## 1. New version released, AFDEX_V16

The new version of AFDEX, named as AFDEX_V16R01 is now officially released from the date of July 25th, 2016. It has already been through the strict test procedure and applicative usages by domestic and foreign experts for two months, whereas V16R00 corresponds to the first version published in 2016. It also shows a significant side of beta version, which includes such an outstanding analytic feature in terms of elastoplasticity with elastic die deformation duly considered. Moreover its structure can be characterized to have a feature of far flexible connections to other engineering software with greatly extensible caliber embedded in internal functions. Paying an appreciable attention to various demands brought forward by field users has additionally contributed to yield the vast improvement in detailed functional issues.

New major functions and primary improvements are listed below. Some fractions of them were previously published in 2016 Spring Conference of Korean Society for Technology of Plasticity, while the other critical portions will be introduced in the forthcoming MFCAE 2016 and our regular training sessions.

1.1 Main functions in the new version

- Elastoplastic finite element analysis with elastic die deformation
- Simultaneous analytic capability for forming and die structure
- Analysis with shrink fit considered
- 3D elastoplastic analysis
- Stage-by-stage progressive analysis
- Sheet metal forming analysis
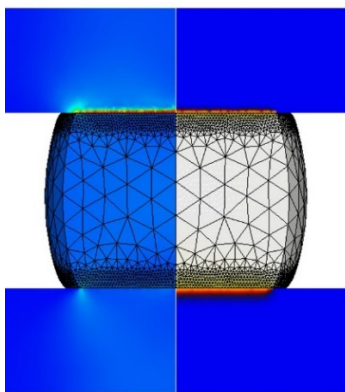
An example of analysis in the left-hand side shows the result gotten from 3D non-isothermal analysis for stress (left) and temperature (right), while the upper die is under the forming and thermal loads together and the lower die reflects the effect from forming load only. By the way the resulting compressive stresses are observed on the upper die surface due to thermal load, ultimately leading to the die surface failure due to spalling, etc. Temperature in the lower die is shown to be slightly higher as the dwelling process was considered.

1.2 Primary improvements

- Mesh density control utilities
- Pre-processor UI's for special processes
- More detailed manuals
- Tutorial Part I and II added
- Enhanced interface functions for other software
- Advances in computation speed

2. Academic events and exhibitions

2.1 Papers presented at KSTP special session

In the 2016 Spring Conference of Korean Society of Technology of Plasticity held this April, most advanced state-of-the art forging simulation technologies are introduced in its special session titled "On the simulation technology for precision metal forming." The event also witnessed MFRC Inc. to present totally 13 papers, whose main contents dealt with precision forging simulations and analyses for special process with die deformation duly considered.

Table 1. List of papers at the 2016 Spring Conference of KSTP presented by AFDEX Development Team

	2016 Spring conference of Korean Society for Technology of Plasticity
1	Consideration on Accuracy in Forging Simulation
2	Elastoplastic Finite Element Analysis of Axi-symmetric Cold Forging Process with an Elastic Die Deformation
3	Rigid-viscoplastic Finite Element Analysis of Axi-symmetric Hot Forging Process with an Elastic Die Deformation
4	Elastoplastic Finite Element Analysis of a Bevel Gear in consideration of an Elastic Die Deformation
5	Rigid-Plastic Finite Element Analysis of Hot Forging Process in a Crankshaft with an Elastic Die Deformation
6	An Analytic Review on the AFDEX spring-back capability
7	Finite Element Modeling of a Hot Aluminum Roll Forging Process with Emphasis on the Grip Role and its Application
8	Elastoplastic Finite Element Modeling of an Ultrasonic Surface Rolling Process under the Plane Strain Condition
9	Analysis of the fixed Scroll Die Forging Process in consideration of the Elastic Die Deformation
10	Finite Element Prediction of Die Temperature Change in the Long Material Drawing
11	Finite Element Analysis of a Porthole Extrusion Process with an Elastic Die Deformation
12	Optimization of Initial Blank Shape in an Elliptic Multi-stage Deep Drawing for Formability Improvement
13	A Study on the U-cup Friction Characteristics under Servo Motions

2.2 SIMTOS 2016 exhibition

MFRC has joined as an exhibitor the 2016 SIMTOS held at KINTEX through April 13th to 17th in Korea. This year SIMTOS firstly opened a special section arena for manufacturers' engineering software in the form of station booth. Organizers of the SIMTOS closely supported each exhibitor in making its specific PR activities and successful displays on official tech magazines and the SIMTOS homepage without difficulty.

The booth of MFRC Inc. visited many people from forging industry, relevant CAE engineers and manufacturing-side professors. People from UPVIET, especially, have dropped by the booth, leading later to the partnership contract between two companies. The new business relationship setup may as well reveal a soaring increase of interest in the field of forging industry in Vietnam.

2.3 Exhibition of AFDEX at Hannover Messe 2016

Dispatched were Dr. Jangho Lee, Dr. Suk-Hwan Chung and Dr. Jaegun Eom to Hannover Messe 2016 from April 24th to 29th, held in Germany in order to join the Messe as an exhibitor, while AFDEX has strenuously tried to strengthen its global market position and

strategic caliber since the historic APA join with Altair Eng. in November last year. Through the event AFDEX has secured several noteworthy chances of market promotion so that it made crucial contacts with more than 80 forging companies from the European countries like Germany, Italy and Turkey, and also MFRC could make its business cooperation tie with Altair Europe more solid than ever. There were also strategic business meetings in the middle of the Messe for the EU region between Altair Germany and MFRC, and several consultative meetings were also made with companies and research institutes in the region including the "L" company, one of the prevailing German forging companies. AFDEX additionally had some meaningful talks with university students who continuously visited the booth in search of attractive job openings, one of whom is currently under an official recruiting process.

2.4 Presentation at PLM Conference

On May 25th Dr. Man-Soo Joun, president of MFRC, had a presentation opportunity at PLM (Product Lifecycle Management) Conference on the subject of the state-of-art forging technology. Regarding the arena of Manufacturing Engineering which attracts these days far less interest from university researchers and students compared to other industrial sectors, he has stressed out the importance of Engineering software, especially about the cruciality of systematic R&D establishment for the purpose of building up an everlasting and future-oriented R&D formation with software companies at the hierarchical apex.

The event was meanwhile supervised by KOAMI (Korea Association of Machinery Industry) and KSMIA (Korea Smart Manufacturing Industry Association) with CAD & Graphics and SCDE (Society for Computational Design and Engineering) as its organizers.

2.5 MFCAE 2016 (Users Conference)

MFCAE 2016 will be held at Ramada Plaza Hotel in Jeju Island, Korea for two days spanning from Aug. 18th to19th, which is the formal name of the AFDEX users conference. The conference is supposed to introduce new functions embedded in the new version of AFDEX whose details are to be explained separately by way of posters to the interested participants. Orally presented subjects are principally followed by poster presentations again, through which vigorous technology interchanges are widely anticipated. Moreover a special presentation on the forging industry in Korea, China and Japan will be given, while the parameter optimization in forging processes based on AFDEX and HyperStudy is currently under preparation. And selected student teams in GISPAM 2016 from Mexico are also to

present their applicative projects passionately researched in the GISPAM course.

Note that we are putting no restrictive barriers on the presentation language even though the conference is an international event. Speakers may give presentations either in their mother tongue or in English when preferred, while translation services are available during the course of presentation when needed. In the poster session, especially, a bunch of translators will be there to foster international cooperations as much as possible. For timetable and conference details you are encouraged to visit our website www.afdex.com.

3. International and domestic cooperation

3.1 Co-work with CODESE Co. for enhanced pre- and post-processor

While most users tend to utilize AFDEX quite conveniently these days, advanced users and special process engineers are not rarely witnessed to compose the input file by direct manipulation of those higher level of options based on the Windows's notepad. Our past experience in developing proper pre- and post-processors, which later amount to a productive usage of such expert options, indicate that current ways of processor development turns out to be not enough. And MFRC has come to a final cooperation contract in March for the applicative works based on computer graphics technology with the company of CODESE.

It is known to be a developer company of tools for pre- and post-processors including Vacoframe, a software development tool kit, furtherly extended to GUI development experiences. MFRC now anticipates that such fortified pre- and post-processor and new resulting functional addition will meet user's needs more fruitfully and swiftly.

3.2 Agents in India and Vietnam: KRATOS, UPVIET

At the later part of March MFRC has finally made distributorship agreements with KRATOS Engineering Ltd. in India and UPVIET Co. in Vietnam. The former company KRATOS Eng. is well noted for its previous successful introduction of MOLDEX 3D into Indian market, dealing currently with the software of MSC software, Core Technologies, Delcam and PTC, etc. Meanwhile the latter UPVIET has mainly distributed the software of MAGMA, and extended the business up to the area of HyperWorks and Mento Graphics (E-CAD) in Vietnamese market.

3.3 Workshop in Iran

Mr. M. Irani, professor of an Iranian university and currently enrolled as Ph.D. candidate at GNU, has recently opened a two days long training class for forging simulation technology titled "Learn how to use AFDEX for metal forming simulation" where 18 Iranian engineers in the region are reportedly participated.

3.4 AFDEX launch event for KRATOS Eng. in India

AFDEX launch events for Indian market will be held in several places including the area of Pune, India from Jul. 18th to 24th, as 4 MFRC people accompanied by Dr. M.-S. Joun are supposed to join the momentous launching opportunity, together with supportive business purpose of fortifying the current market power of the Korean companies in India. On the first day there will be a visit to Eaton for a detailed Q&A session, which is the very company MFRC especially worked together at the earlier stage of Altair APA program to India, while the following days will be also packed in by strategically planned launch events by KRATOS Eng. and MFRC together.

3.5 A visit to partner company in Vietnam and cooperative works

On the way to UPVIET Co. in Vietnam, Mr. Seungwon Jeong, researcher at MFRC, delivered an educational session for technicians at the agent company of UPVIET focused more on how to use AFDEX. He also visited a Vietnamese forging company in order to introduce them AFDEX and how well it might be operated in a detailed fashion. It is quite notable that several applications to their processes have revealed the superiority of AFDEX's simulation results. For the time to come an energetic business activity is greatly expected from UPVIET Co. in Vietnamese market.

3.6 Educational events held in China

In the Altair rollout events held from April through May nationwide in China, which comprised the major cities of Shanghai, Changsha, Beijing, Xian, and Shenzhen, MFRC and its Chinese business partner BRIMET have joined together in broadly presenting AFDEX in the land of the biggest forging market.

In the meantime the event of AFDEX users meeting was also held on April 19th at Shanghai Holiday Inn Hotel, where more than 50 technicians, engineers and potential users attended as seen in the picture. Prior to the meeting mentioned above the AFDEX delegate including Dr. M.-S. Joun visited BRIMET to check the status of on-going cooperative research topics for micro-structural prediction, additionally hosting a seminar in Yanshan University in Qinhuangdao city, which soon led to the mutual R&D collaboration agreement on the field of rolling process. MFRC also visited several companies in the region from the industrial sectors of forging, sheet metal forming and forging equipment, which were kindly introduced by BRIMET.

3.7 Cooperative talks with JSOL

The day of March 26th has specifically observed that the two companies of MFRC and JSOL, AFDEX's strategic partner in Japan have met in Seoul to hold a policy review session for user supportive issues in the market. They have ardently discussed to produce the most reasonable ways of AFDEX version management, resulting in the agreement of sharing JSOL's precedent experience in the relevant matters so that more systematic customer support activities might be tangible in near future.

3.8 A monumental visit to Altair Headquarters

Dr. M.-S. Joun and Dr. Suk-Hwan Chung have paid an official visit to Altair Headquarters in the vicinity of Detroit in the States for the purpose of discussing those collaborative matters between two companies in near future, producing very positive evaluation on the current cooperative ways of doing together with a hilarious agreement about one level higher collaboration relationship. The business cooperation between MFRC and Altair is also expected to yield multi-facetted fruitful accomplishments, continuing from the second part of this year to ultimately reveal its totally different services at the third quarter in 2017.

3.9 AFDEX's analytic results to be shared with others

To successfully meet various requests raised by advanced engineers a number of works are currently under way, which may connect AFDEX with other software respectively dealing with their own expertise of welding, optimization and life expectancy prediction. It is mainly directed toward the works which enable users to easily use the file of AFDEX-based results in the atmosphere of other software. Printing out the AFDEX results in the form of data structure other software inherently requires may constitute one of the ways for this purpose, while sharing the data format in which AFDEX usually produces its output amounts to be another candidate way of matching the demands.

3.10 Educations for Mexican and ASEAN university students

This summer MFRC operates an international education program of GISPAM 2016 for five weeks stretching from Jul. 18th to Aug. 20th in which 20 Mexican university students will be involved in the subjects of mechanics, CAD and Korean made 3 engineering software of AFDEX, MAPS-3D and RecurDyn.

The program of GISPAM originally started three years ago to meet the requests by the State of Mexico in Mexico in order to educate the Mexican students solely based on the software of AFDEX at that time, nowadays extended further to those three Korean made softwares of which developers are eagerly struggling to expand their market to the foreign countries. The GISPAM program has been financially fully supported from the starting year 2014 by the State of Mexico. The participating Mexican students are all known to be very qualified top 5% students, and the course is to be offered in English, while previously selected GNU Korean students and AFDEX users are supposed to join those Mexican students.

In the meantime 24 Asian students whose academic background is Mechanical Engineering are also to be educated in the special course offered by GNU for six weeks starting from July 3rd. Core contents to be introduced in the course are all directed towards the engineering software developed purely in Korea.

4. Job opportunity: new and career recruit

MFRC is currently searching for 3 to 4 engineers with their majors in Mechanical, Material, and Computational Engineering fields on a provisional basis throughout the year. A due preference is given to the Ph.D. or Master holders in the relevant engineering fields, while an expertise in foreign languages (English, Japanese or Chinese) are also preferred. Be aware that non-majors who can advance international webinar meetings at their own discretions are equally eligible to apply, as long as they intend to continue their studies in the graduate course as part-timers in Mechanical or Material engineering department. Applicants are expected to work in Pangyo, Jinju and other desirable areas in duty of R&D, technical support domestic and abroad, or cooperation assistances in global partner business such as in Altair Eng.