy perform run sequence in the following way if cooling is included in your plastics package.
  - Flow → Cool → Flow → Pack → Warp

4 CONVERGENCE ANALYSIS

In any Finite Element Analysis (FEA), convergence analysis needs to be completed to confirm the solution is independent of mesh size.

- Re-run analysis with subsequent mesh refinements (each refinement should generally double number of nodes).
- Calculate percent change in solution values until solution has converged to less than 4 or 5%.