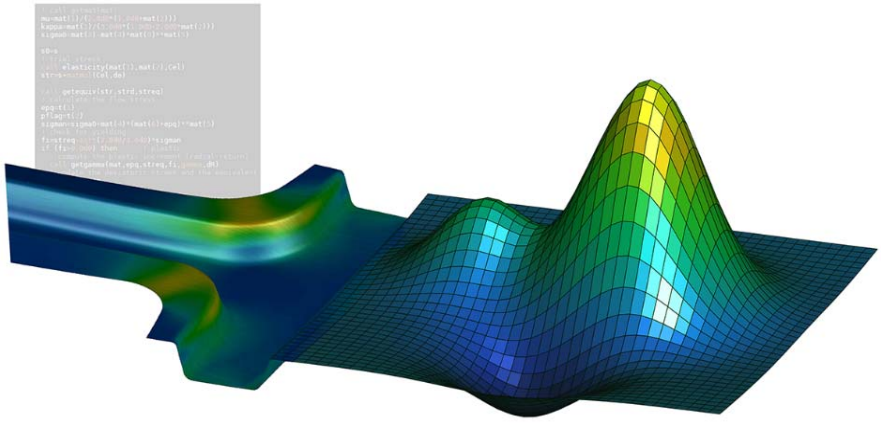
The 38th International Deep Drawing Research Group Annual Conference

IDDRG 2019

Forming 4.0: Big Data - Smart Solutions



Conference Program

Monday 3 June		
Time	**Activity**	**Location**
14:00 - 18:00	Registration	Upark Hotel
18:00 - 20:00	Welcome reception	

Tuesday 4 June

Time		Activity	Location
8:15-8:40		Registration at conference venue	
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.	
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 Shinyeong Lee, Jin-Hwan Kim, 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, Tudor Balan	
		Characterization *Chair: Celalettin Karadogan*	Waaier 2
	10:05-10:30	Non-linear strain path experiment and modeling for very high strength material M S Wi, S Y Lee and F Barlat	
	10:30-10:55	Improved bendability characterization of UHSS sheets L. Wagner, H. Schauer, H. Pauli, J. Hinterdorfer	
	10:55-11:20	Investigation of non-proportional load paths by using a cruciform specimen in a conventional Nakajima test R. Norz, W. 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 L 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 S Münstermann, P Wechsuwanmanee, J Lian	
	10:30-10:55	Effect of pre-strain on stretch flange deformation limit of steel sheets E Iizuka, K Higai, Y 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 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 P Frey, M Lechner, T Bauer, T Shubina, A Yassin, S Wituschek, M Virkus, M 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 J Goncalves, S Alibeigi and S Sarkar	
12:40-14:00		Lunch	

Tuesday 4 June

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 crystal plasticity model H. J. Bong, J. Lee, M.-G. Lee	
	15:10-15:35	Crystal plasticity based predictions of mechanical properties from heterogeneous steel microstructures P.J.J. Kok, W. Spanjer, F.Korver, Y. An, M. 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 A Boyer, H Laurent, M C 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 F Zgoll, S Kuruva, T Götze and W Volk	
	15:35-16:00	Modelling of dynamic loads during series operation for optimisation of part holder design M. Burkart, M. Liewald and J. 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 S Westhäuser, M Schneider, M Teschner, I A 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 A.R. Chezan, T.V. Khandeparkar, C.H.L.J. ten Horn and M. Sigvant	
	17:20-17:45	Augmented Reality for Forming Technology – Visualisation of Simulation Results and Component Measurement M Lechner, R Schulte and M 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 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 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 A Birkert, B Hartmann, F Lepple, M Straub and P 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 S Golovashchenko, N Reinberg, N Wang and Q 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	

Wednesday 5 June

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	
		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 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 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 L Morand, D Helm, R Iza-Teran and J Garcke	
	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 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.	
		Formability *Chair: Sandrine Thuillier*	Waaier 4
	11:00-11:25	On the way towards a comprehensive failure modelling for industrial sheet metal stamping processes N. Manopulo, B. Carleer	
	11:25-11:50	Determining a threshold Strain Nonuniformity Index (SNI) to predict failure in sheet metal components P P Date, Pratik Kulkarni and K D 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	

Wednesday 5 June

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 E 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 Al *Chair: Lander Galdos*	Waaier 2
	14:45-15:10	Characterisation of new lubrication systems for hot forming of high strength aluminum alloys N Rigas, J Degner, E Berendt, F Junker and M 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 P Larour, L Wagner, A Felbinger, J Angeli	
	15:10-15:35	Effects of fracture area measurement method and tension test specimen type on fracture strain values of 980 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 E Ota, Y Yogo and N 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 M.S. Niazi, P. Amborn, E. Lamers and J. 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 J. Lacues, C. Pan, J.-C. Franconville, P. Guillot, M. Capellaere, T. Chezan, J. Hol, J.H. Wiebenga, A. Souchet, V.	
	16:55-17:20	Pressure and sliding velocity dependent surface asperity based friction model: Application to springback 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 L. Wagner, P. Larour, J. Lackner, H. Schauer, E. Berger	
	16:55-17:20	Influence of single hat crash box flange triggering and impactor top plate welding strategy on axial crash foldability of AHSS & UHSS sheets P Larour, J Lackner, L Wagner	
	17:20-17:45	Thermomechanical forming and crash simulations M Abspoel, M E Scholting, M Lansbergen	
18:00-18:45		Transfer to Bloemenbeek restaurant	
19:00-22:00		Conference banquet	

Thursday 6 June

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 D Rosenstock, J Banik, T Gerber, S 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 K Krachenfels, B Rothammer, R Zhao, S Tremmel and M Merklein	
	9:40-10:05	Sliding characteristics of hot-dip galvanized steel sheets depending on aging time after production K Hoshino, Y Yamasaki and S Taira	
	10:05-10:30	Press formability of newly developed high lubricity hot-dip galvanized steel sheets S Furuya, K Hoshino, Y Ogihara, Y Yamasaki and S 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 Br unig, Stellen 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 K 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 N Beulich, J Spoerer and W Volk	
	11:25-11:50	A first step towards an in-line shape compensation for UHSS roll forming Buddhika Abeyrathna, Bernard Rolfe and Matthias Weiss	
	11:50-12:15	Numerical evaluation of mechanical performance for self-piercing riveted fiber-reinforced plastic and metal sheets W Noh, K Y Park, C Kim, M G Lee, C Y Jung and J H Song	
	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	

Thursday 6 June

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 B Hansen, M Hoebler, S Purr, J Meinhardt and M Merklein	
	15:10-15:35	Developing smart multi-sensor monitoring for tool wear in stamping process Michael Pereira, Vignesh Shanbhag, 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 S Senn and M 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	

Friday 7 June

Technical Tours