ANSYS Postprocessing

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Postprocessing Overview

The ANSYS software suite is providing at least three different postprocessing applications. The following table is an attempt to provide to LRZ users a short outline of the available capabilities:

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CFD-Post is the original graphical postprocessor of the CFX-5 software suite. But later it was adapted for the postprocessing of ANSYS Fluent results too. From its origin, CFD-Post operates on vertex-based sets of data, i.e. variables which are primarily stored in the vertices of a numerical mesh. It offers the same powerful CEL/CCL expression and command language as the other components of the ANSYS CFX software suite, so that the evaluation of complex algebraic terms in postprocessing can be accomplished without programming. Postprocessing results can be exported as HTML reports, graphics files, movie files, CSV, etc.

For postprocessing of cell-centered Fluent results the user must be aware, that those cell-centered data are converted to vertex-based data during the reading of CAS/DAT files. On one hand side this is leading to an observable peak in memory consumption during this import operation. On the other hand side, the postprocessor is already doing an interpolation step at this point, so that the postprocessing is already no longer based exactly on the solvers results data. This might result e.g. in slight differences e.g. in the integration of massflows through inlet/outlet where the Fluent solver reports a negligible mass imbalance, but CFD-Post shows some difference. These interpolation effects become minor with mesh refinement.
### ANSYS Fluent Postprocessing

ANSYS Fluent is a single-window monolithic CFD application, which aims to provide the whole CFD workflow "under one roof". Consequently ANSYS Fluent provides its own postprocessing capabilities in the ANSYS Fluent GUI and logically this is applicable to ANSYS Fluent results only.

**Advantages:**

- Build-in postprocessing capabilities are available during the run time of the simulation, if the so-called Fluent Cortex is able to run (on LRZ Cluster Systems this is not possible). So postprocessing results (graphs, images) and even movies can be produced "on the fly" during the simulation and in parallel, while the data are processed in the Linux clusters memory.
- The build-in postprocessor operates on the cell-centered distributed data of the ANSYS Fluent solver, i.e. no additional interpolation takes place, which can slightly affect the data.

**Disadvantages:**

- Postprocessing during parallel simulation run reduces the efficiency of the parallel computation, since it introduces additional serialization in parts of the postprocessing code.
- Comparable poor quality of produced postprocessing in comparison to the capabilities of other postprocessors (CFD-Post, Ensight)
- No CEL/CCL command and expression language. Hard to automate the postprocessing this way.
- Almost no chance to transfer a once defined postprocessing definition from one case to another, which is with CST /CSE files from ANSYS CFX a no-brainer. Ensight has its own transferable style files too.

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### ANSYS EnSight & ANSYS EnSight Enterprise (HPC)

EnSight was formerly owned by CEI, Inc. before it was acquired by ANSYS in 2017. EnSight was positioned as a general purpose postprocessor for CFD and CSM results data from a wide variety of simulation tools of very different vendors and in very different file formats. EnSight is capable of reading and comparing up to 32 different models in different formats at the same time, e.g. comparing an ANSYS CFX, Star CCM+ and an ANSYS Fluent simulation result. ANSYS EnSight has its own expression language (similar but different from the CCL expression language of ANSYS CFX), which makes it similar powerful for creation and visualization of derived postprocessing variables.

In the version ANSYS EnSight Enterprise (formerly EnSight HPC) this postprocessor is fully parallelized and capable of postprocessing extremely large cases up to several 100 Mill. cells. In case that you have such postprocessing needs, please contact the LRZ V2C Virtual Reality & Visualization Center for further information and possible assistance.

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**own laptop or workstation (non-LRZ)**
- LRZ Remote Visualization Systems
- LRZ V2C Virtual Reality & Visualization Center
Results of ANSYS Mechanical simulations (APDL) are usually postprocessed in ANSYS Workbench, but could potentially be postprocessed using ANSYS EnSight as well. Same applies to results from other components of the ANSYS software portfolio like LS Dyna, Polyflow, FORTE, IcePack, Maxwell, HFSS, etc.

**ANSYS Postprocessing on RVS**

Postprocessing of large datasets from either CFD or CSM simulations is a very memory intensive tasks, in many cases a computationally intensive task too. Therefore we encourage LRZ users to

1. either transfer the CFD or CSM results data from LRZ Cluster Systems to their own computer systems for postprocessing with maximum local graphics performance, or
2. make use of the LRZ Remote Visualization Systems wherever possible and applicable, since these systems provide on one hand side large enough memory, a certain degree of parallelism due to their multi-processor architecture and VirtualGL graphics support.

Once you are logged into one of these LRZ Remote Visualization Systems, you can check the availability of the desired ANSYS postprocessing software, load the corresponding ANSYS version environment module and run the postprocessing application.

For ANSYS CFD-Post this procedure consists of:

```bash
> module avail cfx
> module load cfx/19.2
> vglrun cfdpost
```

For ANSYS Fluent postprocessor this procedure consists of:

```bash
> module avail fluent
> module load fluent/19.2
> vglrun fluent
```

For ANSYS Workbench based postprocessing this procedure consists of:

```bash
> module avail ansys
> module load ansys/19.2
> vglrun runwb2
```

For ANSYS EnSight this procedure consists of:

- For the EnSight Standard version:
  ```bash
  > module avail ensight
  > module load ensight/standard
  > vglrun ensight102
  ```

- or for the EnSight Enterprise (HPC) version:
  ```bash
  > module load ensight/hpc
  > vglrun ensight102
  ```