

LOADING PATH EFFECT ON FORMING LIMITS

Zurich, June 6 – 8, 2023



Overview

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY			
8:30 - 9:00	WELCOME COFFEE						
Early morning		Mohr	Welcome	Volk	Hora	Grolleau	Tekkaya
			Volk		Karadogan		Yoon
			Thuillier		Manopulo		Butcher
COFFEE BREAK							
Late morning		Barlat	Chezan	Yoon	Bouchard	Tekkaya	M.G. Lee
			Kuwabara		Barlat		Korkolis
			Grolleau		v.d.Boogaard		Ha
13:00 - 14:30	LUNCH						
Early afternoon		Hora	Worswick	Worswick	Inal	Butcher	Li
			Narasimhan		Balan		J. Lian
			Sigvant		Numisheet 2025		Erice Dhara
COFFEE BREAK							
Late afternoon		M Lee	Zhang/Song	Inal	Norz	Roth	C. Lian
			Kinsey		Jordan		Samadian
			Highlights		Maier		Highlights
Social events	Reception @ 6pm	Banquet Züriberg @ 7pm	Dinner in old town @ 8pm	Local Bar @ 6:30pm			

<https://numisheet2023.ethz.ch/>

Local Organizing Committee

Prof. Vincent Grolleau (UBS/ETH Zurich)
 Prof. Pavel Hora (Inspire)
 Martina Koch (ETH Zurich)
 Prof. Dirk Mohr (ETH Zurich)
 Dr. Christian Roth (ETH Zurich)

Steering Committee

Prof. Ton van den Boogaard (U of Twente)
 Prof. Toshihiko Kuwabara (Tokyo U of Agri. and Tech.)
 Prof. Dirk Mohr (ETH Zurich)
 Dr. Tom Stoughton (GM)
 Prof. Wolfram Volk (TU Munich)
 Prof. Jeong Yoon (KAIST & Deakin University)

DAY 1 - Tuesday, June 6, 2023

9:00 – 9:35 am	Prof. Dirk Mohr (ETH Zurich, Switzerland) WELCOME ADDRESS
9:35 – 10:10 am	Prof. Wolfram Volk (TU Munich, Germany) PREDICTION OF FAILURE FOR SHEET METAL PARTS – EXPERIMENTS, MODELS AND LIMITS
10:10 – 10:45 am	Prof. Sandrine Thuillier (U of South Brittany, France) MULTI-STEP DRAWING OF METALLIC CUPS: A CASE STUDY FOR STRAIN PATH CHANGES
10:45 – 11:15 am	Coffee Break
11:15 – 11:50 am	Dr. Toni Chezan (Tata Steel, Netherlands) INDUSTRIAL EXAMPLES OF FAILURE IN SHEET METAL FORMING DUE TO NONPROPORTIONAL LOAD PATHS.
11:50 – 12:25 pm	Prof. Toshihiko Kuwabara (Tokyo U of Agri. and Tech., Japan) MEASUREMENT OF FORMING LIMITS OF AL 6XXX SUBJECTED TO LINEAR AND NONLINEAR STRESS PATHS
12:25 – 1:00pm	Prof. Vincent Grolleau (ETH Zurich, Switzerland) HIGH THROUGHPUT AUTOMATED NAKAZIMA TESTING WITH UNI- AND BIAXIAL PRE-LOADING OF STEEL AND AL SHEETS
1:00 – 2:30 pm	Lunch
2:30 – 3:05 pm	Prof. Michael Worswick (U of Waterloo, Canada) CHARACTERIZATION OF ELEVATED TEMPERATURE FORMING LIMITS FOR A RANGE OF PROCESSING METHODS AND ALLOYS
3:05 – 3:40 pm	Prof. K. Narasimhan (IIT Bombay, India) USE OF CRUCIFORM SAMPLES FOR STUDYING THE EFFECT OF STRAIN PATHS ON FORMING LIMITS IN AN ALUMINUM SHEET
3:40 – 4:15 pm	Prof. Mats Sigvant (Volvo, Sweden) FAILURE PREDICTION OF NON-LINEAR STRAIN PATHS FROM AN INDUSTRIAL PERSPECTIVE
4:15 – 4:45 pm	Coffee Break
4:45 – 5:20 pm	Prof. Shi-Hong Zhang and Prof. Hongwu Song (Chinese Academy of Sciences, China) FORMING LIMIT PREDICTION METHODS FROM INDUSTRY TO MULTI-SCALE LEVEL: ADVANCES AND APPLICATIONS
5:20 – 5:55 pm	Prof. Brad Kinsey (U of New Hampshire, USA) LOADING PATH AND TEMPERATURE MANIPULATION DURING DOUBLE-SIDED INCREMENTAL FORMING OF SS304L

DAY 2 - Wednesday, June 7, 2023

9:00 – 9:35 am	Prof. Pavel Hora (Inspire, Switzerland) CHALLENGES IN THE SIMULATION OF THE FORMING PROCESSES OF COMPLEX THIN BIPOLAR PLATES
9:35 – 10:10 am	Dr. Celalettin Karadogan (U of Stuttgart, Germany) SIMPLIFIED CHARACTERIZATION OF THE LOAD-PATH DEPENDENCE OF STRAIN-BASED FORMING LIMITS
10:10 – 10:45 am	Dr. Niko Manopulo (AutoForm, Switzerland) STREAMLINED SOFTWARE SOLUTIONS FOR NECKING AND FRACTURE UNDER NON-PROPORTIONAL LOADING
10:45 – 11:15 am	Coffee Break
11:15 – 11:50 am	Prof. Pierre-Olivier Bouchard (CEMEF, MinesParis, France) SHEET SPIN FORMING: ANALYSIS OF MATERIAL FLOW AND MECHANICAL LOADING PATH TO SOLVE NECKING ISSUES
11:50 – 12:25 pm	Prof. Frederic Barlat (Postech, Korea) RESEARCH IN PLASTICITY FOR INDUSTRIAL APPLICATIONS
12:25 – 1:00pm	Prof. Ton van den Boogaard (U of Twente, Netherlands) IN-PLANE BENDING TEST FOR CHARACTERIZATION OF HIGH-STRAIN HARDENING AND EDGE DUCTILITY
1:00 – 2:30 pm	Lunch
2:30 – 3:05 pm	Prof. Kaan Inal (U of Waterloo, Canada) THE EFFECTS OF STRAIN PATHS, TEMPERATURE AND DYNAMIC RECRYSTALLIZATION ON THE FORMABILITY OF MAGNESIUM ALLOYS
3:05 – 3:40 pm	Prof. Tudor Balan (ENSAM, France) A FEW LOAD-PATH-DEPENDENT FORMABILITY ISSUES FROM INDUSTRY
3:40 – 4:00 pm	Prof. Wolfram Volk (TU Munich, Germany) NUMISHEET CONFERENCE PLANNING, MUNICH 2025
4:00 – 4:30 pm	Coffee Break
4:30 – 4:50 pm	Roman Norz (TU Munich, Germany) CROSS-LOADING OF PRE-FORMED MATERIALS AND ITS EFFECTS ON THE ONSET OF YIELDING
4:50 – 5:10 pm	Benoit Jordan (ETH Zurich, Switzerland) EXTRACTING THE STRESS-STRAIN CURVE AFTER THE ONSET OF NECKING IN UNIAXIAL TENSION EXPERIMENTS
5:10 – 5:30 pm	Lorenz Maier (TU Munich, Germany) MUC-TEST FOR THE INVESTIGATION OF MULTI-DIRECTIONAL STRAIN HARDENING BEHAVIOR FOR ALLOY SHEETS

DAY 3 - Thursday, June 8, 2023

- 9:00 – 9:35 am **Prof. Erman Tekkaya (U of Dortmund, Germany)**
EFFECT OF LOADING PATH ON DAMAGE EVOLUTION IN METAL FORMING
- 9:35 – 10:10 am **Prof. Jeong Whan Yoon (KAIST & Deakin University, Australia)**
INCORPORATION OF PATH-INDEPENDENCY FOR DUCTILE FRACTURE CRITERIA UNDER NON-PROPORTIONAL LOADINGS
- 10:10 – 10:45 am **Prof. Cliff Butcher (U of Waterloo, Canada)**
EXPERIMENTAL EVALUATION OF DAMAGE ACCUMULATION MODELS IN NON-LINEAR STRAIN PATHS FOR A DP1180 STEEL.
- 10:45 – 11:15 am **Coffee Break**
- 11:15 – 11:50 am **Prof. Myoung-Gyu Lee (Seoul National University, Korea)**
PREDICTION OF MULTI-DIRECTIONAL STRENGTHS AND DUCTILITY OF STEEL PLATE AFTER BENDING DOMINATED LOADING PATH CHANGE
- 11:50 – 12:25 pm **Prof. Yannis Korkolis (Ohio State University, USA)**
EFFECT OF LOADING PATH ON DUCTILE FRACTURE INITIATION: THE CASE OF BIAXIALLY-LOADED AA6260-T4 TUBES
- 12:25 – 1:00 pm **Prof Jinjin Ha (U of New Hampshire, USA)**
MATERIAL MODELING USING ARTIFICIAL NEURAL NETWORK AND DUCTILE FRACTURE OF COMMERCIAL PURE TITANIUM
- 1:00 – 2:30 pm **Lunch**
- 2:30 – 2:50 pm **Dr. Xueyang Li (ETH Zurich, Switzerland)**
RATE- AND TEMPERATURE-DEPENDENT HOSFORD-COULOMB FRACTURE INITIATION MODEL
- 2:50 – 3:10 pm **Prof. Junhe Lian (Aalto University, Finland)**
ANISOTROPY-INDUCED LOCALIZATION AND FRACTURE IN FORMING LIMITS
- 3:10 – 3:30 pm **Prof. Borja Erice (Mondragon University, Spain)**
DUCTILE FRACTURE OF COLD-ROLLED AA5457 SHEET UNDER CONTROLLED NON-PROPORTIONAL LOADINGS
- 3:30 – 3:50 pm **Dr. Sisir Dhara (University of Warwick, UK)**
IN-SITU STUDY OF FRACTURE MECHANISM IN ADVANCED HIGH STRENGTH STEELS DURING A NOTCH TENSILE TEST
- 3:50 – 4:20 pm **Coffee Break**
- 4:20 – 4:40 pm **Dr. Changwei Lian (Baosteel)**
FRACTURE LIMIT OF ADVANCED HIGH STRENGTH STEELS UNDER PLANE STRAIN AND COMPLEX LOADING PATHS
- 4:40 – 5:00 pm **Dr. Pedram Samadian (U of Waterloo)**
FRACTURE OF HOT-STAMPED USIBOR[®]-DUCTIBOR[®] TAILOR-WELDED BLANKS IN DIFFERENT LOADING CONDITIONS

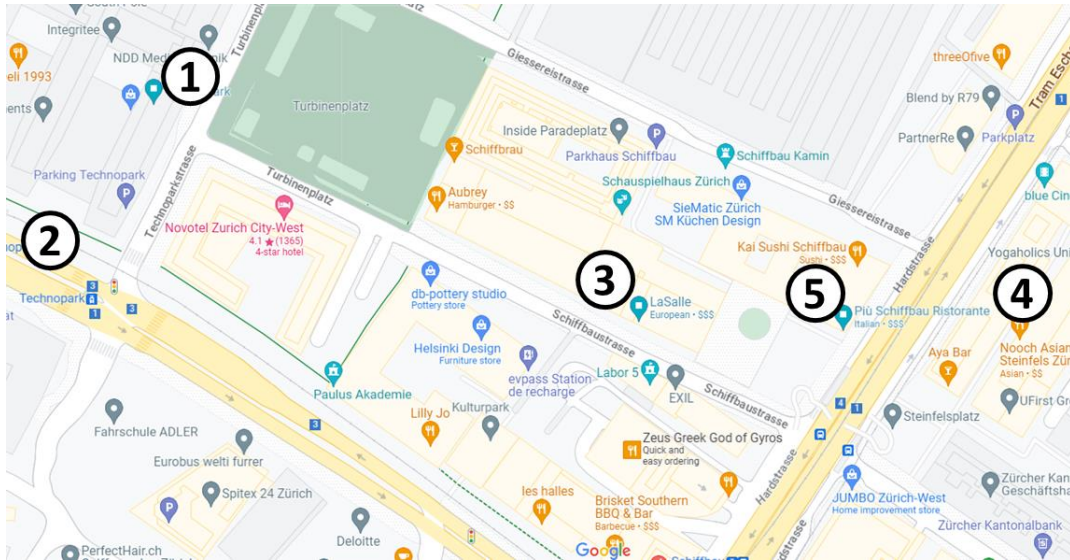
Conference Venue

- **Room L51, Technopark Zürich** (① on map)
 - Technoparkstrasse 1, <https://goo.gl/maps/ScCmtkfdjinkkw9cQ7>
 - Take Tram 4 (direction “Altstetten”) to station “Technopark” (② on map)
 - Enter main entrance of “Technopark” from Turbinenplatz (① on map)
 - Take the right elevator up to the 6th floor, enter room L51

Social Events

- **Monday @ 6pm:** reception at Dozentenfoyer (ETH main building, ⑥ on map)
 - Leonhardstrasse 34, <https://goo.gl/maps/WJdHnXtFpDUhHUN98>
 - From station “Central” (⑦) take “Polybahn” (entrance next to Starbucks)
 - Exit top station towards right (50m walk to Polyterasse)
 - Enjoy the view from Polyterasse
 - Enter main building, walk about 50m straight
 - Take elevator to floor J, then a few stairs to the Dozentenfoyer
- **Tuesday @ 1pm:** lunch at restaurant “LaSalle” (③ on map)
 - Schiffbaustrasse 4, <https://goo.gl/maps/Nfs7QZPi5NRdQiJe6>
 - From Technopark: just walk down Schiffbaustrasse (250m)
 - Enter Schiffbau building from square on the left
- **Tuesday @7pm:** banquet dinner at Sorell Hotel Zürichberg (⑧ on map)
 - Orellistrasse 21, <https://goo.gl/maps/H6DrZbjaa03WSvBg7>
 - From station “Technopark” take the Tram 4 (direction “Tiefenbrunnen”) to station “Central”, leaves every 7min
 - From station “Central” (⑦) take Tram 6 to station “Zoo” (15min ride), leaves every 7min;
 - From station “Zoo” about 5min walk to the restaurant
- **Wednesday @ 1pm:** lunch at Asian restaurant “Nooch” (④ on map)
 - Heinrichstrasse 267, <https://goo.gl/maps/dmnYLPnueLivteiA6>
 - From Technopark: just walk down Schiffbaustrasse (350m), cross the tram rails, then turn left, Nooch is hidden behind the Aya bar
- **Wednesday @ 8pm:** dinner at restaurant “Haus zum Rüden” (⑨ on map)
 - Limmatquai 42, <https://goo.gl/maps/Pcz7xJvn3qZmq3de8>
 - From station “Technopark” take the Tram 4 (direction “Tiefenbrunnen”) to station “Rathaus”, leaves every 7min
 - Walk straight in direction of Tram on the left sidewalk (100m)
- **Thursday @ 1pm:** lunch at restaurant “Piu Schiffbau” (⑤ on map)
 - Hardstrasse 259, <https://goo.gl/maps/WpK5z4RPofYmqy388>
 - From Technopark: just walk down Schiffbaustrasse (250m)
 - Enter Piu from square on the left

Map of Technopark neighborhood



Map of Zurich area

