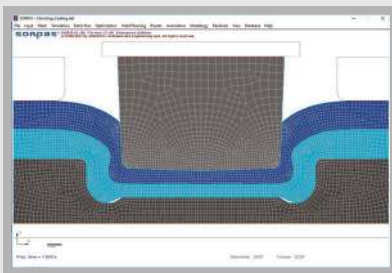
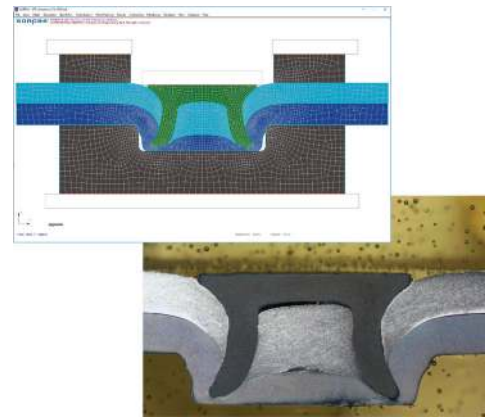


MECHANICAL JOINING NEW MODULE FOR SPR, RIVETING AND CLINCHING

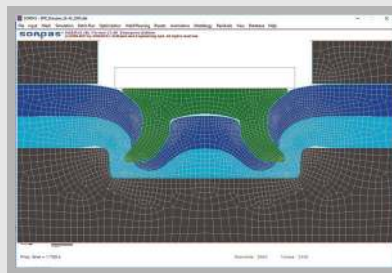
Better Simulation of Joining by Forming

The new module in SORPAS® 2D for mechanical joining has been fully developed and now ready to be released. Intensive new developments have been made in the past two years on the basis of many years experiences in metal forming and solid state bonding as well as close collaborations with industries and universities. A lot of numerical verifications were made for simulations of self-piercing riveting (SPR), clinching and riveting processes. Experimental validations were also made for simulations of SPR. Further development and improvement are now continued on hybrid joining with adhesives and combined mechanical joining and resistance welding. A beta version has been provided to selected industrial users for testing and feedback.



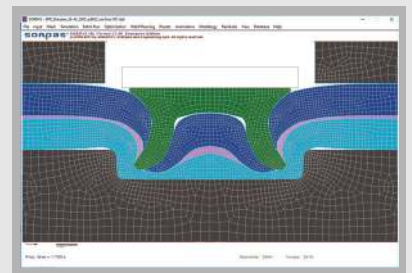
Automated Adaptive Remeshing

Based on the existing mechanical model in SORPAS® 2D, the first key new development was the adaptive remeshing for overcoming the extremely large deformation during mechanical joining processes. This is now fully implemented with the automated adaptive remeshing which works for all applications with coating, adhesive and fractures.



Friction and Fracture Modeling

The second key new development was on the modeling of fracture as seen in self-piercing riveting (SPR). Due to complicated conditions at contact interfaces between different objects, the friction modeling was made with three friction models. The material database is also upgraded with new materials data for fracture and surface friction.



Hybrid Joining with Adhesive

Further new developments are also made especially on hybrid joining for combined mechanical joining and adhesive bonding, as well as combined mechanical joining and resistance welding. The graphic user interface (GUI) of SORPAS® 2D is now integrated for the entire joining process chain with options of welding, joining and hybrid joining.