TRITONE PRO-TIPS

MINIMIZING LIVE SETTERS WITH ANSYS ADDITIVE SUITE

Tritone

Minimizing Live Setters with Ansys Additive Suite

CHALLENGE

MoldJet Technology allows the manufacturing of a multitude of complex geometries, offering a certain advantage over traditional manufacturing, which often necessitates a many operations/added costs to produce a complex part.
The main challenge when producing parts using sintered based technology comes from the sintering process, where forces are applied on the parts under extremely high temperatures and can deform the geometry. This can lead to inaccuracy with regards to the desired dimensions.

SOLUTION

To predict the behavior of parts during the sintering process, we use Ansys Additive Suite simulation. Ansys created a wizard that allows to easily run an analysis considering different parameters as the thermal stresses, grain size or to predict total deformation of parts.
The analysis provides information to the software and enables it to suggest a "compensated geometry", which means a pre-distorted part, that will, after distortion inside the furnace, reach the desired geometry. The following graph explains this process:

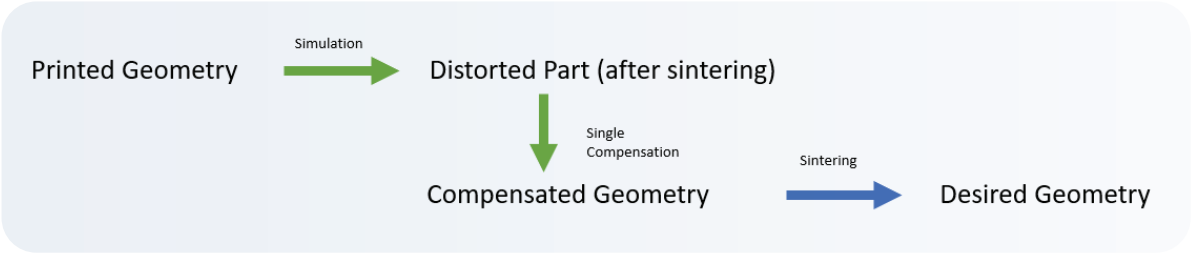

Figure 1: Workflow of Single Distortion Compensation

For more accurate compensated geometry one can use Iterative Compensation which requires additional computational efforts.

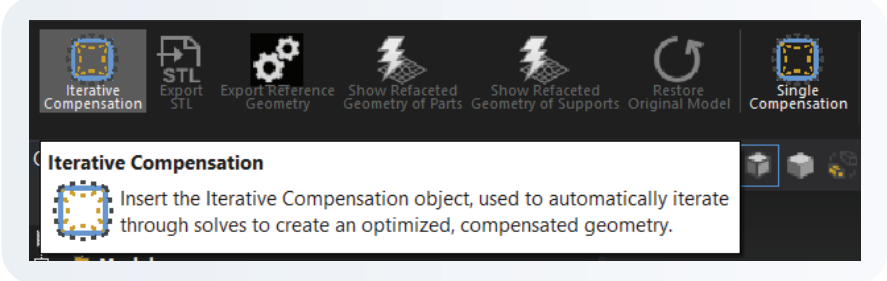

Figure 2: Iterative Compensation

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BENEFITS

The use of this simulation tool enables some key benefits for the MoldJet Technology community:

- Ability to design parts without live setters
- Enhance the geometric accuracy of parts
- Test by simulation different ways of sintering and picking the best orientation
- Better understand the process and implementations of new design guidelines

SUCCESS

The new wizard allows to enter parameters in an intuitive way for each part to be manufactured on the tray, as shown in Figure 3:

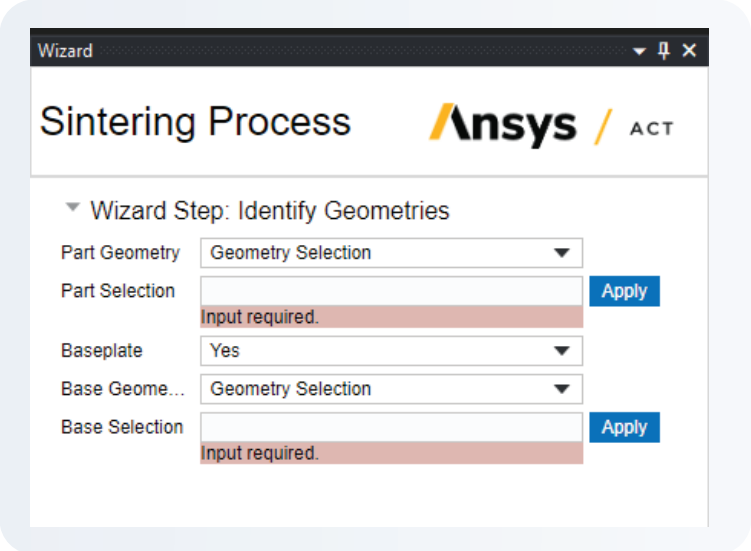

Figure 3: Sintering Process Wizard

Let's take a C-shaped part to illustrate our case study.

C-shapes are challenging to manufacture because they are prone to large distortions due to unpredictable friction of the part with the baseplate during the sintering. This friction causes deformation, usually at the tips of the C-shape.

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Here is a picture of the expected part that we want to obtain:

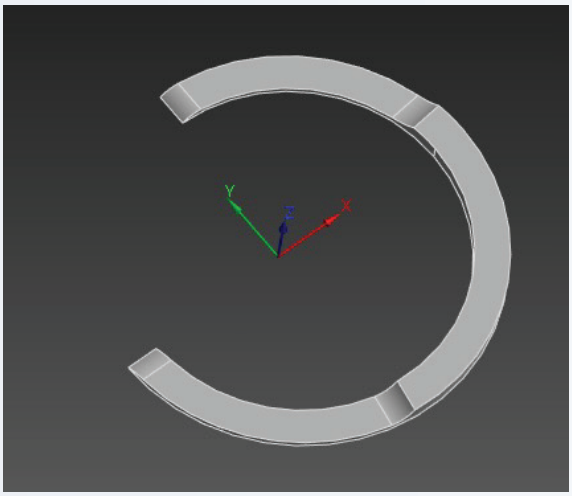

Figure 4: CAD Model before Sintering

After running the analysis to see how the part will look after sintering, here is the result:

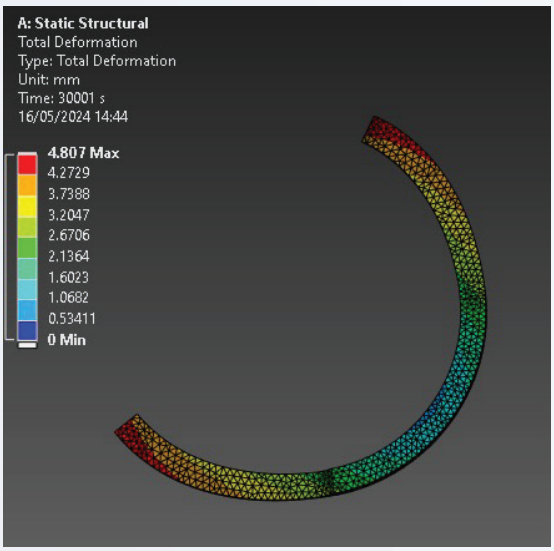

Figure 5: Distorted Part after Sintering (illustrated)

Note:
We used a scaled-up illustration to show the behavior of the part during sintering when displaying the results.

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Let's generate a Single Compensation to get the compensated part to manufacture:

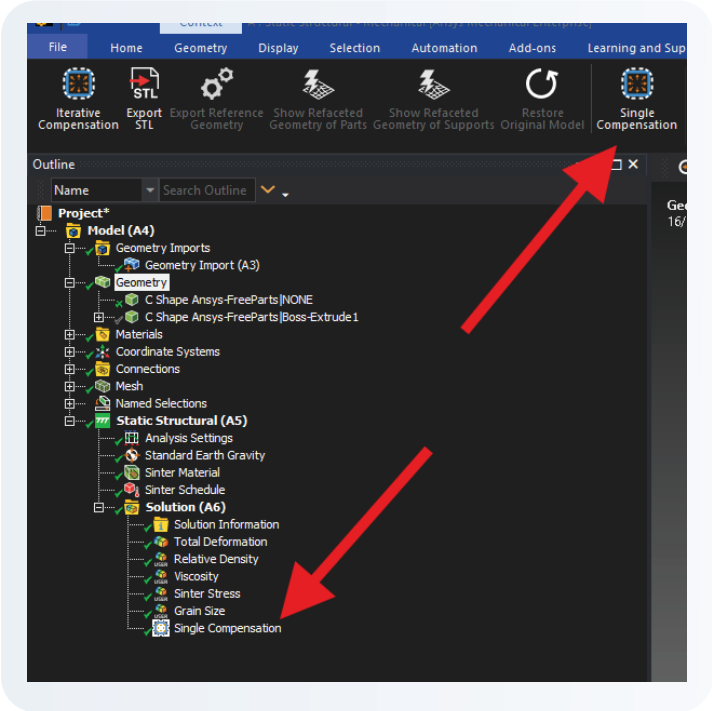

Figure 6: Single Compensation Generation

We then obtain the compensated part in a STL format, ready to be manufactured:

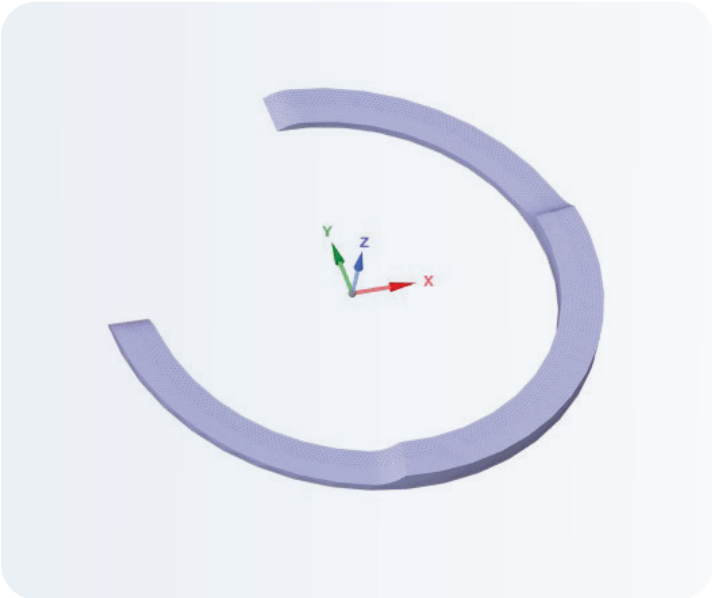

Figure 7: Compensated part to ready for manufacturing

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CONCLUSION

Ansys simulation tools are exceptional when used to predict the behavior of parts during the sintering process.

This simulation tool can be easily used with the help of the Wizard.

When the sintering simulation is over, the user can learn about the process that the part has been through and decide to generate a compensated part. This compensated part will be generated as a STL file.

To conclude, Ansys Additive Suite simulation is a potent tool that can be used in many ways by the engineers to obtain the desired results, according to their specific needs.