2019

iddrg

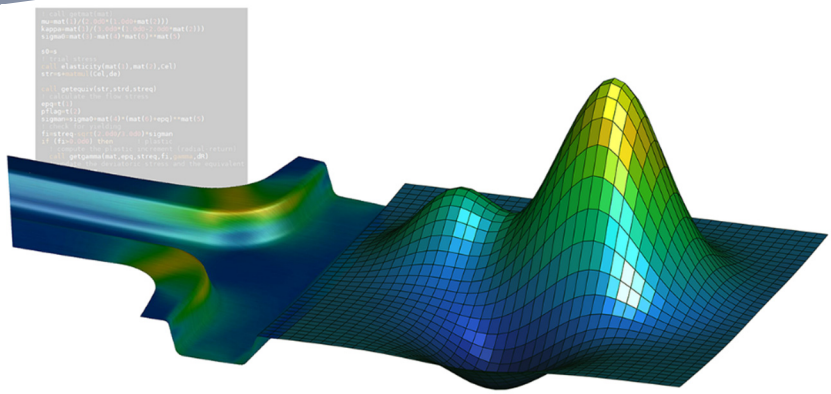
ENSCHEDE – THE NETHERLANDS

3-7 June 2019

38th International Deep Drawing Research Group Conference

Forming 4.0: Big Data – Smart Solutions

Enschede, the Netherlands



UNIVERSITY OF TWENTE.

TATA STEEL

International Deep Drawing Research Group annual conference 2019 will be held in Enschede, The Netherlands. It is co-organized by the University of Twente and Tata Steel Europe and as such reflects the strong bonds between academia and industry represented by this conference series.

All engineering aspects of sheet metal forming are included, such as behavior of workpiece materials, formability, tools, tribology, process robustness, simulation methods and experiments. Apart from the general topics, the theme of IDDRG 2019 is *Forming 4.0: Big Data, Smart Solutions* and contributions in this field are actively solicited.

At the IDDRG, the leading sheet metal specialists and researchers from all over the world gather for fruitful discussions on challenging technical topics in forming technology.

The conference is designed to provide an inspiring environment for knowledge development, discussions and interactions.

Conference chairs:
Ton van den Boogaard, University of Twente
Nico Langerak, Tata Steel Europe

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van Tyne, C.	USA
Volk, W.	Germany
Worswick, M.	Canada
Yoon, J.	Australia
Yoshida, F.	Japan
Zhang, S.H.	China

Campus map

The conference will be organised at the campus of the University of Twente. The main conference venue is the Waaier. The venue is at a walking distance from the U-Park hotel and hotel De Broeierd.

Conference venue

Route to campus of the University of Twente:

Drienerlolaan 5, 7522NB Enschede, The Netherlands

Busses to the campus depart from the following railway stations:

- Enschede Centraal:
  - Line 1, direction “Universiteit Twente”
  - Line 8, direction Hengelo-Noord
  - Line 9, direction Hengelo
- Hengelo Centraal:
  - Line 9, direction Enschede
- Enschede Kennispark:
  - Line 1, direction “Universiteit Twente”

Station Enschede Kennispark is located at 15 minutes walking distance from the campus. The bus stops **“Westerbegraafplaats/ UT”**, **“UT/ De Zul”** and **“UT/ Hallenweg”** are located at walking distance from the conference venue and U-Park hotel.

To plan your journey, visit www.9292.nl/en or use Google Maps.

Public transport in the Netherlands:

Train travel

Two different train companies are active around Enschede, being NS and Blauwnet. NS operates the nationwide network, whereas Blauwnet operates the most frequent trains in the Enschede Area. You can either purchase a separate ticket for each journey at the train station to travel with a specific company or purchase an anonymous public transport chip card which allows travelling with all public transport companies. Before travelling you need to check in with your chip card or ticket at a pole on the station and check out before you leave the station. Make sure you check in and out at a pole of the same company: a yellow one when travelling with NS and a blue one when travelling with Blauwnet. When transferring to a different company, make sure to check out first at the company you travelled with and then check in at the company you are continuing with.

Bus travel

In busses, it is possible to buy a single ticket by debit or credit card. Cash payment in busses is not possible. You can also check in using your public transport chip card when entering the bus and check out when you leave the bus again.

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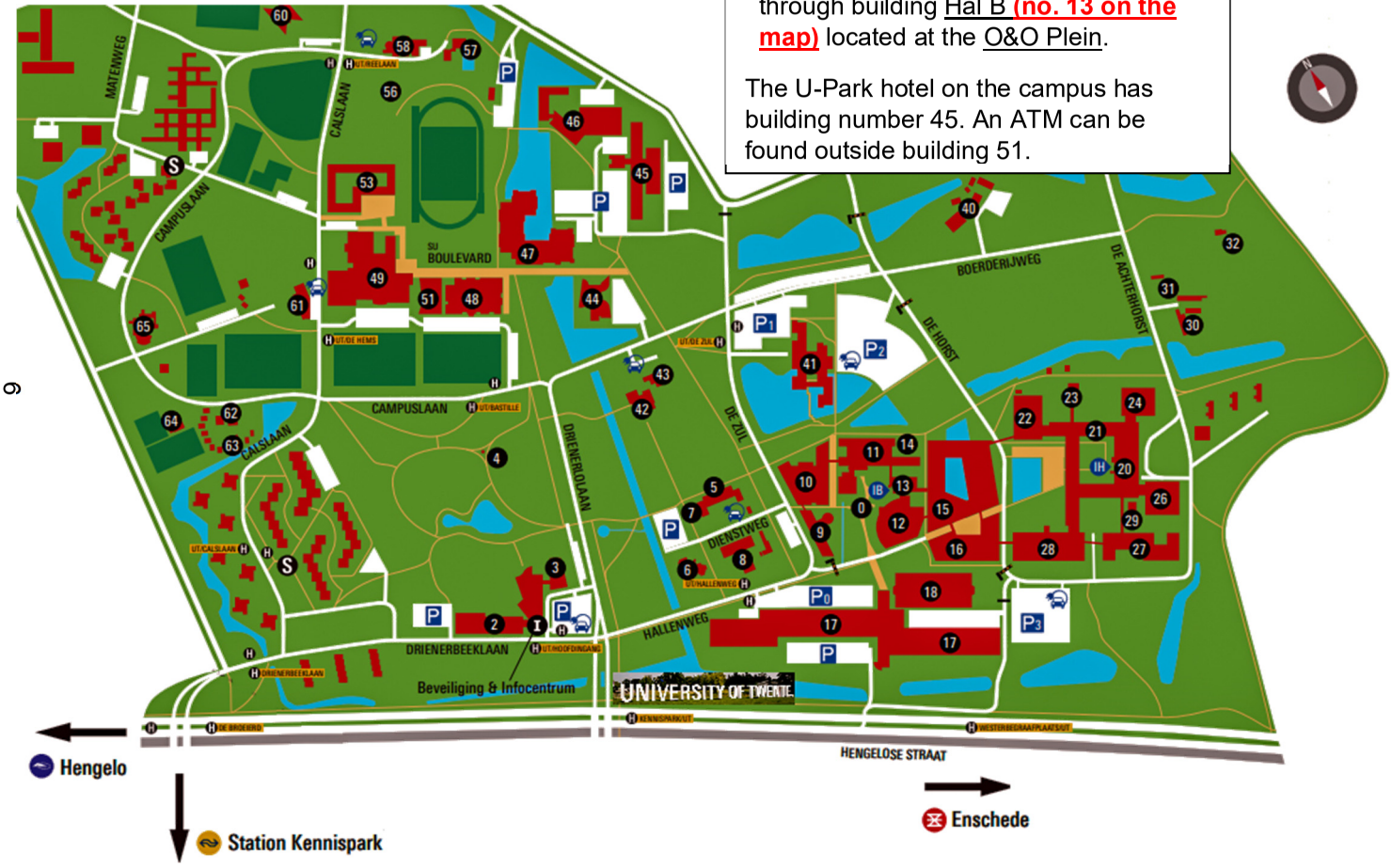
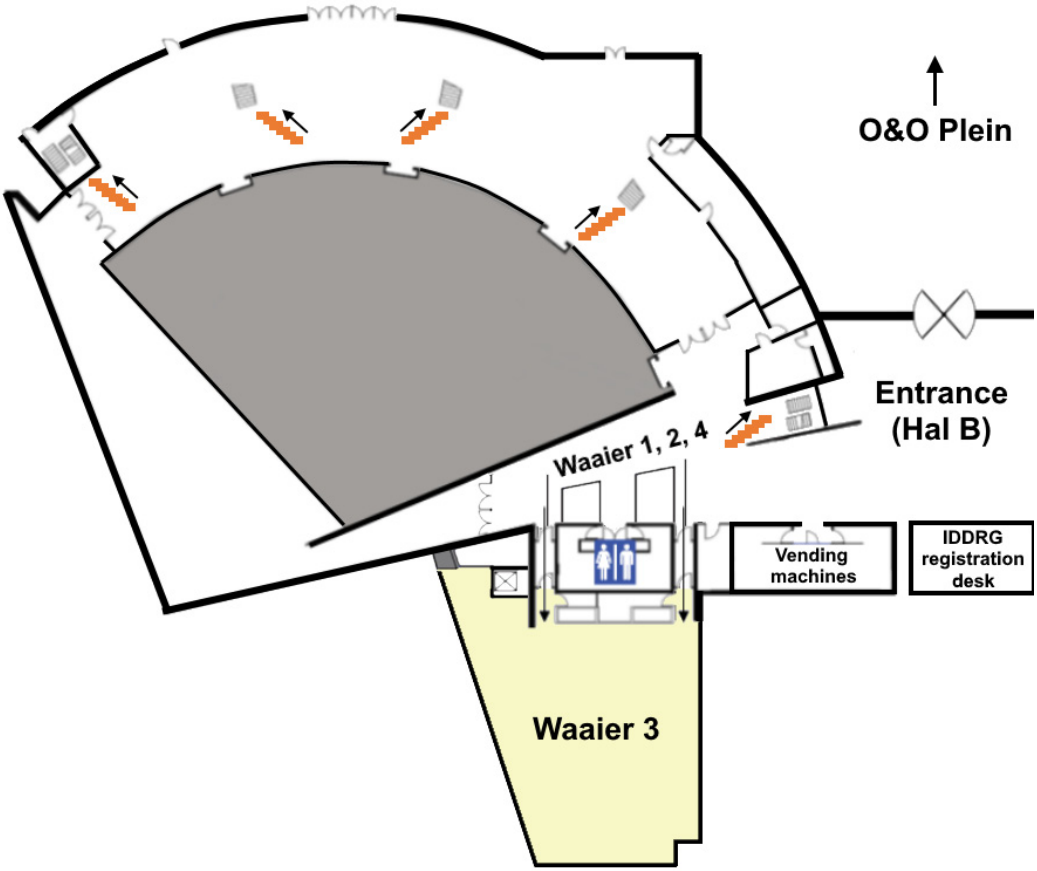
The conference venue De Waaier **(no. 12 on the map)** can be entered through building Hal B **(no. 13 on the map)** located at the O&O Plein.

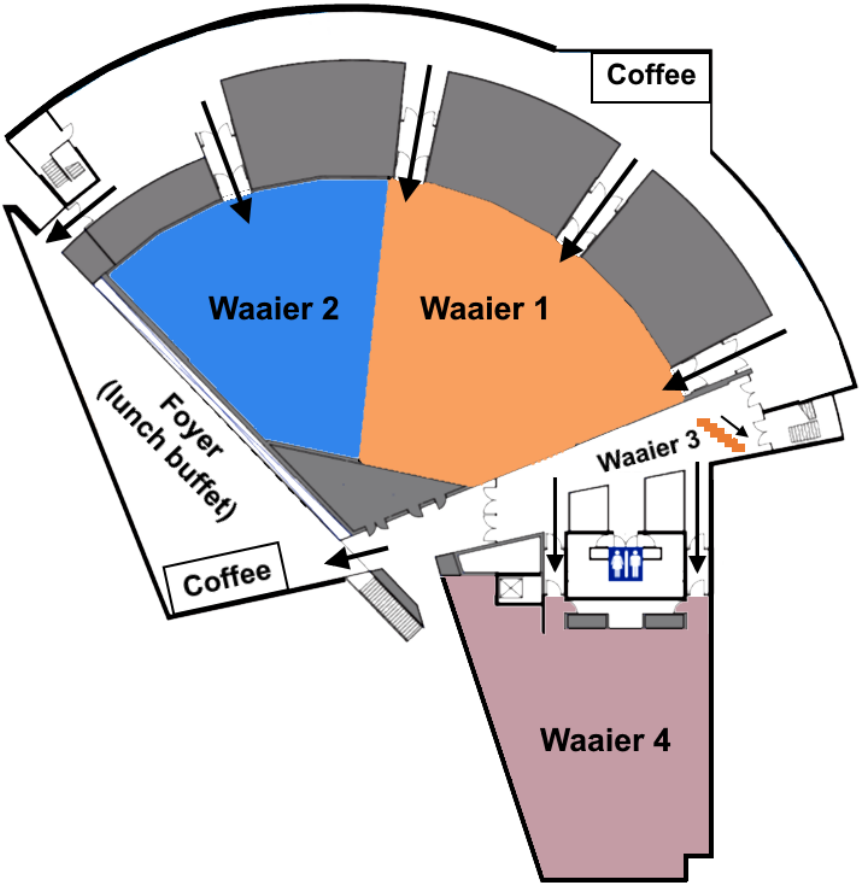
The U-Park hotel on the campus has building number 45. An ATM can be found outside building 51.



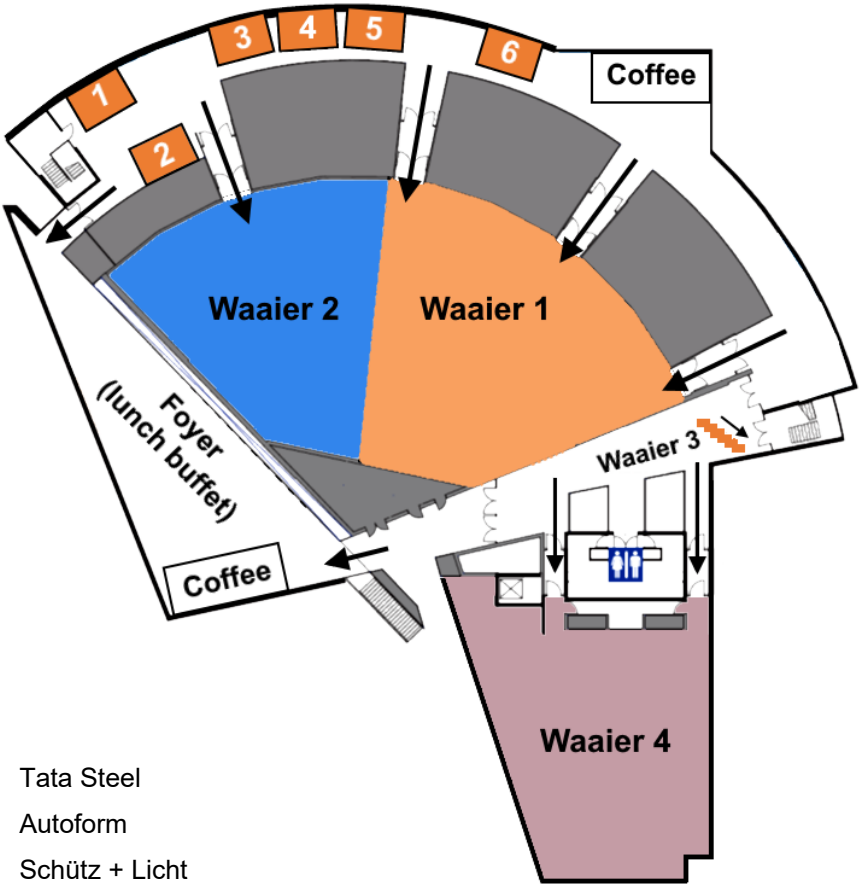
Waaier ground floor



Waaier first floor



Exhibition map



1 Tata Steel

2 Autoform

3 Schütz + Licht

4 Erichsen

5 Data M

6 AP&T

The conference banquet will be at the beautiful country estate “De Bloemenbeek”.

Landhuishotel & Restaurant
De Bloemenbeek

Beuningerstraat 6
7587 LD
De Lutte

Landhuishotel De Bloemenbeek is located along the meandering Bloemenbeek creek in the middle of the Dinkeldal river valley close to the village De Lutte. It is situated in the region of Twente, which is regarded as the Estate of the Netherlands. The rich natural environment of the countryside of Twente is known for its authentic cultural heritage, such as castles and manors. The region offers woodlands with babbling brooks, exceptional hillside views, heathlands with sheep, picturesque villages and much more. Twente is known for the peace and quiet in its beautiful natural surroundings.

The transfer from the conference venue to the banquet will be by bus.

The bus stop is located between campus buildings “Citadel” and “Ravelijn”. The transfer busses will leave from 18:00.

You can find the location of the bus stop and the route to it in the map shown to the left. After the dinner, you will be transferred back to your hotel by bus.

Technical tour: TATA Steel

The technical tour to Tata Steel, IJmuiden, includes a visit to the innovation centre and one of the production plants. Tata Steel is one of the world's most geographically diversified steel producers, with operations in 26 countries and commercial offices in over 35 countries. It serves many demanding markets worldwide, including construction and infrastructure, automotive, packaging and engineering, and understands that customer needs are different in each market. For automotive, Tata Steel offers multiple steel products ranging from strip to tube and tailor welded blanks to advanced automotive steels. For packaging, Tata Steel makes specialist steels designed for food and drinks cans, aerosols, paint tins, luxury packaging and more.

Program:

08:00 – 10:30	Bus trip, Enschede - IJmuiden
10:30 – 15:00	Visit Tata Steel including Lunch
15:00 – 15:45	Optional drop-off at Schiphol airport
16:00 – 18:30	Bus trip, Schiphol airport – Enschede

Technical tour: Voestalpine

The technical tour to Voestalpine Automotive in Amersfoort includes a visit to the press shop. Voestalpine Automotive Components Bunschoten is both a competence center and production location of high-quality Class A exposed panels for the automotive industry.

Program:

08:30 – 10:00	Bus trip, Enschede - Amersfoort
10:00 – 12:30	Visit Voestalpine including Lunch in the bus
12:30 – 13:00	Optional drop-off at Amersfoort train station for Schiphol Airport
13:00 – 14:30	Bus trip, Amersfoort – Enschede

The busses for the technical tours leave between the campus buildings “Citadel” and “Ravelijn”. This location is identical to that of the bus stop for the transfer to the conference banquet. You can find the stop on the map on page 10.

Registration and information desk opening hours

The registration desk will be open during the following hours:

Monday,	June 3	U-Park Hotel	14:00	-	20:00
Tuesday,	June 4	Waaier	08:00	-	17:45
Wednesday,	June 5	Waaier	08:30	-	18:00
Thursday,	June 6	Waaier	08:30	-	16:45

The U-Park Hotel (building 45) and Waaier (building 12) can be found on the campus maps on page 6.

The presenter preparation room desk will be available throughout the conference.

Internet access

On the campus, you can use the free internet service that is provided for visitors. Select the WLAN network "**Enschede Stad van nu**" and follow the instructions on the screen to get connected to the internet.

Smoking policy

It is not permitted to smoke in any building at the university. There are designated smoking areas outside the buildings. We kindly request delegates to keep these areas free of litter. The smoking ban applies to all restaurants, bars, cafes and public venues in the Netherlands.

In case of emergency:
Contact the alarm number of the security department of the University of Twente at **+31 53 489 22 22** or inform one of the members of the local organisation committee. Outside the campus, you can call the nationwide alarm number **112**.

The presentations are organized in 4 parallel sessions on Tuesday and 3 parallel sessions on Wednesday and Thursday in rooms Waaier 1, 2, 3 & 4. Please note that Waaier 3 is located at the ground floor next to the IDDRG registration desk.

Keynotes will be addressed at Waaier 1.

Monday, 3 June

Time	Activity	Location
14:00 - 18:00	Registration	U Park Hotel
18:00 - 20:00	Welcome reception	

Tuesday, 4 June

Time	Activity	Location
8:15-8:40	Registration at conference venue	Waaier reception
8:40-9:10	Opening by conference chair	Waaier 1
9:10-9:50	**Keynote:** Prof. Brad Kinsey (University of New Hampshire) Beyond simply shaping: Forming 4.0 to control product properties.	

Time	Activity	Location
10:05-11:20	**Constitutive modeling** *Chair: Miklós Tisza*	Waaier 1
10:05-10:30	Multi-coefficient optimization of homogeneous anisotropic hardening model for AHSS ***Shin-yeong Lee**, Jin-Hwan Kim and Frédéric Barlat*	
10:30-10:55	Descriptions of stress-strain responses of non-linear unloading and closure of stress-strain hysteresis loop based on the Yoshida-Uemori model ***Fusahito Yoshida***	
10:55-11:20	Effect of kinematic hardening on the yield surface evolution after strain-path change ***Yanfeng Yang**, Cyrille Baudouin and Tudor Balan*	
	Characterization *Chair: Celalettin Karadogan*	Waaier 2
10:05-10:30	Non-linear strain path experiment and modeling for very high strength material ***Minsu Wi**, S Y Lee and Frédéric Barlat*	
10:30-10:55	Improved bendability characterization of UHSS sheets ***Leopold Wagner**, Hermann Schauer, Heinrich Pauli and Josef Hinterdorfer*	
10:55-11:20	Investigation of non-proportional load paths by using a cruciform specimen in a conventional Nakajima test ***Roman Norz** and Wolfram Volk*	
	Machine Learning & Big data *Chair: Christian Koroschetz*	Waaier 3
10:05-10:30	Computationally efficient necking prediction using neural networks trained on virtual test data ***Lars Greve**, B Schneider, M Andres, J D Martinez, T Eller, B v d Weg, J Hazrati, A H v d Boogaard*	
10:30-10:55	Predictive Analysis from numerical and experimental data in press hardening ***Lars Penter**, Patrick Link, Steffen Ihlenfeldt, Anke Stoll and André Albert*	
10:55-11:20	Towards neural network models for describing the large deformation behavior of sheet metal ***Maysam Gorji Bandpay** and Dirk Mohr*	
	Edge formability *Chair: Eisso Atzema*	Waaier 4
10:05-10:30	Modelling the surface roughness influence on the hole expansion ratio of multiphase steel ***Sebastian Münstermann**, Peerapon Wechsuwanmanee and Junhe Lian*	
10:30-10:55	Effect of pre-strain on stretch flange deformation limit of steel sheets ***Eiji Iizuka**, Kazuhiko Higai and Yuji Yamasaki*	

	10:55-11:20	The effect of microalloying on the sheared edge ductility of ferritic steels ***Jaakko Hannula**, Antti Kaijalainen, David Porter, Vili Kesti and Jukka Kömi*	Waaier 4
11:20-11:50		Coffee break	
11:50-12:40		**Constitutive modeling** *Chair: Ton van den Boogaard*	Waaier 1
	11:50-12:15	Constitutive model parameter identification via full-field calibration ***Christian Ilg**, André Haufe, Katharina Witowski, David Koch and P Roehl Suanno*	
	12:15-12:40	A new approach for advanced plasticity and fracture modelling ***Namsu Park**, Thomas B. Stoughton and Jeong Whan Yoon*	
		Springback *Chair: Bart Carleer*	Waaier 2
	11:50-12:15	Springback characteristics of a martensitic steel for warm U-shape bending: Experiments and FE simulation ***Yuhao Sun**, Zhaoheng Cai, Denis Politis, Xi Luan, Guang Chen and Liliang Wang*	
	12:15-12:40	Spring-Back Analysis Method Considering the Die Deformation Due to the Stamping Pressure of the Ultra-High Strength Steel ***Gihyun Bae** and Junghan Song*	
		Machine Learning & Big data *Chair: Lars Greve*	Waaier 3
	11:50-12:15	Prediction of forming limit diagrams using machine learning *Vishwanath Hegadekatte and **Fatih Sen***	
	12:15-12:40	Blockchain for forming technology – tamper-proof exchange of production data ***Philipp Frey**, Michael Lechner, Thilo Bauer, Tatyana Shubina, Antonia Yassin, Simon Wituschek, Maximilian Virkus, Marion Merklein*	
		Edge formability *Chair: Sergey Golovashchenko*	Waaier 4
	11:50-12:15	The effects of shear affected zone on edge crack sensitivity in dual-phase steels ***Niloufar Habibi**, Thorsten Beier, Helmut Richter, Markus Könemann and Sebastian Münstermann*	
	12:15-12:40	Comprehensive understanding of effective parameters on edge cracking sensitivity of hot-rolled complex phase steels ***Jorge Goncalves**, Samaneh Alibeigi and Sujay Sarkar*	
12:40-14:00		Lunch	

Time		Activity	Location
14:00-14:40		**Keynote:** Dr. Christian Koroschetz (AP&T) How digitalization influences sheet metal forming production solutions and its industry	Waaier 1
14:45-16:00		**Crystal plasticity** *Chair: Semih Perdahcioglu*	Waaier 1
	14:45-15:10	Prediction of mechanical behaviour of an ultra-thin sheet metal under non-proportional loading using a CP model ***Hyuk Jong Bong**, Jinwoo Lee and Myoung-Gyu Lee*	
	15:10-15:35	Crystal plasticity based predictions of mechanical properties from heterogeneous steel microstructures ***Piet Kok**, Wil Spanjer, Frank Korver, Yuguo An and Maxim Aarnts*	
	15:35-16:00	Parameter identification of 3D yield functions based on a virtual material testing procedure *Alexander Butz, **Alexander Wessel** and Dirk Helm*	
		Characterization *Chair: Brandon Hance*	Waaier 2
	14:45-15:10	Prediction of residual stresses in biaxial stretching of tailor welded blanks by finite element analysis ***Amit Kumar**, D Ravi Kumar, Vijay Gautam*	
	15:10-15:35	Evaluation of the stress vs strain curve using a high temperature bulge test device ***Adrien Boyer**, Hervé Laurent and Marta Oliveira*	
	15:35-16:00	Forming simulation for TWIP steel ***Marco Goesling** and Thomas Thülig*	
		Tool design *Chair: Nader Asnafi*	Waaier 3
	14:45-15:10	Optimization of forming machine stiffness for increased production accuracy ***Karel Ráž**, Milan Čechura*	
	15:10-15:35	Virtual die spotting: Compensation of elastic behavior of forming presses ***Fabian Zgoll**, Srinath Kuruva, Tobias Goetze and Wolfram Volk*	
	15:35-16:00	Modelling of dynamic loads during series operation for optimisation of part holder design ***Maximilian Burkart**, Mathias Liewald and Johannes Wied*	
		Local formability *Chair: Pierre Yves Manach*	Waaier 4
	14:45-15:10	Local formability of AHSS: Measurement technique, specimen types and robustness ***Martin Gruenbaum**, Goekce Aydin, Thomas Dettinger and Sebastian Heibel*	
	15:10-15:35	Fracture toughness measurements to understand local ductility of advanced high strength steels ***David Frómeta**, Antoni Lara, Begoña Casas and Daniel Casellas*	
	15:35-16:00	Local ductility – key parameter for predicting formability of AHSS ***Sebastian Westhäuser**, Matthias Schneider, Matti Teschner and Ingwer Denks*	

16:00-16:30		Coffee break	
16:30-17:45	**Simulation of Forming Processes** *Chair: Paulo Martins*		Waaier 1
	16:30-16:55	Bridging the gap between engineering and tryout of sheet metal forming parts by a smart solution ***Michael Stippak**, Bart Carleer*	
	16:55-17:20	Accurate sheet metal forming modeling for cost effective automotive part production ***Toni Chezan**, Tushar Khandeparkar, Carel ten Horn and Mats Sigvant*	
	17:20-17:45	Augmented Reality for Forming Technology – Visualisation of Simulation Results and Component Measurement *Michael Lechner, **Robert Schulte** and Marion Merklein*	
	Characterization *Chair: Bert Geijselaers*		Waaier 2
	16:30-16:55	Aging behavior of ultra-fine grained AA 6061 alloy subjected to constrained groove pressing followed by cold rolling ***Kandarp Changela**, Sunil Kumar, K. Hariharan and D. Ravi Kumar*	
	16:55-17:20	Experimental study on the mechanical properties of 7xxx aluminium alloy sheet under different heat treatment conditions ***Yumi Choi**, Chanmi Moon and Myoung-Gyu Lee*	
	17:20-17:45	Die quench process sensitivity of AA7050 ***Raphael Boulis** and Michael Worswick*	
	Tool design *Chair: Eneko Saenz de Argandoña*		Waaier 3
	16:30-16:55	Design and Validation of 3D-Printed Tools for Stamping of DP600 ***Nader Asnafi**, Jukka Rajalampi and David Aspenberg*	
	16:55-17:20	Digital process support in toolmaking by using optical metrology ***Peter Essig**, Mathias Liewald, Christian Bolay and Thomas Schubert*	
	17:20-17:45	Improved Spring-Back Compensation Strategy through Location Optimized Part Position in the Dies ***Arndt Birkert**, Benjamin Hartmann, Felix Lepple, Markus Straub and Philipp Zimmermann*	
	Formability *Chair: Chester van Tyne*		Waaier 4
	16:30-16:55	Effect of material structure on trimming and sheared edge stretchability of 6xxx aluminum alloys ***Sergey Golovashchenko**, Natalia Reinberg, Nan Wang and Quochung Le*	
	16:55-17:20	Numerical simulation of hydraulic bulging using uniaxial and biaxial flow curves and different yield criteria ***Ved Prakash**, D. Ravi Kumar, Marion Merklein and Hinnerk Hagenah*	
	17:20-17:45	Warm forming characteristics of aa7050-t6 ***Hossein Pishyar** and Michael Worswick*	

Time		Activity	Location
8:30-9:10		**Keynote:** Prof. Paulo Martins (Técnico Lisboa) Joining by Forming,	Waaier 1
9:15-10:30		**Active process control** *Chair: Pavel Hora*	Waaier 1
	9:15-9:40	Control of the servo-press in stamping considering the variation of the incoming material properties ***Hyunok Kim**, Jiahui C. Gu, and Laura Zoller*	
	9:40-10:05	Part-to-Part Model Predictive Control - using a modified Gauss-Newton scheme. ***Benny Endelt***	
	10:05-10:30	Part to part control for deep drawing processes ***Jörg Heingärtner**, Pascal Fischer, David Harsch, Yasar Renkci, Matthäus Kott, Mark Veldhuis, Dirk Hortig, Pavel Hora*	
		Characterization *Chair: Patrick Duroux*	Waaier 2
	9:15-9:40	Material characterization of high strength sound-deadening sheets and its application on a square cup drawing simulation *Hyeonil Park, Se-Jong Kim, Jinwoo Lee, **Daeyong Kim***	
	9:40-10:05	Forming behaviour of stainless steel sheets at different material thicknesses ***Annegret Lehmberg**, Christina Sunderkoetter, Thorsten Glaesner and Heinz-Guenter Brokmeier*	
	10:05-10:30	The influence of residual stresses induced by near-net-shape blanking processes on the fatigue behavior under bending loads ***Jens Stahl**, Daniel Müller, Isabella Pätzold, Roland Golle, Thomas Tobie, Wolfram Volk and Karsten Stahl*	
		Formability *Chair: Fatih Sen*	Waaier 4
	9:15-9:40	Effect of novel impact hydroforming technology on the formability of Al alloys ***Yong Xu**, Ali Abd El-Aty, Shihong Zhang, Yan Ma and Dayoung Chen*	
	9:40-10:05	Enhancement of fracture forming limit by crystallographic texture reformation of AA1050 sheets in Single Point Incremental Forming ***Parnika Shrivastava** and Puneet Tandon*	
	10:05-10:30	Formability study on stamping an engine hood with aluminum alloy sheet ***Fuh-Kuo Chen** and Chien-Wei Lin*	
10:30-11:00		Coffee break	

11:00-12:40	**Active process control** *Chair: Mathias Liewald*		Waaier 1
	11:00-11:25	Digital Twin models for an optimal design and control of a conditionally robust sheet metal forming process ***David Harsch**, J. Heingärtner, Y. Renkci and P. Hora*	
	11:25-11:50	Feedback control of laser forming using flattening simulations for error determination ***Anders Thomsen**, Benny Endelt and Morten Kristiansen*	
	11:50-12:15	A knowledge-based surrogate modeling approach for cup drawing with limited data *Lukas Morand, Dirk Helm, Rodrigo Iza-Teran and Jochen Garcke, **Alexander Butz***	
	12:15-12:40	Bayesian Model-based State Estimation for Mass Production Metal Forming ***Jos Havinga**, Ton van den Boogaard and Pranab Mandal*	
	Processes *Chair: Myoung-Gyu Lee*		Waaier 2
	11:00-11:25	Analysis of material behaviour and shape defect compensation in the flexible roll forming of advanced high strength steel ***Sadegh Ghanei**, Buddhika Abeyrathna, Bernard Rolfe and Matthias Weiss*	
	11:25-11:50	Novel roll stand for flexible profile bending ***Juri Martschin**, Rickmer Meya, Christian Löbbe and A. Erman Tekkaya*	
	11:50-12:15	Parameter measurement and conductive heating during press hardening by hot metal gas forming *Mirko Bach, Lars Degenkolb, Franz Reuther, **Verena Psyk**, Reinhard Mauermann and Markus Werner*	
	12:15-12:40	AA1100-O cylindrical cup-drawing using 3D servo-press *Jinjin Ha, Alexander Breunig, Johnathon Fones, Florian Hoppe, Yannis P. Korkolis, Peter Groche and **Brad L. Kinsey***	
	Formability *Chair: Sandrine Thuillier*		Waaier 4
	11:00-11:25	On the way towards a comprehensive failure modelling for industrial sheet metal stamping processes ***Niko Manopulo** and Bart Carleer*	
	11:25-11:50	Determining a threshold Strain Nonuniformity Index (SNI) to predict failure in sheet metal components ***Prashant Date**, Pratik Kulkarni and Kartik Jamadar*	
	11:50-12:15	On the failure prediction of dual-phase steel and aluminium alloys exposed to combined tension and bending ***Alexander Barlo**, Mats Sigvant and Benny Endelt*	
	12:15-12:40	Investigation of crack prediction method using limiting surface strain in high-strength steel sheets ***Toyohisa Shinmiya**, Yusuke Fujii, Yuji Yamasaki and Yoshikiyo Tamai*	
12:40-14:00	Lunch		

Time		Activity	Location
14:00-14:40		**Keynote:** Dr. Menno van der Winden (TATA Steel Europe) TATA Steel's journey to advanced analytics at scale.	Waaier 1
14:45-16:00		**Constitutive modeling** *Chair: Wolfram Volk*	Waaier 1
	14:45-15:10	A plane stress yield surface using Bézier curve interpolation in two directions ***Henk Vegter**, Michael Abspoel and Hans Mulder*	
	15:10-15:35	Temperature dependency of material constitutive behaviour: a simple model ***Eisso H Atzema***	
	15:35-16:00	Prediction of flow curves of very thin brass sheets incorporating size effect in hardening model *Dhruv Anand, **D Ravi Kumar***	
		Tribology AI *Chair: Lander Galdos*	Waaier 2
	14:45-15:10	Characterisation of new lubrication systems for hot forming of high strength aluminum alloys ***Nikolaos Rigas**, Julia Degner, Erik Berendt, Friedhelm Junker and Marion Merklein*	
	15:10-15:35	Coating effects on the galling behaviour of aluminium metal forming processes ***Xiao Yang**, Yiran Hu, Yang Zheng, Denis J. Politis, Liliang Wang*	
	15:35-16:00	Assessment of solutions to reduce wear with the warm forming of aluminum ***André Maillard**, Christophe Piat and Yanming Chen*	
		Fracture *Chair: Dirk Mohr*	Waaier 4
	14:45-15:10	Local fracture strain measurement in AHSS uniaxial flat tensile tests considering specimen geometry and fracture morphology ***Patrick Larour**, Leopold Wagner, Andreas Felbinger and Johann Angeli*	
	15:10-15:35	Effects of fracture area measurement method and tension test specimen type on fracture strain values of 980 class AHSS ***Brandon Hance** and Todd Link*	
	15:35-16:00	A robust experimental technique to determine the strain to fracture for plane strain tension ***Christian C. Roth**, Vincent Grolleau and Dirk Mohr*	
16:00-16:30		Coffee break	

16:30-17:45	**Hot/Warm forming Al** *Chair: Zhi Deng*		Waaier 1
	16:30-16:55	Improvement of formability for hot stamping of aluminum alloy sheets by press motion control ***Eiichi Ota**, Yasuhiro Yogo and Noritoshi Iwata*	
	16:55-17:20	Strain rate and temperature dependent plastic response of AA7075 during hot forming *Kedar Pandya, **Christian Roth** and Dirk Mohr*	
	17:20-17:45	Hot Die Forming - Flat (HDF-FAl): An innovative hot forming technology for extreme lightweight in aluminum sheet alloys ***Muhammad Niazi**, Peter Amborn, Edwin Lamers and Jürgen Hirsch*	
	Tribology cold stamping *Chair: Benny Endelt*		Waaier 2
	16:30-16:55	Friction and lubrication in sheet metal forming simulations: Application to the Renault Talisman trunk lid inner part *J. Lacues, C. Pan, J.-C. Franconville, P. Guillot, M. Capellaere, T. Chezan, J. Hol, **J.H. Wiebenga**, A. Souchet, V. Ferragu*	
	16:55-17:20	Pressure and sliding velocity dependent surface asperity based friction model: Application to springback simulation ***Kijung Lee** and Myoung-Gyu Lee*	
	17:20-17:45	Roughness effects in mixed lubrication friction modeling for sheet metal forming applications ***Meghshyam Shisode**, Javad Hazrati, Ton van den Boogaard*	
	Crash *Chair: Christian Roth*		Waaier 4
	16:30-16:55	Characterizing axial crash foldability of AHSS & UHSS sheets by means of L-profile compression tests ***Leopold Wagner**, Patrick Larour, Jan Lackner, Hermann Schauer and Erich Berger*	
	16:55-17:20	Thermomechanical forming and crash simulations *Michael Abspoel, Marc Scholting and **Marcel Lansbergen***	
	17:20-17:45	Influence of single hat crash box flange triggering and impactor top plate welding strategy on axial crash foldability of AHSS & UHSS sheets ***Patrick Larour**, Jan Lackner and Leopold Wagner*	
18:00-18:45		Transfer to Bloemenbeek restaurant	
19:00-22:00		Conference banquet	

Time		Activity	Location
8:30-9:10		**Keynote:** Prof. dr. Dirk Mohr (ETH Zürich) The potential of machine learning based constitutive modeling	Waaier 1
9:15-10:30		**Hot stamping** *Chair: Bernard Rolfe*	Waaier 1
	9:15-9:40	Investigation of the influence of forming parameters on the springback of hot-stamped hat-shaped parts ***Cheng-Kai ChiuHuang**, Shi-Wei Wang and Ping-Kun Lee*	
	9:40-10:05	Hot stamping steel grades with increased tensile strength and ductility - MBW-K 1900, tribond 1200 and tribond 1400 ***Dirk Rosenstock**, Janko Banik, Thomas Gerber and Stefan Myslowicki*	
	10:05-10:30	Formability of AlSi and Zn coating during hot stamping ***Jenny Venema**, Gerben Botman, Tu Phan and Theo Kop*	
		Tribology cold stamping *Chair: Mats Sigvant*	Waaier 2
	9:15-9:40	Influence of varying sheet material properties on dry deep drawing process ***Kim Krachenfels**, Benedict Rothammer, Rong Zhao, Stephan Tremmel and Marion Merklein*	
	9:40-10:05	Sliding characteristics of hot-dip galvanized steel sheets depending on aging time after production ***Katsuya Hoshino**, Yuji Yamasaki and Shoichiro Taira*	
	10:05-10:30	Press formability of newly developed high lubricity hot-dip galvanized steel sheets ***Shinichi Furuya**, Katsuya Hoshino, Yuki Ogihara, Yuji Yamasaki and Shoichiro Taira*	
		Damage/Fracture *Chair: Vincent Grolleau*	Waaier 4
	9:15-9:40	Experimental and numerical analysis of damage and fracture mechanisms in metal sheets under non-proportional loading paths ***Michael Brünig**, Steen Gerke, Moritz Zistl*	
	9:40-10:05	Predicting plasticity and fracture of severe pre-strained EN AW-5182 by Yld2000 yield locus and Hosford-Coulomb fracture model in sheet forming applications ***Alan A. Camberg**, Thomas Tröster, Friedrich Bohner and Jörn Tölle*	
	10:05-10:30	Characterizing damage and fracture of sheet metal materials using large scale test specimen ***Sebastijan Jurendic** and David Anderson*	
10:30-11:00		Coffee break	

11:00-12:40	**Hot stamping** *Chair: Pasi Peura*		Waaier 1
	11:00-11:25	A type of cruciform specimen applied to evaluate forming limits for boron steel under hot stamping conditions ***Ruiqiang Zhang**, Zhutao Shao and Jianguo Lin*	
	11:25-11:50	Prediction of Necking & Thinning Behavior During Hot Stamping Conditions of 22MnB5 Steel *Amarjeet Kumar Singh and **Krishnaiyengar Narasimhan***	
	11:50-12:15	New Multiphase CP and DP 1000 MPa strength level grades for improved performance after hot forming *Chris Lahaije, Radhakanta Rana, Christina Sunderkoetter, Maribel Arribas, Iñigo Aranguren, Daniele De Caro and Iñaki Pérez*	
	12:15-12:40		
	Processes *Chair: Krishnaiyengar Narasimhan*		Waaier 2
	11:00-11:25	Sensitivity analysis of process and tube parameters in free-bending processes ***Nikolas Beulich**, Josef Spoerer and Wolfram Volk*	
	11:25-11:50	Numerical evaluation of mechanical performance for self-piercing riveted fiber-reinforced plastic and metal sheets ***Wooram Noh**, K Y Park, C Kim, M G Lee, C Y Jung and J H Song*	
	11:50-12:15	A first step towards an in-line shape compensation for UHSS roll forming *Buddhika Abeyrathna, Bernard Rolfe and **Matthias Weiss***	
	12:15-12:40		
	Damage/Fracture *Chair: Michael Brünig*		Waaier 4
	11:00-11:25	Statistics of Fracture in 3-Point Bending ***Martin Sadhinoch**, Ronald Mulder and Martin Kampczyk*	
	11:25-11:50	On the Design of Novel Multi-failure Specimens for Ductile Failure Testing *Bruce Williams and **Hari Simha***	
	11:50-12:15	Characterizing plasticity and fracture of sheet metal through a novel in-plane torsion experiment ***Vincent Grolleau**, Christian Roth and Dirk Mohr*	
	12:15-12:40	An automated material calibration framework for shells fracture and simulation ***Juan G. Londono**, Mostafa Mobasher, Badri Hiriyur and Pawel Woelke*	
12:40-14:00	Lunch		

Time		Activity	Location
14:00-14:40		**Keynote:** Dr. Bart Carleer (Autoform) Understanding simulation accuracy	Waaier 1
14:45-16:00		**Warm forming Mg** *Chair: Fuh-Kuo Chen*	Waaier 1
	14:45-15:10	Warm Forming Simulation of a ZEK100 Magnesium Door Panel ***Kaab Omer**, Clifford Butcher, Michael Worswick and Tim Skszek*	
	15:10-15:35	Influence of the preheating strategy on the deep drawing of extruded magnesium alloy ME20 sheets ***Hamed Dardaei Joghan**, Marlon Hahn, Heinrich Traphöner and Erman Tekkaya*	
	15:35-16:00	Characterization of Heat Transfer Coefficient of Lightweight Alloys in Kirksite Dies ***Kaab Omer**, Clifford Butcher and Michael Worswick*	
		Tribology cold stamping *Chair: Javad Hazrati*	Waaier 2
	14:45-15:10	Basics for inline measurement of tribological conditions in series production of car body parts ***Barbara Hansen**, Michael Hoebler, Stephan Purr, Josef Meinhardt and Marion Merklein*	
	15:10-15:35	Developing smart multi-sensor monitoring for tool wear in stamping process *Vignesh Shanbhag, Michael Pereira, Brendan Voss, Indivarie Ubhayaratne and **Bernard Rolfe***	
	15:35-16:00	Friction modelling in sheet metal forming simulations for aluminium body parts at Daimler AG *C. Bolay, P. Essig, C. Kaminsky, **J. Hol**, P. Nägele and R. Schmidt*	
		Tool design *Chair: Muhammad Niazi*	Waaier 4
	14:45-15:10	Identification of process limits for punching with a slant angle ***Adrian Schenek**, Mathias Liewald and Sergei Senn*	
	15:10-15:35	Investigation of a new sheet metal shear cutting tool design to increase the part quality by superposed compression stress ***Sergei Senn** and Mathias Liewald*	
	15:35-16:00	Finite element modeling and durability evaluation for rubber pad forming process ***Junyong Park**, Yongnam Kim, Jeong Whan Yoon, Hyunwoo So, Jongshin Lee and Sangjin Ko*	
16:00-16:20		Coffee break	
16:20-16:30		Closure	Waaier 1
16:30-16:45		IDDRG 2020 presentation	

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