AFDEX Newsletter Q3 / 2019

MFRC

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1. Improved major functions of AFDEX_V19R02

1.1 Structural analysis of assembled die

Accurate contact treatment in conducting structural analysis of complicated assembled dies considering shrink fit and planes of symmetry is of great importance in terms of solution reliability.

Numerical jumps of stress components can be frequently met especially at die corners because of geometric and numerical complexities. Of course, these kinds of numerical local jumps of stress have influence only on their associated local regions following Saint-Venant's principle. However, these numerical phenomena can deteriorate the solution reliability.

In the latest release, V19R02 provides some advanced functions of predicting stresses of assembled dies. Figs. 1.1 and 1.2 compare the new predictions with the previous predictions, indicating that the predictions exhibit much more stable solutions.

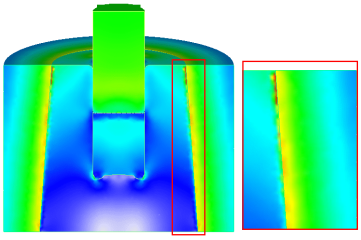


Fig. 1.1 V19R01

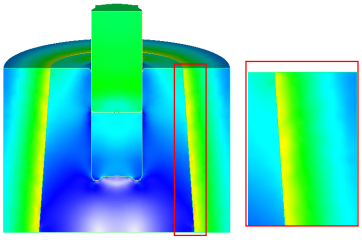
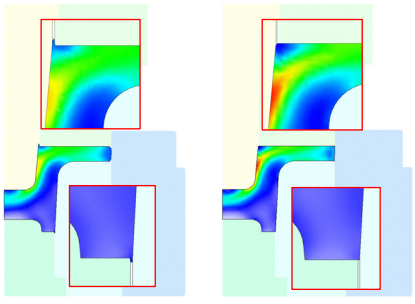


Fig. 1.2 V19R02

1.2 Sophisticated treatment of gap flow of material between die parts

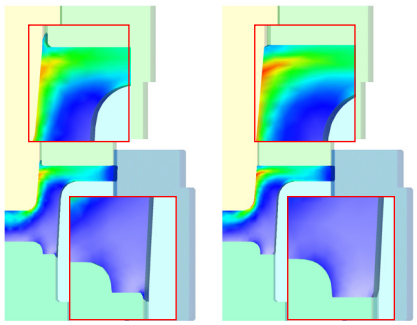
Assembled dies for predicting their associated metal forming processes are more realistic. However, some numerical schemes are inevitably necessary to deal with gap flow between die parts, and users need to consider the methods of dealing with it.

Therefore, a scheme of preventing the material from being flown into a small gap between the die parts is inevitable. i.e., practical and general schemes related to the gap flow prevention is necessary. The previous version has supplied a function which shows good results for some specific problems. For the latest version, V19R02, we improved its generality considering the various cases. Figs. 1.3 and 1.4 illustrate the capability of gap flow prevention for 2D and 3D examples, respectively, which are purposely artificial process designs.



(a) Allowance of gap flow (b) Prevention of gap flow

Fig. 1.3 2-dimensional example



(a) Allowance of gap flow (b) Prevention of gap flow

Fig. 1.4 3-dimensional example

1.3 Coarsening STL die information

Fine die surface information constructed by a STL format with so many triangular patches may not contribute to enhancing the solution accuracy when the finite element mesh system of material is not compatible with the die information in terms of mesh size. For the fine die surface model to be meaningful, the FE mesh system of the material should be much finer.

When the die STL input is so fine, it would rather be coarsened in a direct way. Thus, a new coarsening function will be delivered from V19R02, to make it compact in terms of computational efficiency. Fig. 1.5 compares input surface and modified surface. Note that the former is described by 420,000 tetrahedrons while the latter by 30,000 tetrahedrons, revealing that the number of triangular patches were drastically reduced with negligible loss of surface characteristics.

(a) 420,000 tetrahedrons (b) 30,000 tetrahedrons

Fig. 1.5 Example of the new coarsening function

2. Notices

2.1 Expositions during Q2

MFRC participated and exhibited AFDEX in Forge Fair 2019 held during May 21-23 at Cleveland, Ohio, US. Many visitors enquired about the functions of AFDEX and showed immense interest in using it. The ease of using AFDEX at first look was very appealing to majority of our stall visitors.

AFDEX was exhibited in ICPMMT 2019, held at Kenting, Taiwan on May 24. Dr. Mansoo Joun gave a key-note speech about the factors affecting the accuracy of metal forming simulation.

MFRC conducted a global webinar titled "Multibody Simulation in metal Forming" for the simulation community on 18th of June along with Altair. We witnessed the highest attendance among the webinars we have conducted so far, thanks to the popularity and importance of the topic. The webinar was recorded and is available on request. Please visit the link below to view it. https://web.altair.com/2019-mfrc-apa-webinar

MFRC participated in the NUMIFORM 2019 held at Portsmouth, New Hampshire, US on 23 June as a sponsor jointly with Altair. Moreover, J-STAMP had been exhibited by JSOL Corporation, one of the best software companies in Japan as well as the partners of MFRC in Japan.

MFRC also exhibited in Korea Metal Week 2019 from June 19 to 22, and the technical seminar titled "Design and Application of metal forming using CAE technology" was presided by Dr. Hokeun Moon.

2.2 Upcoming exhibitions in Q3

MFRC will visit Shanghai, China for exhibiting AFDEX in MetalForm China 2019 from July 17. AFDEX will also be displayed along with BRIMET's products in their booth.

An AFDEX exhibition and workshop will be held in ICAME 2019 in Kota Kinabalu, Malaysia from August 14. In the conference, Dr. Joun will give a presentation about the effect of metal forming simulation technology in developing countries.

2.3 MFCAE 2019

MFCAE 2019 will be held at Jinju MBC Convention from 8th to 9th of August, which will be one of the main user conferences of AFDEX. MFCAE has been held as an international event since 2014 as a metal forming CAE technology conference organized by Gyeongsang National University. But it had been happening domestically in Korea since 1996.

In the morning of the first day, there will be an opportunity for the undergraduates participating in GISPAM 2019 to present (30 Mexicans, 2 Malaysians, 10 Koreans). Note that participation into the morning session is allowed only to the invited persons. The regular event starts from 13:00. In the afternoon, developers will spend 5 hours in detail for further education, discussion and for the introduction of new functions. In the morning of the second day, a graduate session, a regular session and an invited presentation session will be held and about 15 research and application examples with research ideas or plans will be presented and discussed. At the same time, customized trainings on special topics and/or functions can be made, based on the requests of maintenance users. The participants will be presented with the textbook "Macroscopic modeling of metal forming processes by FEM" (Mansoo Joun, Wanjin Chung and Seokmoo Hong)".

Participate actively to learn how to use simulation software and gain more expertise. Please contact Ms. Vivian(jelee@afdex.com) or visit www.afdex.com.

Table 1. Schedule of MFCAE 2019

Date	Contents
08.08. (Thursday)	Special session for GISPAM participants
	Developer session
	Education session
	Discussion
08.09. (Friday)	General session
	Graduate students' session
	Invited scholar session

2.4 GISPAM 2019

GISPAM 2019 will be held at Gyeongsang National University for five weeks starting on 15 July. It is an international educational event in which 30 distinguished students from Mexico, 10 Korean university students and 2 university students from Malaysia participate.

GISPAM is the sixth international event of the year, started by the government of the State of Mexico five years ago, requesting AFDEX training for the best scholarship students in the State of Mexico.

The subjects to be lectured consist of mechanics with some fundamentals including mathematics, statics and solid mechanics, engineering plasticity, finite element method, CAD practice, AFDEX practice and creative application, technical writing and presentation. All lectures are conducted in English. In addition, we will provide students with useful training experiences by visiting companies and experiencing traditional Korean culture. If you are interested in this program, please contact Ms. Vivian (jelee@afdex.com).