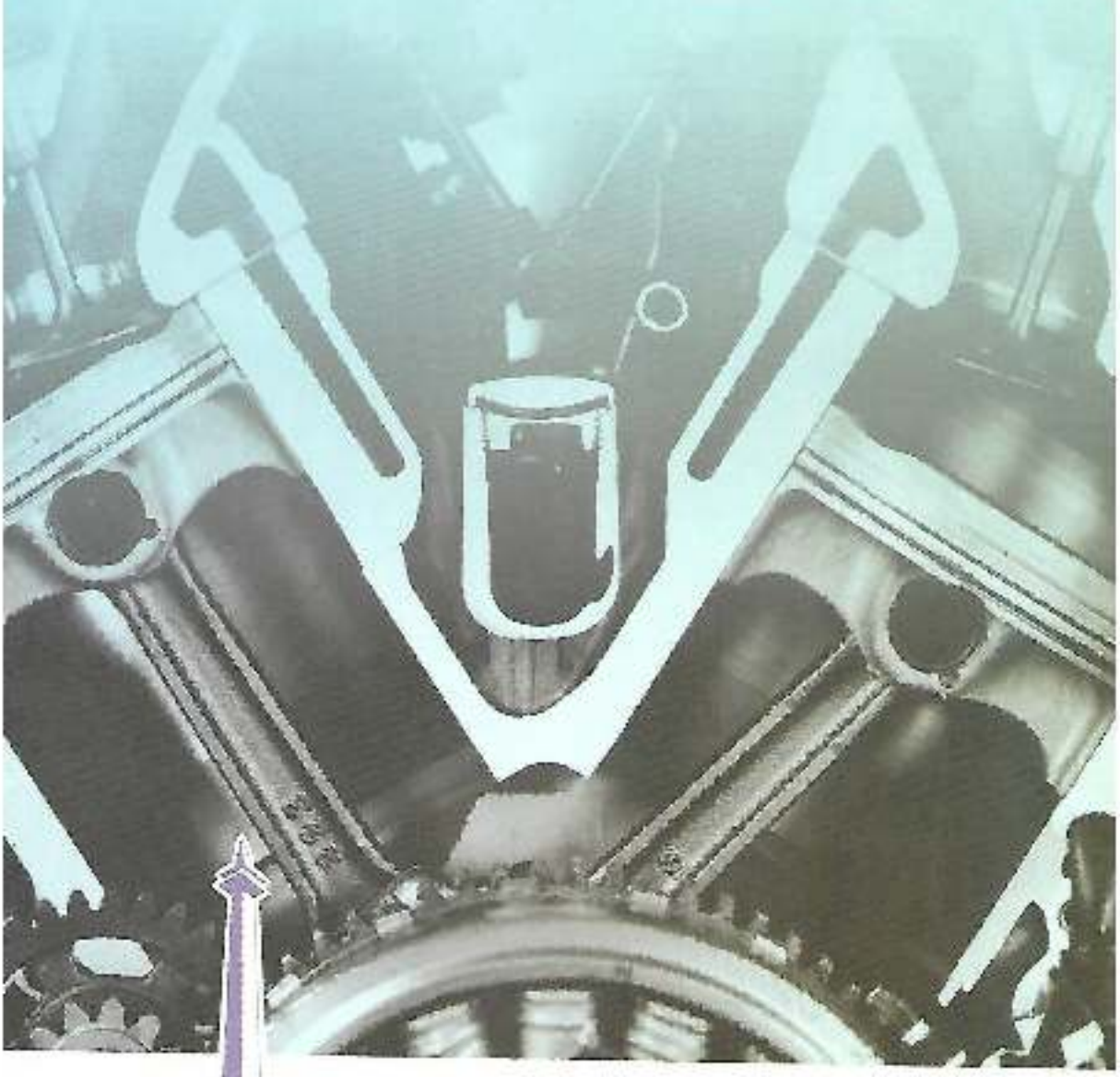
SETC 201

Prelimina Program

NOVEMBER 15-17, 2
JAKARTA, INDONESIA

SMALL ENGINE TECHNOLOGY CONFERENCE

SMALL ENGINE TECHNOLOGY - ERATING A PROMISING FUTURE"



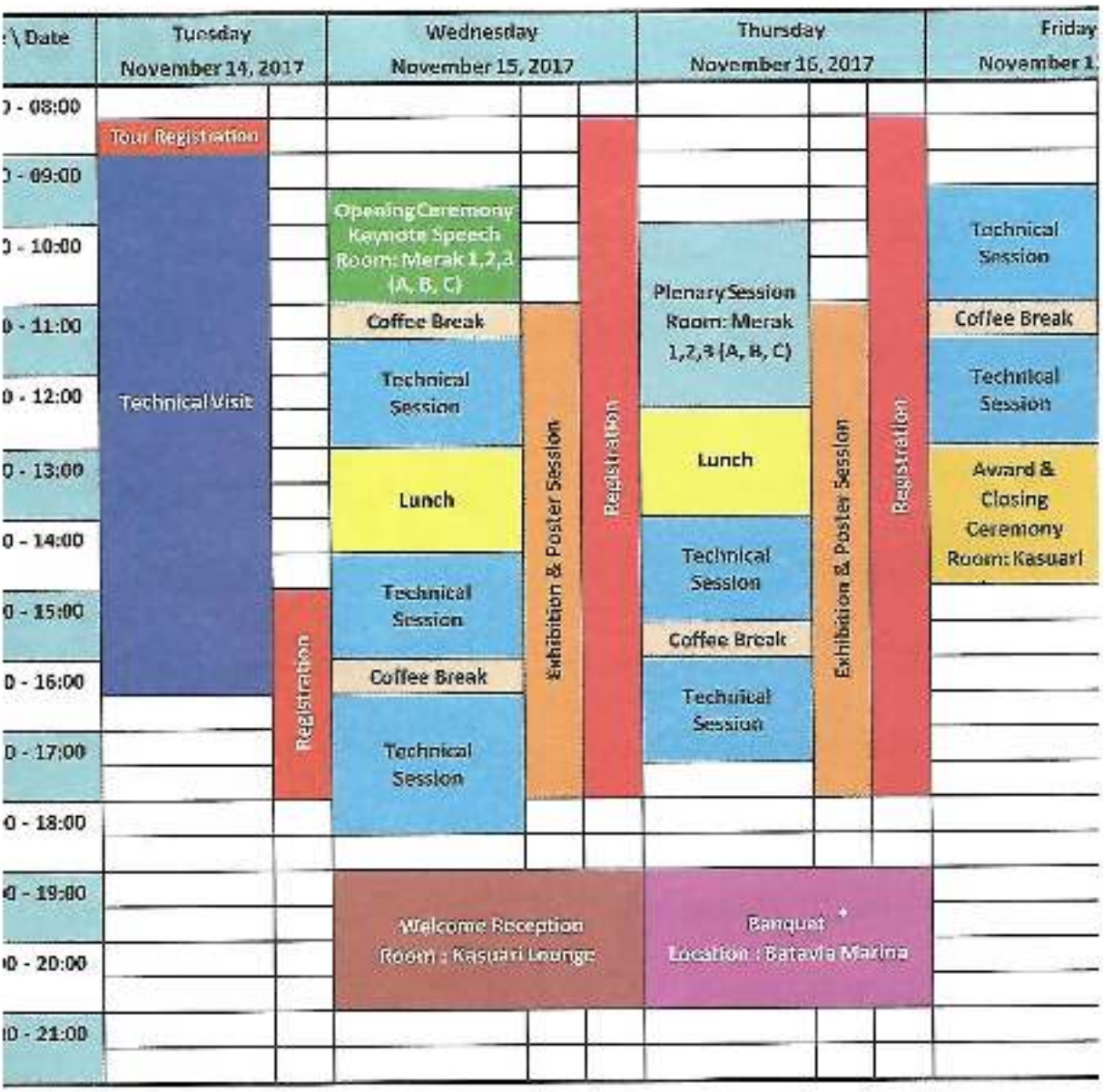
Preliminary Program

SAE IATO
INTERNATIONAL · SAE - INDONESIA

"SMALL ENGINE TECHNOLOGY - GENERATING A PROMISING FUTURE"

ASE FIND GUIDELINES FOR SPONSORSHIP ATTACHED ON THE BACK OF PAGE 46

PROGRAM AT-A-GLANCE



iquet start time may be subject to change due to situation of transportation.

SETC History

Times	Year	City	Country
1st	1989	Milwaukee	USA
2nd	1991	Yokohama & Hamamatsu	Japan
3rd	1993	Pisa	Italy
4th	1995	Milwaukee	USA
5th	1997	Yokohama	Japan
6th	1999	Madison	USA
7th	2001	Pisa	Italy
8th	2002	Kyoto	Japan
9th	2003	Madison	USA
10th	2004	Graz	Austria
11th	2005	Bangkok	Thailand
12th	2006	San Antonio	USA
13th	2007	Niigata	Japan
14th	2008	Milwaukee	USA
15th	2009	Penang	Malaysia
16th	2010	Linz	Austria
17th	2011	Sapporo	Japan
18th	2012	Madison	USA
19th	2013	Taipei	Taiwan
20th	2014	Pisa	Italy
21st	2015	Osaka	Japan
22nd	2016	Charleston	USA
23rd	2017	Jakarta	Indonesia

JSAE

HONORARY COMMITTEE

Chair : Tatsuya Shinkai (SUZUKI MOTOR CORPORATION)

Yuji Horiuchi (Kawasaki Heavy Industries, Ltd.)

Yuji Marui (Honda R&D Co., Ltd.)

Makoto Shimamoto (Yamaha Motor Co., Ltd.)

Shujiro Shiohara (Japan Land Engine Manufacturers Association)

Hideo Shuji (Nihon University)

GENERAL COMMITTEE

Chair : Tomoo Shiozaki (Honda R&D Co., Ltd

Takashi Mitome (SUZUKI MOTOR CORPORATI

Yasuyuki Muramatsu (Yamaha Motor Co., Lt

Michihisa Nakagawa (Kawasaki Heavy Industries

Tacao Okazaki (Japan Land Engine Manufactu Association / Kubota Corporation)

Koji Yoshida (Nihon University)

ORGANIZING COMMITTEE

Chair: Ryosuke Ishikawa (SUZUKI MOTOR CORPORATION)

Shosaku Chiba (Honda R&D Co., Ltd.)

Masaaki Ishibashi (Honda R&D Co., Ltd.)

Katsuhito Kajitani (Kawasaki Heavy Industries, Ltd.)

Hibiki Koga (Honda R&D Co., Ltd.)

Tatsuya Kuboyama (Chiba University)

Naoyoshi Kuragaki (Yamaha Motor Co., Ltd.)

Yohei Kurihara (SUZUKI MOTOR CORPORATION)

Makoto Matsuo (Kawasaki Heavy Industries, Ltd.)

Tadao Okazaki (Japan Land Engine Manufacturers Association / Kubota Corporation)

Yoichi Shimoda (SUZUKI MOTOR CORPORATION)

Hiroaki Tamamaki (SUZUKI MOTOR CORPORATION)

Ichiro Uemura (Kawasaki Heavy Industries, Ltd.)

Toshio Yamaguchi (SUZUKI MOTOR CORPORATION)

Koji Yoshida (Nihon University)

Makoto Yoshida (Yamaha Motor Co., Ltd.)

TECHNICAL COMMITTEE

Chair: Shigeru Fujii (Yamaha Motor Co., Ltd

Yuji Araki (Yamaha Motor Co., Ltd.)

Akira Iijima (Nihon University)

Ryosuke Ishikawa (SUZUKI MOTOR CORPORAT

Akihito Kasai (Honda R&D Co., Ltd.)

Aki Kodai (Kawasaki Heavy Industries, Ltd.

Tatsuya Kuboyama (Chiba University)

Hirotaka Kurita (Yamaha Motor Co., Ltd.)

Masaru Mamiya(SUZUKI MOTOR CORPORATI

Takashi Mitome (SUZUKI MOTOR CORPORATI

Takahito Murase (Kawasaki Heavy Industries,

Toru Nakazono (Japan Land Engine Manufactu Association / YANMAR CO., LTD.)

Yutaka Nitta (SUZUKI MOTOR CORPORATIO

Tadao Okazaki (Japan Land Engine Manufactu Association / Kubota Corporation)

Tomoo Shiozaki (Honda R&D Co., Ltd.)

Hisayuki Sugita (SUZUKI MOTOR CORPORATI

Hiroya Ueda (Honda R&D Co., Ltd.)

Hiroshi Yano (Kawasaki Heavy Industries, Lt

Koji Yoshida (Nihon University)

SAE

TECHNICAL COMMITTEE

Chair : Simona Silvia Merola (Istituto Motori - CNR)
William Attard (Fiat Chrysler Automobiles)
Kai Beck (MOT GmbH)
Glenn Bower (University of Wisconsin, Madison)
Brian Callahan (Achates Power, Inc.)
Derek Cleasby (Bosch Engineering GmbH)
Czerinski (University of Applied Sciences Biel-Bienne)
Mark Degler (Mercury Marine)
Silvana Dilorio (Istituto Motori - CNR)
Pierre Duret (IFP School)
Giovanni Ferrara (University of Florence)
Ken Fosaaen (Kerdea Technologies)
Jaal Ghandhi (University of Wisconsin, Madison)
Adrian Irimescuimescu (Istituto Motori - CNR)
Tobias Kallerhoff (Robert Bosch GmbH)
Robert Kee (Queen's University Belfast)
Thomas Lagö (QirraSound Technologies Europe AB)
Paul Litke (Air Force Research Laboratory)
Ezio Mancaruso (Istituto Motori - CNR)
Michael Marcella (Maxima Racing Oils)
Luca Marchitto (Istituto Motori - CNR)
Nagesh Mavinahally (Meggitt Control Systems)
Geoffrey McCullough (Queen's University of Belfast
Jay Meldrum (Michigan Technological University)
David Palmer (BRP US, Inc.)
Paul Richards
Stephan Schmidt (Graz University of Technology)
Leonid Tartakovsky (Technion - Israel Institute of Technology)
Cinzia Tornatore (Istituto Motori - CNR)

Ikatan Ahli Teknik Otomotif (IATO)

ORGANIZING COMMITTEE

Chair : Gunadi Sindhuwinata (IATO)
Djoko W. Karmiadji (Universitas Pancasila)
Budi Praselyo Soesilo (IATO)
Indria Herman (Institut Teknologi Bandung)
Hari Sasono (AISI-IATO)
Ivo Aryanto (IATO)
Andi Hartanto (AISI-Honda)
Dicky Gondo Saputro (AISI-IATO)
Ismail Syahrial (Universitas Pancasila)
Widjang Djendrawan (AISI-Suzuki)
Zianni Karmiadji (IATO)
Victor Assani (AISI-Suzuki)
Irma Fitrasari (AVL GmbH Jakarta)
Suzaryono (AISI-Yamaha)
Hanggoro Ananta Krishna (AISI-Honda)
Irawan Sucahyono (IATO)
Ishaak Karmiadji (IATO)
Hadi Suryadipradja (GIAMM)
Bayu Prabowo (Universitas Prasetiya Mulya)
Tri Yuswidjajanto (Institut Teknologi Bandung)
Arka Soewono (Universitas Katolik Atma Jaya)
Sheila Tobing (Universitas Katolik Atma Jaya)
Cristiand (Universitas Katolik Atma Jaya)

TECHNICAL COMMITTEE

Chair : Iman K. Reksowardojo (Institut Teknologi Bandung)
Ignatius Pulung Nurprasetio (Institut Teknologi Bandung)
Bambang Sugiarto (Universitas Indonesia)
I Nyoman Sutantra (Institut Teknologi Sepuluh November)
Jayan Sentanuhady (Universitas Gajah Mada)
Poetro Lebdo Sambegoro (Institut Teknologi Bandung)
Bentang Arief Budiman (Institut Teknologi Bandung)

KEYNOTE SPEECH IN OPENING CEREMOI

Speaker (Tenta

Prof. H. Mohamad Nasir, Ph.D., Ak.

Minister of Research, Technology and Higher Education of the Republic of Indonesia

Education:

1975 - 1978	Pondok Pesantren Mambaul Ilmi Asy-syar'y Sarang, Rembang, Indonesia
1979 - 1982	SMA Kediri di Pondok Pesantren Al-Islah, Kediri, Indone
1983 - 1988	Bachelor Degree in Economics, Universitas Diponegoro, Semarang, Indonesia
1993	Master Degree (M.Si) from Universitas Gadjah Mada, Yogyakarta, Indonesia
2004	Doctoral Degree (Ph.D) from Universiti Sains Malaysia (USM), Penang, Malaysia

Career:

1986 - 1987	Auditor at Koperasi Jasa Audit Duta Karya
1987 - 1988	Auditor at Kantor Akuntan Publik Drs. Tahrir Hidayat
1989 - 1989	Finance Manager at PT. IKA CHIRZA PUTRA
1990 - 1992	Staff at Departemen Studi Kelayakan Bisnis, Kantor Akui Publik Drs. Bayudi Watu Perwakilan Semarang
1990 - 2014	Lecturer, Faculty of Economics, Universitas Diponegoro Semarang
1994 - 1996	Coordinator for Accounting Extension Program, Faculty Economics, Universitas Diponegoro
1994 - 1997	Member of Internal Quality Assurance, Universitas Diponegoro
1996 - 1998	Program Secretary, Accounting Department, Faculty of Economics, Universitas Diponegoro
1999 - 2006	Head of Master Program, Accounting Department, Facu Economics, Universitas Diponegoro
1999 - Present	Member of Senate, Faculty of Economics, Universitas Diponegoro
2006 - 2010	Deputy Chancellors of Finance and Human Resources, Universitas Diponegoro
2007 - 2014	Specialized staff for DPRD Kota Semarang
2011 - 2014	Dean, Faculty of Economics and Business, Universitas Diponegoro,
2014	Member of Revitalization BUMD Jawa Tengah

peaker

r. Tatsuya Shinkai

neral Manager
ead of Motorcycle
gineering)
otorcycle
erations,
ZUKI MOTOR
RPORATION

Education:

1982 Graduated from Engineering Department, Hiroshima University

Career:

1982 Joined to Suzuki Motor Corporation
Assigned to Two-wheeler Engineering Department
1985 Assigned to Testing Analysis Department
1995 Promoted to Deputy Manager in charge of Communalize VE
1996 Assigned to Thai Suzuki Motor
2000 Promoted to Deputy Manager in charge of Engineering Departn
2002 Assigned to Suzuki Motor R&D China
Promoted to Manager of Suzuki Motor R&D China
2007 Assigned as Chief Engineer for Small Displacement Motorcycle
2009 Assigned to Asia Project as Deputy General Manager
2010 Assigned to Suzuki Motorcycle India as General Manager
2012 Assigned to Motorcycle Engine Department as General Manage
2013 Promoted to Executive General Manager Engineering

Dr. Holger Lochmann

ector, Research
d R&D Services -
HL

1967 Born in Frankfurt/Main, Germany.
1988 "After school and military service, started to study chemistry an chemical engineering at Technical University Darmstadt Germar The main interests were atmospheric chemistry, chemical engineering and analytical chemistry. Followed by a PhD at TU Darmstadt with the focus of a development of an analytical met for ultra small volume samples such as single plant cells or singl rain drops."
1999 Joined STIHL as R&D engineer for catalyst development.
2001 "Became the leader of the central chemical lab of STIHL. Responsible for: fuels, oils, plastic materials, after treatment technologies and exhaust emission analysis."
2005 Appointed as Division manager for governmental relations and emissions at STIHL. Simultaneously he was elected as Chairman of the small SI engine group within Euromot. Within this functio he worked with European Commission, US-EPA, CARB and many other legislative bodies worldwide on the harmonization and development of new emission standards.
2014 Became the Division Staff Manager.
2015 Promoted to Director Research and R&D Services

PLENARY SESSION Thursday, November 16, 9:00 - 1

Theme : *Energy Outlook In Asian Countries Fro*
The Standpoint Of Small Engine Field (Tentative)

We have focused on a number of themes and many intriguing ideas have been presented in th
ETCs.
ecently, small engine technologies have been applied for various industrial fields and adap
nany kinds of fuel resources.
here are a wide range of fuels used in small engine such as gasoline, light oil, bioethanol, bio
uel, and CNG. It is an important element to understand the fuels' supply and demand structu
rder to explain the future development of small engine technologies in Asian countries and e
o worldwide.
n this SETC2017 plenary session, we invite experts in energy outlook in Asian countries.
Discussions will provide useful information for considering usage of fuels.
We hope to have an active exchange of opinions between the speakers and audiences.

Moderator

Prof. Takeo KIKKAWA

Professor of Management,
Graduate School of Innovation
Studies, Tokyo University of Science

Office Address: Graduate School of
Innovation Studies, Tokyo University
of Science

Education:

1975	Graduated from University of Tokyo (Department of Economics, Economics Course)
1977	Graduated from University of Tokyo (Department of Economics, Business Administration C
1983	Finished Doctoral Course of Graduate School of University of Tokyo on Economics

Degree:

1996 Doctor of Economics (University of Tokyo)

Career:

1983 - 1987	Full-time Lecturer of Department of Business Administration, Aoyama Gakuin Uni
1987 - 1993	Associate Professor of Department of Business Administration, Aoyama Gakuin Uni
1987 - 1988	Visiting Scholar of Harvard Business School
1993 - 1995	Associate Professor of Institute of Social Scier University of Tokyo
1996 - 2007	Professor, Institute of Social Science, University of Tokyo
1996	Guest Professor of St. Gallen University
1998 - 2004	Guest Professor of Yonsei University
1998 - 1999	Guest Professor of Berlin Free University
2007 - 2015	Professor, Graduate School of Commerce and Management, Hitotsubashi University
2015 - Present	Professor of Management, Graduate School c Innovation Studies, Tokyo University of Scien
2017 - Present	President, the Business History Society of Jap

ubject : *The Prospect of Energy Supply and mall Engine in Asia Pacific Rural Area* (Tentative)

Speaker

CHEW, Chong Siang Ph.D.

nior Researcher
search Department, ASIAM
search Institute, Inc. (ARI)

Researches:

2006 - 2009	Indonesia Biofuels Program Evaluation
2009	Prospect of Renewable Energy on Policies and Internat Corporation Projects in Vietnam
2010	Energy Modeling Practice Program in Laos and Cambod
2005 - 2015	Energy Modeling on Energy Demand/Supply Outlook o APEC Region Developing Country
2011 - 2014	Study on Asian Potential of Biofuel Market

Key Publications:

Chew Chong Siang and Ioyoda Takashi (2006), "The Used od Syste Biomass Resource Development in China: Current Issues and Prob Renewable Energy 2006, International Conference

Chew Chong Siang (2006), "Current Status of New and Renewable Ener China: Introduction of Fuel Ethanol", IEEJ Energy Journal Vol.3 Su 2006, The Institute of Energy Economics

Chew Chong Siang, "Sustainable Biomass System Development in Indonesia", 2010.9

Kan Sichao, Chew Chong Siang, "Biofuels in Selected Southeast Asian Coun Presented at the 29th Conference on Energy, Economy, and Enviror (Japan), 2013

Chew Chong Siang, Kan Sichao, "Biofuel Demand and Supply in the Region", China International Bio-Energy Conference & Expo 2014.6

ubject : *Potentials for Biofuel Use in Asia: A Supply, Demand and Policy Analysis*

Speaker

ANBUMOZHI, Venkatchalam PhD

nior Energy Economist,

onomic Research Institute for EAN and East Asia, Jakarta donesia

Education :

PhD The University of Tokyo, Tokyo, Japan - 1995
MEng, Asian Institute of Technology, Bangkok, Thailand - 1991
BE, Tamilnadu Agricultural University, Coimbatore, India - 1989

Career :

Senior Energy Economist, Economic Research Institute for ASEAN and East A (January 2014 –)
Senior Fellow and Capacity Building Specialist – Asian Development ban Tokyo, Japan (December 2008 – December 2013)
Senior Policy Researcher, Institute for Global Environmental Strategies, K (September 2004- December 2008)
Assistant Professor, The University of Tokyo, Tokyo, Japan (May 1999 – Augu (May 1999 - August 2004)
Assistant Manager and Senior Engineer, Pacific Consultant International, To (October 1999 - May 1999)

Key Publications:

Globalization of Low-Carbon Technologies: Impact of Paris Agreement Australia (2017)
Towards Circular Economy: Corporate Management and Policy pathways, ER
Investing in Low-Carbon Energy Systems: Implications for Regional Cooperatio Australia. Springer Australia (2016)
Managing the Transition to Low-Carbon Economy: Perspectives, Policies an

ubject : **Renewable Energy in Indonesia (TBD)**

Speaker

Dr. Dadan Kusdiana

istry of Energy and Mineral urces of Republic of nesia
ctorate General of New, ewable Energy and Energy ervation

Education :
PHD from Graduate School of Energy Science, Kyoto University majoring in s environmental energy science ,-

Career :
2013 Director for Bioenergy
2015 Head for Public Communication Center of Ministry of Energy and Min Rasource
2016 Secretary for Directorate General of New Renewable Energy and En Conservation

Awards :
2014: Japan Energy Society as The Best Young Researcher

Major Reserch Topics :
Biofuel production and uses technology

Key Publications:
Publications on biodiesel production technology on Elsevier Journal, Journa American Oil Chemist Society, Industrial Chemical Engineering of Japan

ubject :
rtamina Fuel, Lubricant and Domestic Gas

eaker : Representative from Pertamina (TBD)

ECHNICAL SESSIONS

Listed as of April 26, 2

ıtative session timetable will be available on http://www.setc-jsae.com/ in the end of Augus

dvanced Combustion

ganizers: Akihito Kasai (Honda R&D Co., Ltd.), Koji Yoshida (Nihon University), William Attard at Chrysler Automobiles), Jaal Ghandhi (University of Wisconsin-Madison), Simona Silvia Me tituto Motori-CNR)

179010	**SORE Emission Control in China** Jia Bin, Qin Jing, Ding Qian Lan, Zhang Shun, Yan Xi Cheng, Liu Peng, Gao Hong Ge, Xu, (Tianjin Internal Combustion Engine Research Institute)
179050	**A Study on Characteristic of Abnormal Combustion in a Supercharged SI Engine** Shuhei Takahata, Akira Iijima, Hideo Shoji , Kento Shimizu, Takahiro Ishikawa (Nihor University)
179064	**Fuel Economy Development for a CVT Power Train on Roller Chassis Dynamomet and Transfer to Dynamic Engine Testbed** Christian Manfred Hubmann (AVL List GmbH)
179069	**A Study of Ignition and Combustion Characteristics by Multi-Stage Pulse Dischar using Optically Accessible Engine** Takuma Furusyo, Kotaro Takeda, Yuki Yoshida, Zhimin Lin, Akira Iijima, Hideo Shoji (Nihon University), Taichiro Tamida, Takashi Hashimoto (Mitsubishi Electric Corpor
179077	**Group Combustion Excitation in Randomly Distributed Droplet Clouds Based on Flame-spread Characteristics with Two-droplet Interaction in Microgravity** Herman Saputro (Sebelas Maret University)
179091	**The Possibility for Realization of Dual Combustion Cycle for Spark Ignition Engine** Koji Yoshida (Nihon University)
179111	**Effects of Spark Discharge Characteristic on Cycle-to-cycle Variations of Combusti for Lean SI Operation with High Tumble Flow** Kosaku Sasaki, Dongwon Jung, Takeshi Yokomori, Norimasa Iida (Keio University)
179112	**The effect of Combustion Characteristics on Knocking in Lean Burn SI Engine** Yasunobu Goto, Dongwon Jung, Toshihisa Ueda, Norimasa Iida (Keio University)
179118	**Study on the Suppression of Pressure Wave at Spontaneous Ignition of Gasoline Surrogate Mixture in a Rapid Compression Machine** Kohei Honda, Yusuke Miyauchi, Yusuke Usami, Ryohei Toyoda, Koki Yoshida, Akira Ii Mitsuaki Tanabe (Nihon University)
179119	**Analysis of Pressure Wave Generated by SI Knocking using High Speed Observatic End-gas Autoignition** Akira Iijima (Nihon University)
179120	**Chemical Reaction Processes of Fuel Reformation by Diesel Piston Compression o Rich Homogeneous Air-Fuel Mixture** Go Asai (YANMAR Co., Ltd.), Yusuke Watanabe, Shuntaro Ishiguro, Gen Shibata, Hideyuki Ogawa, Yoshimitsu Kobashi (Hokkaido University)

ternative Fuels

ganizers: Hiroya Ueda(Honda R&D Co., Ltd.), Tohru Nakazono(LEMA / YANMAR Co., Ltd.), Sim
ria Merola(ISTITUTO MOTORI-CNR), Paul Richards(-), Luca Marchitto(Istituto Motori-CNR), Ci
natore(NATIONAL RESEARCH COUNCIL)

179022	**Effect of fuel injection pressure on the characteristics of CRDI diesel engine powe by Pine oil blended fuel** RAJ KIRAN K , Saravanan Ganapathy , C. Syed Aalam (Annamalai University)
179026	**Lean burn effect on exhaust gas components of small SI-ICE with bio-syngas** Masahide Kobayashi , Noboru Hieda(Kanazawa University)
179054	**The Effect of Gasoline-Ethanol Blended on Performance and Emission of a Fuel Injection Motorcycle 115 cc with Automatic Transmission in Indonesia** Iman Kartolaksono Reksowardojo, Phonethip Trichanh, Kevin Ferdyamin, Mega Zulf Akbar(Institut Teknologi Bandung)
179063	**Extending Lean Operational Limit of Gasoline Direct Injection (GDI) Engine Fuelle with Hydrogen Rich Gas from Plasma Fuel Reformer** B PREM ANAND, K Kumara vel, C G Saravanan(Annamalai University)
179070	**Thermodynamic Loss Analysis of a high power motorcycle engine with focus on alcohol blended fuels** Stephan Anton Jandl (Graz University of Technology)
179078	**Optical Analysis in Alcohol-Blended Fuels on the Mixture Preparation and Combu Behaviour of Small Two-Stroke SI Engines** Kai Beck, Fabian Titus, Fabian Rauber,Justus Weßling (MOT GmbH)
179088	**An Effect of Bio Diesel Fuel for Low Compression Ratio Diesel Engine Performanc** Hikaru Yamada, Koji Yoshida(Nihon University)
179092	**Spectroscopic investigation of initial combustion stages in a SI engine fuelled wit ethanol and gasoline** Simona Silvia Merola , Silvana Di Iorio , Adrian Irimescu , Paolo Sementa , Bianca M Vaglieco (ISTITUTO MOTORI)
179103	**Development of a fuel injection strategy for a Diesel engine Fumigated with Etha** Tripoom – Painrungrot(King Mongkut's Institute of Technology Ladkrabang.)

illegiate Events

ganizers: Akira Iijima (Nihon University), Takashi Mitome (SUZUKI MOTOR CORPORATION),
offrey McCullough (Queen's Univ. of Belfast)

179087	**Clean and Sustainable Energy for Small Urban Car** Sangriyadi SETIO, Wiranto Arismunandar, Rudy Ong, Adefrid Dwithama, Stefanus Adrian, Angela Claudia, Jery Octavianus, Nu'man Amri Maliky(Institut Teknologi Bandung)
179110	**An Investigation on the Design and Manufacturing of Powertrain System for Stud Formula Japan (SFJ) Vehicle** Tomoaki Kodama, Yasuhiro Honda, Yoichiro Takahashi, Liu Chen, Daisuke Kagawa (Kokushikan University)

esel Engine

ganizers: Masahiko Sugimoto (Kubota Corporation), Ezio Marcaruso (Istituto Motori-CNR), Lu
rchitto (Istituto Motori-CNR), Brian Callahan (Achates Power, Inc.), Cinzia Tornatore(NATION.
SEARCH COUNCIL),Paul Litke (Air Force Research Laboratory)

179023	**Experimental and Numerical Analyses of Swirl Flow by Helical Grooves on Piston i Diesel Engine Run on Biodiesel** Prabhakaran P, C.G. Saravanan, K. Raj Kiran, E. James Gunasekaran (Annamalai University)
179030	**Effect of heat flux on end of Diesel and Kerosene droplet evaporation in high temperature condition** Yoshihide Ota, Hiroshi Enomoto, Jun Higashihara, Masahiro Sasao, Noboru Hiede, Yoshikazu Teraoka (Kanazawa University)
179032	**Characteristics of Flat-Wall Impinging Spray Flame and Its Heat Transfer under Sm Diesel Engine-Like Condition** Rizal Mahmud, Seong Bum Kim, Keiya Nishida , Yoichi Ogata (University of Hiroshim Toru Kurisu (University of Hiroshima, Mazda Motor Corporation), Jun Kanzaki, Tada: Tadokoro (Mazda Motor Corporation)
179035	**Influence of pressure conditions in supercritical atmosphere on flame diameter of Diesel oil and Hexadecane droplet** Takuya Mino, Hiroshi Enomoto, Yoshikazu Teraoka, Noboru Hieda, Masahiro Sasao, Higashihara (Kanazawa University)
179046	**Improvement of Thermal Efficiency and Exhaust Emission in Diesel Engine by App Spray Internal EGR** Tomoyuki Mukayama, Ryota Nishigami, Annisa Bhikuning, Eriko Matsumura, Jiro Se (Doshisha University), Go Asai, Masaki Kuribayashi (YANMAR CO., LTD.)
179089	**Development of 2-cylinder Diesel Engine for European quadricycle in compliance EURO4** Hiroki Oso (Kubota Corporation)
179101	**The Effect of Exhaust Gas Recirculation On Performance And Emission of Ethanol Fumigated Diesel Engine** Kontom – Thammakul (TAIST - Tokyo tech)
179102	**Impact of ethanol blends with bio diesel(B20) on performance combustion characteristics and emissions of a diesel engine** Surith Dulanjala De Silva (TAIST- Tokyo tech)
179105	**Dynamic Modeling of a Diesel Oxidation Catalyst and Diesel Particulate Filter Aftertreatment System for Regeneration Control Development** Chia-Jui Chiang, T. F. Kuo, Anton Halim (National Taiwan University of Science and Technology), S. C. Cheng, Y.Y. Ku (Automotive Research and Testing Center)
179107	**Model-based Analysis of the Oscillatory NOx in Urea Selective Catalytic Reduction Systems** Chih-Cheng Chou (National Defense University), T. F. Kuo, T. H. Tsai, Y. H. Su (Nationa Taiwan University of Science and Technology), J. H. Lu (National Chung Hsing University), Y. Y. Ku (Automotive Research and Testing Center)
179115	**Analysis of Heat Transfer Correlation in a Diesel Engine Based on Heat Flux Measurement using a Rapid Compression and Expansion Machine** Tatsuya Kuboyama, Yasuo Moriyoshi (Chiba University), Hidenori Kosaka (Tokyo Inst

Emissions

Organizers: Hiromi Deguchi (SUZUKI MOTOR CORPORATION), Leonid Tartakovsky (Technio Institute of Technology), Kai Beck(MOT GmbH), Jan Czerwinski (University of Applied Scier Bienne), Silvana Di Iorio(Istituto Motori CNR)

20179009	**A theoretical study of interaction between platinum and oxide support for e gas purification catalyst** Kazuya Miura, Toyofumi Tsuda, Akio Hikasa, Hiroyuki Minokoshi, Fumikazu Kir (SUZUKI MOTOR CORPORATION), Ryo Watanabe, Choji Fukuhara (Shizuoka U
20179011	**Study of ion current application for misfire detection in motorcycle applicati** Lorenzo Mucciarella, Alberto Grimaldi, Francesco Virgilii (Eldor Corporation)
20179041	**Current findings in measurement technology and measurement methodolo and fuel consumption for two-wheeler-applications** Johannes Hiesmayr, Stefan Hausberger, Christian Zinner, Patrick Filips, Stephar Schmidt(Graz University of Technology), Roland Wanker, Hubert Friedl(AVL Lis
20179042	**Results, assessment and legislative relevance of RDE and fuel consumption measurements of two-wheeler-applications** Johannes Hiesmayr, Stefan Hausberger, Jürgen Blassnegger, Roland Kirchberge Christian Zinner, Patrick Filips (Graz University of Technology)
20179076	**Motorcycle Emission Profiles in Bandung City, Indonesia** Adyati P Yudison, Driejana Driejana, Iman K Reksowardojo, Aminudin Sulaema Teknologi Bandung)
20179094	**Impact of Biodiesel on Small CI Engine Combustion Behavior and Particle En Characteristic** Preechar Karin, Chinda Charoenphonphanich, Jiramed Boonsakda, Park Watanawongskorn, Eakkawut Saenkhumvong (King Mongkut's Institute of Tec Ladkrabang), Nuwong Chollacoop(National Science and Technology Developm Agency), Katsunori Hanamura(Tokyo Institute of Technology)
20179126	**A Visualization Study of Soot Production and Oxidation Characteristics Unde Engine Like Conditions** Huynh Thanh Cong, Cong Thanh Huynh(Ho Chi Minh City University of Techno Akihiko Azetsu, Takahiro Kashima, Daisuke Komasaki, Yuta Saito(Tokai Univers

Environmental Impacts

Organizers: Hiromi Deguchi (SUZUKI MOTOR CORPORATION), Leonid Tartakovsky (Technic Institute of Technology) ,Kai Beck(MOT GmbH), Jan Czerwinski (University of Applied Scier Bienne), Silvana Di Iorio(Istituto Motori-CNR)

20179016	**Analysis of Fuel Consumption Status of Small Off-road Engines in China** Jing Qin, Bin Jia, Qianlan Ding, Xicheng Yan, Shun Zhan, Peng Liu (Tianjin Inter Combustion Engine Institute)
20179019	**The Air Fuel Ratio analysis of the I/M data of motorcycles in Taiwan** Liao Ren-Chi (National Chung Hsing University)
20179116	**Effect of Coolant Water and Intake Air Temperatures on Thermal Efficiency o Engines** Naohiro Hasegawa, Yasuo Moriyoshi, Tatsuya Kuboyama (Chiba univercity), M Iwasaki (Calsonic Kansei Corporation)

ngine Components

rganizers: Takahito Murase (Kawasaki Heavy Industries, Ltd.), Adrian Irimescu (Istituto Motor NR), Luca Marchitto (Istituto Motori-CNR)

)179015	**Improvement Approaches of Throttle Response for High Output Snowmobile En with Turbocharger** YUJI SAKAI, Atsushi Murashima (Yamaha Motor Co., Ltd.)
)179055	**Optimization of Intake Port for Improvement of Fuel Consumption and Torque** Yota Sakurai, Yoshinori Nakao, Astushi Hisano, Masahito Saitou, Kunihiro Tanaka (Kawasaki Heavy Industries, Ltd.)
)179060	**Study on Helical Vortex Cyclone Air Cleaner Applied to General-Purpose Engine** Hiroto Takahashi (Honda R&D Co., Ltd. Power Products R&D Center)
)179124	**VAVE design of Antihop Clutch for Motorbikes.** Ashutosh Padmakar Jahagirdar (Endurance Technologies Ltd.)

ngine Controls

rganizers: Yutaka Nitta (SUZUKI MOTOR CORPORATION), Tobias Kallerhoff (Robert Bosch Gmb n Fosaaen (Kerdea Technologies), Adrian Irimescu (Istituto Motori-CNR)

)179045	**Engine Starting System Simulation based on Air-Fuel Ratio Control** Yoshihito Itou (Yamaha Motor Co., Ltd.)
)179052	**Research on Misfire Detection Algorithms for Motorcycle Engine Firing at Unever Intervals** Katsunori Tasaki (Keihin Corporation)
)179065	**Enhanced Diagnosis for Small Engines** Riccardo Basso, Hans-Jürgen Schacht, Matthias Rath, Markus Neumayer (Graz Univ of Technology)

ngine Technology

ganizers: Yuji Araki (Yamaha Motor Co., Ltd.), Akira Iijima (Nihon University), agesh S Mavinahally (Meggitt Control Systems), Luca Marchitto (Istituto Motori-CNR)

)179001	**The Development of the Szorenyi Rotary Engine** Peter D King (Partner)
)179003	**Innovative Carburetor Design with Dynamic Air to Fuel Ratio (AFR) Control for Improved Fuel Economy and Reduced Emissions** Timothy C Simmons (INI Power Systems)
)179005	**Designing Stratified Combustion System for Gasoline Direct Injection Engine by C Software** Jyun-Wei Chen, Hsin Chieh Chiu, Yong Fu Syu, Yuh Yih Wu (National Taipei Universit Technology)
179007	**Applying EGR System In Turbo-Charged Engine for Range Extender** Yu Tang Wang, Jie Yin, Yuh Yih Wu (National Taipei University of Technology)
179129	**Study of a turbocharged engine for motorbike application** Vincenzo Bevilacqua, Giovanni Corvaglia , Matthias Penzel, Klaus Fuoss (Porsche Engineering Services GmbH)

Fuel Supply Systems

Organizers: Michihisa Nakagawa (Kawasaki Heavy Industries, Ltd.), Luca Marchitto (Istituto Motori-CNR), Nagesh S. Mavinahally (Meggitt Control Systems)

20179002	**Application of a New-Concept Gasoline Pump Injector (GPI) on a Motorcycl** Balasubramanian Nallannan, Jayabalan Sethuraman, Titus Iwaszkiewicz (Stan India Private Limited)
20179017	**The spray characteristics optimization for compact motorcycle engine using internal cylinder flow analysis** Yuzuru Sasaki (Keihin Corporation)
20179058	**Investigation of Combustion Instabilities in a Port Injected SI Engine Using F Visualization** A. Velavan (Annamalai University)
20179059	**Effects of Port Injection Specifications on Emission Behavior of THC and Eng Maximum Power** Yoshinori Nakao (Kawasaki Heavy Industries, Ltd.)
20179131	**The Way of Suppressing Self-excited Vibration in Small Pressure Regulator f Motorcycles** Takashi Yokoo, Takeshi Enomoto, Masaki Morita (AISAN INDUSTRY CO., LTD.)

HCCI

Organizers: Tatsuya Kuboyama (Chiba University), Tomoo Shiozaki (Honda R&D Co., Ltd.) Attard (Fiat Chrysler Automobiles), Jaal Ghandhi (University of Wisconsin-Madison), Ezio (Istituto Motori-CNR)

20179061	**The Effect of In-Cylinder Flow and Mixture Distributions on Combustion Characteristics in a HCCI Engine** Shogo Watanabe, Tatsuya Kuboyama, Yasuo Moriyoshi (Chiba University), Ke (SUZUKI MOTOR CORPORATION)
20179073	**Numerical Investigations of the Operation Boundaries of a Natural Gas Fueled** Jörn Judith, Denis Neher, Maurice Kettner (Karlsruhe University of Applied S Darko Kozarac (Faculty of Mech. Eng. and Naval Arch), Markus Klaissle (Sene Wärme-Energiesysteme GmbH)
20179084	**A Study of Combustion in an HCCI Engine Assisted by Non-Equilibrium Plas Discharge** Hyota Hoshino (Nihon University)
20179085	**Analysis of Supercharged HCCI Combustion using Low-carbon Alternative I** Masaaki Togawa, Yuki Takamura, Keito Agui, Takeshi Nishiyama, Akira Iijima, (Nihon University)
20179090	**Influence of Engine Speed on Autoignition and Combustion Characteristics Supercharged HCCI Engine** Hiroto Tanaka, Tatsuya Sato, Shuntaro Takano, Yuya Motoki, Hyota Hoshino, Higuchi, Akira Iijima, Hideo Shoji (Nihon University)
20179096	**Effect of Fuel Injection Parameters on Performance and Emission Characte HCCI Engine - A CFD Study** Guru Kiran H.R, J M Mallikarjun (Indian Institute of Technology, Madras)

I179106	**Dynamic Modeling of a Homogeneous Charge Compression Ignition Engine with Exhaust Throttle** Chia-Jui Chiang, J. W. Wu, T. F. Kuo, Kenny Purnomo (National Taiwan University of Science and Technology)
I179128	**Experimental Investigation on Widen the HCCI Regime in a Small Engine by Mear Compression Ratio and EGR Variants** Le Anh Tuan (Hanoi University of Science and Technology), Ha Thi Khuong (Univers Transport and Communications)

ybrids, Electric Drives, and Fuel Cells

ganizers: Yasuyuki Muramatsu (Yamaha Motor Co., Ltd.), Glenn Bower (University of Wiscon adison), Jay Meldrum (Michigan Tech)

I179039	**Development of New Compact Hybrid System** Satoshi Itoh, Michiyasu Yamamoto (SUZUKI MOTOR CORPORATION)
I179062	**Assessment of Hybrid Two-Wheeler for Mobility in Emerging Markets beyond 20** Pradeep Ramachandra, Manohar Halahali, Prashanth Anantha (Bosch Limited)
I179079	**Study on Appropriate Cooling System According to the Output of the Motor and Inverter for Small EV** Tsukasa Shimizu, Jin Ito, Hideki Shirazawa, Yasuyuki Muramatsu (Yamaha Motor Co
I179104	**Development of a Dynamic Lifetime Prediction Model for Ultracapacitors based Accelerated Aging Tests** Chia-Jui Chiang, T. F. Kuo, Weiliem Abubakar, G. Lee, W. R. Huang (National Taiwan University of Science and Technology)

ıbricants

ganizers: Tohru Nakazono(LEMA / YANMAR Co., Ltd.) ,Michael Marcella(Maxima Racing Oils)

I179008	**Delivering Fuel Economy with Motorcycle Oil Additive Technology** Pei Yi Lim (Infineum Singapore Pte Ltd) ,Anne Young (Infineum USA LP), Youhei Inagaki(Infineum Japan Ltd)
I179012	**The influence of friction modifiers in fully formulated motorcycle oils on steel-stc and clutch-steel contacts using a benchtop testing method.** Gareth Moody, David Gillespie, John Eastwood (Croda Lubricants)
I179031	**Evaluation of Bio Lubricants for Two Stroke Motorcycle Engines** Jiun Chin Chen, Jau Huai Lu(National Chung - Hsing University), Yong Yuan Ku (Automotive Research and Testing Center)
I179095	**Effect of Biofuel and Soot on Metal Wear Characteristic using Electron Microscop 3D Image Processing** Preechar Karin (King Mongkut's Institute of Technology Ladkrabang), Katsunori Hanamura(Tokyo Institute of Technology), Warawut Amornprapa, Phiranat Khamsr (International College, King Mongkut's Institute of Technology Ladkrabang), Kobsal Sriprapha(National Electronics and Computer Technology Center, NSTDA), Pol-ake Budsayahem , Pattara Chammana (Kingmongkut's Institute of Technology Ladkraba

Materials

Organizers: Hirotaka Kurita (Yamaha Motor Co., Ltd.), Aki Kodai (Kawasaki Heavy Industri
David Palmer (Bombardier Recreational Product Inc.) , Mark Degler (Mercury Marine)

20179006	**The effect of tempering conditions for the delayed fracture characteristics carburized steels** Yoichi Inoue , Toshiya Ohta, Hirotaka Kurita (Yamaha Motor Co.,Ltd.)
20179071	**INTER-PLY HYBRID COMPOSITE BASALT-GLASS WOVEN FABRICS REINFORCE LIGHTWEIGHT MATERIALS FOR VEHICLE STRUCTURES** I.D.G Ary Subagia (Udayana University (UNUD)), A. Herman Yuwono (Universi Indonesia), Kim Yonjig (Chonbuk National University)
20179056	**Development of Low Cost Aluminum Tapered Handlebar for Motorcycles** Hirotoshi Inui (Honda R&D Co., Ltd.)
20179125	**THIN WALL AUSTEMPERED DUCTILE IRON CONNECTING ROD FOR LIGHTER AUTOMOTIVE COMPONENT** Rianti Dewi Sulamet-Ariobimo, Gregah Yudha (Universitas Trisakti)

Measurement & Simulation

Organizers: Tadao Okazaki (Kubota Corporation), Hisayuki Sugita (SUZUKI MOTOR CORP
Simona Silvia Merola (Istituto Motori -CNR), Adrian Irimescu (Istituto Motori -CNR), Step
Schmidt (Graz University of Technology), Giovanni Ferrera (University of Florence)

20179020	**Measurement and 3D simulation for Analysis of Emission Improvement in Engine** Koichi Tanaka, Kunio Arase, Amane Kitayama, Toru Shimizu, Akihisa Shimura MOTOR CORPORATION)
20179027	**Numerical transient thermal analysis of cylinder head and valve within a 4** Chien-Hsiung Tsai, Wei-Chun Chang (National Pingtung University of Science Technology), Hui-Hui Huang(Aeon Motor Company)
20179028	**Numerical modeling of heat dissipation inside the continuously variable tr of a 400cc scooter** Hui Hui Huang (Aeon Motor Company), Ta Wei He, Hsiung Chien Tsai (Natio University of Science and Technology)
20179036	**Development of a new comprehensive CFD method for thermal performa evaluation of a scooter type motorcycle and its application** Venkata Suresh Kumar Gundavarapu, Manish Garg (TVS Motor Company Lir
20179038	**A Model Based Approach for generating pre-calibration data for Two-Whe** Rose Mary Simon Palackal, Karthikeyan Ramachandran (Robert Bosch Engir Business Solns Pvt Ltd) , Balagovind Nandakumar Kartha, Pramod Reddemr Limited), Srikanth Vijaykumar (Robert Bosch LLC)
20179044	**A methodology for the experimental measurement of the instantaneous speed in internal combustion engines** Michele Becciani, Luca Romani, Giovanni Vichi, Giovanni Ferrara (University
20179047	**Indirect time-resolved visualization of propagating flame on methane-oxy by densely installed multiple ion-probes** Tomoaki Yatsufusa, Keigo Kii, Kentaro Takatani, Shinsuke Miyata (Hiroshima Technology)

)179048	**Precise measurement of propagating flame in 2-stroke gasoline engine by multip ion-probes** Tomoaki Yatsufusa, Kentaro Takatani, Keigo Kii,Shinsuke Miyata (Hiroshima Institut Technology)
)179067	**A 3D-CFD Study of Flow Dynamics on Mixture Preparation for Fuel Injected Motor** Ranjana Kumari Meena, Adwitiya Dube, Pradeep Ramachandra (Bosch Limited)
)179071	**Simulation based optimization of a motorcycle drivetrain by the integration of a continuously variable planetary transmission** Juergen Tromayer, Michael Gaber (Graz University of Technology) , Scott McBroom Thomassy (Fallbrook Technologies Inc.)
)179074	**Comparison of Optimal & Real-time Operation Strategy for a Hybrid Motorcycle** Paul Rieger, Bernhard Schweighofer, Hannes Wegleiter, Christian Zinner, Stephan Schmidt (Graz University of Technology)
)179080	**Automated Calibration to Optimize Development Time, Effort and Quality of Eng Management Systems** Bijith Thiruvappallil Gangadharan Pillai, Pramod Reddemreddy (Bosch Limited)
)179097	**Modeling of Unsteady Heat Transfer Phenomena at the Intake Manifold of a Diese Engine and Its Application to 1-D Engine Simulation** Mitsuhisa Ichiyanagi, Emir Yilmaz, Hayao Joji, Takashi Suzuki (Sophia University)
0179109	**Effect of Injector Nozzle Hole Orientation on Mixture Preparation in a GDI Engin CFD Analysis** Yashas Karaya, Krishna AS, Mallikarjuna JM (Indian Institute of Technology Madras Chennai)
0179113	**Instantaneous Surface Temperature Measurement in Engine Combustion Using I Developed Coaxial Type Thin-film Temperature Sensor** Daijiro Ishii, Hiromi Saito, Yuji Mihara, Yasuo Takagi (Tokyo City University)
0179114	**Solar Powered Vehicle Ventilation System** Pujitha Padmal Abesing Kodippily (King Mongkut Institute of Technology Ladkraba Kobsak Sriprapha (Solar Energy Technology Laboratory, NSTDA)
:0179117	**The Development of the XiL Testbed for Hybrid Powertrain** MING-YEN CHEN (National Taiwan University)
!0179130	**Knock tendency prediction in highly charged SI engines by the use of 3D-CFD simulation** Vincenzo Bevilacqua, Giovanni Corvaglia, Matthias Boeger, Matthias Penzel, Klaus (Porsche Engineering Services GmbH)

NVH Technology

Organizers: Hiroshi Yano (Kawasaki Heavy Industries, Ltd.), Thomas Lagö (QirraSound Technol Europe AB)

20179034	**Active Sound Quality Control based on Subjective Preference** Shunsuke Ishimitsu, Takuma Sagawa, Tomoki Ito, Naoaki Shimatani (Hiroshima Ci University), Toshihisa Takagi, Kazuki Yoshida, Kenta Suzuki, Takanori Chino (SUZU MOTOR CORPORATION)
20179066	**Design and Performance of Acoustic Metamaterial for Inlet Duct Noise Attenua** Jüri Lavrentjev, Hans Rämmal (Tallinn University of Technology)

20179068	**Parallel active control of acceleration sound** Yoshihiro Aramaki, Shunsuke Ishimitsu, Kenta Murai (Hiroshima City Universit Yoshida, Toshihisa Takaki, Takanori Chino, Kenta Suzuki (SUZUKI MOTOR CORI
20179075	**Reliability Study of Micro-Perforated Elements in Small Engine Silencer App** Hans Rämmal, Jüri Lavrentjev, Fabio Auriemma (Tallinn University of Technol

Two Stroke Engine

Organizers: Tomoo Shiozaki (Honda R&D Co., Ltd.), Brian Callahan (Achates Power, Inc.), I
Duret (IFP School), Giovanni Ferrara (University of Florence)

20179029	**A Study of the Control Space for Knock Mitigation in 28, 55, and 85 cm3 Dis** **Two-Stroke, Spark-Ignition Engines** Joseph K. Ausserer (Air Force Test Pilot School), Paul J. Litke (Air Force Resear Laboratory)
20179037	**Analysis of SI and HCCI Combustion in a Two-Stroke Opposed-Piston Free-Pis** Stephan Schneider, Horst Friedrich (German Aerospace Center), Marco Chio Bargende (FKFS Research Institute of Automotive Engineering and Vehicle En Stuttgart)
20179040	**Fine Tuning of a Sequential Injection Strategy for a Two-Stroke LPDI Engine** Luca Romani, Giovanni Ferrara, Francesco Balduzzi, Giovanni Vichi (Universit Florence)
20179043	**Practicability and Influencing Factors of a Lean Burn Mode for Two-Stroke** **Hand-Held Powertools** Pascal Richard Piecha (Institute of Internal Combustion Engines), Stephan Sc Roland Kirchberger (Graz University of Technology)
20179082	**Potential of a Production DI Two-Stroke Engine Adapted for Range Extend** **Motorcycle Applications** Pierre Duret (IFP School), Stéphane Venturi, Antonio Sciarretta (IFP Energies Nigel Foxhall, Walter Hinterberger (BRP-Rotax)
20179121	**Development of a G.D.I. 2-Stroke Engine Focused for a Range-Extender Ap** Patrizio Nuccio, Daniele De Donno, Andrea Magno (Politecnico di Torino)
20179127	**Study of cold start and idle strategies for emission reduction of 2-cylinder** **engines** Franz Winkler, Roland Oswald, Roland Kirchberger (Graz University of Techn

Vehicle Dynamics and Safety

Organizers: Hisayuki Sugita (SUZUKI MOTOR CORPORATION), Masayuki Baba (Honda R&
Derek Cleasby (Bosch Engineering GmbH)

20179004	**Fundamental study of cornering limit characteristics during braking and d** Hideki Sakai (Kindai University)
20179018	**The tire characteristic effect in the motorcycle maneuverability using a ric** **simulator** Masayuki Miki, Tetsuya Kimura (Yamaha Motor Co., Ltd.)
20179033	**Data Analysis of Off-Road Motorcycle in Enduro Race** Akinori Shinagawa, Hisayuki Nozawa (Yamaha Motor Co., Ltd.) , Yutaro Uch

!0179053	**Investigation and Model-Based Compensation of the Pitch Dynamic Impact on Longitudinal Acceleration Measurement on Motorcycles** Alexander Winkler, Gernot Grabmair (Upper Austrian University of Applied Scien Wels Campus)
!0179086	**Development of Low Fuel Consumption Tire for Small Motorcycles** Shinji Takayanagi, Tomoyuki Matsumura, Kiyotaka Sakai, Kenji Tanaka, Takashi Iwa Shigehiro Yamaguchi (Honda R&D Co., Ltd.)
!0179093	**Modeling, Simulation and Validation of 12 DOF Three-Wheeled Vehicle** Dumpala Gangi Reddy (TVS Motor Company), R Krishna Kumar (Indian Institute o Technology, Madras)
!0179099	**Durability Prediction of Motorcycle Body Components Using Advanced Fatigue Analysis** Kazunobu Sakamoto (Yamaha Motor Co.,Ltd.)

/ehicle Components

Organizers: Hisayuki Sugita (SUZUKI MOTOR CORPORATION), Masayuki Baba (Honda R&D Co. Robert Kee (Queen's University Belfast)

!0179049	**Development of Titanium Fuel Tank Applied for Mass-production Motocrossers** Kohei Hirano, Yuki Chihara (Honda R&D Co., Ltd.)
!0179081	**Technology to improve fuel economy in continuously variable transmission syst** Prashansa Satapathy, Pramod Reddemreddy, Aswathi Subramanian, Yuvaraja Chinnamookkaiyan, Bijith Thiruvappallil Gangadharan Pillai, Srikanth Kotichintala (BOSCH Limited)
!0179123	**Design of Motorcycle Front Fork for Impact Loads** Girish Raghunath Kokane, Dinesh Sriram Kalani, Ravindra Vyankatrao Kharul, Muragendra Shivapra Magadum (Endurance Technologies Ltd)

Functional Safety

Organizers: Takashi Mitome (SUZUKI MOTOR CORPORATION), Thomas Lagö (QirraSound Technologies Europe AB)

!0179057	**ISO 26262 C Class Evaluation Method for Motorcycles by Expert Riders Incorpor Technical Knowledge Obtained from Actual Running Tests** Maki Kawakoshi, Takashi Kobayashi, Makoto Hasegawa (Japan Automobile Resea Institute)
!0179083	**Detailed Study of Hazard Analysis and Risk Assessment of ISO 26262 for Motor** Makoto Hasegawa, Takanobu Kaneko (Japan Automobile Research Institute)
!0179122	**Establishment of standard essential patent norms for two wheeler safety syste such as ABS** Soumya Prakash Patra, Ravindra Vynkatrao Kharul (Endurance Technologies Limi

KEY SPEAKER IN CLOSING CEREMONY

Speaker

. Airlangga Hartarto, MBA, MMT.

linister of Industry
f the Republic of
donesia

Career:

Jul 27, 2016 – present :	***Minister of Industry, Republic of Indonesia***
2005 – 2014	President, Indonesian Public Listed Companies Associa (AEI)
2009 – 2014	Advisory Board, Gajah Mada Alumni Association (KAG/
2009 – 2014	Head of Commission VI, House of Representative, Repı of Indonesia
2006 – 2009	Head of Commission VII, House of Representative, Rep of Indonesia
2006 – 2009	President, The Institution of Engineers Indonesia (PII)
2005	Secretary General, Asean Federation of Engineering Organisations
2002 – 2012	Vice President, Gajah Mada Alumni Association (KAGA

Education:

1987	Mechanical Engineering – Gajah Mada University
1996	MBA – Monash University, Australia
1997	MMT – University of Melbourne

2017-11-05

Thin Wall Austempered Ductile Iron Connecting Rod for Lighter Automotive Component - Production of Thin Wall Ductile Iron Connecting Rod 2017-32-0125

Lighter automotive components are produced to respond to global issue regarding energy. Lighter components can be achieved by replacing the material to those known as lighter material such as aluminium or applying thin wall casting technique. Lightweight automotive components will mean lower fuel consumption. Based on the success in making thin wall ductile iron plate (TWDI) with a thickness to 1 mm using a vertical casting, it encourages the implementation of the design to create lightweight automotive components. The design was applied to produce a thin wall two-cylinder engine ductile iron connecting rod which will be upgraded with austempering process. This connecting rod will be applied in Vespa PX150. The designs were simulated in Z-Cast simulation software and analyzed to determine the most optimum design. The chosen design was casted in a foundry to match the simulation. Evaluation of the characteristics will be run in the second stage of the research.

Author(s): Rianti Sulamet-Ariobimo, Gregah Yudha, Tono Sukarnoto, Yusep Mujalis, Yoska Oktaviano
Affiliated: Faculty of Industrial Technology, Universitas Trisakti
Pages: 6
Event: JSAE/SAE Small Engine Technologies Conference & Exhibition

Related Topics:

CONNECTING RODS FUEL CONSUMPTION IRON

SIMULATION AND MODELING CASTING

2017-11-05

Thin Wall Austempered Ductile Iron Connecting Rod for Lighter Automotive Component - Production of Thin Wall Ductile Iron Connecting Rod 2017-32-0125

Lighter automotive components are produced to respond to global issue regarding energy. Lighter components can be achieved by replacing the material to those known as lighter material such as aluminium or applying thin wall casting technique. Lightweight automotive components will mean lower fuel consumption. Based on the success in making thin wall ductile iron plate (TWDI) with a thickness to 1 mm using a vertical casting, it encourages the implementation of the design to create lightweight automotive components. The design was applied to produce a thin wall two-cylinder engine ductile iron connecting rod which will be upgraded with austempering process. This connecting rod will be applied in Vespa PX150. The designs were simulated in Z-Cast simulation software and analyzed to determine the most optimum design. The chosen design was casted in a foundry to match the simulation. Evaluation of the characteristics will be run in the second stage of the research.

Author(s): Rianti Sulamet-Ariobimo, Gregah Yudha, Tono Sukarnoto, Yusep Mujalis, Yoska Oktaviano
Affiliated: Faculty of Industrial Technology, Universitas Trisakti
Pages: 6
Event: JSAE/SAE Small Engine Technologies Conference & Exhibition

Related Topics:

CONNECTING RODS FUEL CONSUMPTION IRON

SIMULATION AND MODELING CASTING

JSAE 20179125 / SAE 2017-32-0125

Thin Wall Austempered Ductile Iron Connecting Rod for Lighter Automotive Component – Production of Thin Wall Ductile Iron Connecting Rod

Rianti Sulamet-Ariobimo, Gregah Yudha, Tono Sukarnoto, Yusep Mujalis and Yoska Oktaviano

Mechanical Engineering Department, Faculty of Industrial Technology, Universitas Trisakti, Jakarta, Indonesia

ABSTRACT

Lighter automotive components are produced to respond to global issue regarding energy. Lighter components can be achieved by replacing the material to those known as lighter material such as aluminium or applying thin wall casting technique. Lightweight automotive components will mean lower fuel consumption. Based on the success in making thin wall ductile iron plate (TWDI) with a thickness to 1 mm using a vertical casting, it encourages the implementation of the design to create lightweight automotive components. The design was applied to produce a thin wall two-cylinder engine ductile iron connecting rod which will be upgraded with austempering process. This connecting rod will be applied in Vespa PX150. The designs were simulated in Z-Cast simulation software and analyzed to determine the most optimum design. The chosen design was casted in a *foundry* to match the simulation. Evaluation of the characteristics will be run in the second stage of the research.

INTRODUCTION

Automotive components need lighter materials to reduce energy consumption. Scherem showed that every 250 lbs of weight reduction will result in 1 mpg of fuel saving [1]. While Hornung in Bockus stated that every 100 gr. reduction of vehicle weight will save 0.5 liter of fuel for 100 kilometers [2]. Austempered ductile iron (ADI) is not a lightweight material but when thin wall casting method was applied, ADI can compete with lightweight materials. Martinez has combined thin wall casting technique with ADI to produce connecting road as presented by Fig. 1 [3].

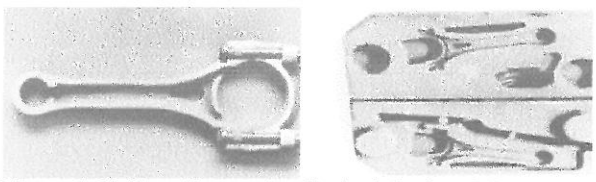


Figure 1. Hollow Connecting Rod – Martinez [3]

Thin wall casting (TWC) is defined as a casting with maximum thickness of 5 mm by Caldera [4] and 3 mm by Stefanescu [5]. TWC application in ductile iron (FCD) will produce thin wall ductile iron (TWDI). TWDI through austempering process produces thin wall austempered ductile iron (TWADI). The thinnest TWDI thickness produced was 1 mm in the form of plate [6,7]. Martinez applied it by creating TWADI hollow connecting rod for two-cylinder engine which produce 55 HP (40 kWh) at 5500 rpm [3]. This hollow connecting rod caused 100 grams of weight reduction. The characterization results showed that the hollow connecting rod has similar abilities compared to the normal one.

Sudarsono et al. [6-12] developed a vertical casting design which produced TWDI plate with full ferrite matrix. Full ferrite matrix is required for TWADI. The design then applied to produce TWDI component. TWDI component produced will be used as a replacement of connecting rod in Vespa PX150. Vespa PX150 is a motorcycle using two-cylinder engine which produce 5,8 kWh at 6000 rpm. So, the TWDI connecting rod must be able to act like the original one. The casting design to produce TWDI connecting rod was presented [13] and the result of simulation process on the purposed casting design showed that shrinkages were found in both small and big ends of the rod [13].

The research of thin wall austempered ductile iron (TWADI) connecting rod is divided into 3 stages. This paper reports the result of the second stage. The aim of this stage is to reduce the defects from both ends by revising the casting design.

RESEARCH METHODS

The research was divided into three stages. In the first stage [13], characterization was applied to the original connecting rod. The characterization gave mechanical properties which should be fulfilled by the TWDI connecting rod. TWDI connecting rod design was also built in this stage. Modification was applied to the original connecting rod of Vespa PX150 (presented in Figure 2) to build the TWDI connecting rod design. The thickness of the I-beam area was reduced from 4 to 3 mm as shown in Figure 3. The purposed design was presented in Figure 4. Casting design was then made to produce the purposed design. The casting design was built based on the patented casting design number

IDP000039503 [6-12] as presented by Figure 5. The casting designs were then analyzed using Z-Cast simulation. In the second stage, the casting designs were improved. The improvement was made based on the simulation result of defects. The improvements were made on shape and dimension of gating system. Casting yield was calculated for every design and the design that fulfill the requirement was produced in foundry scale to verified the simulation result. In the third stage, austempering process will take place.

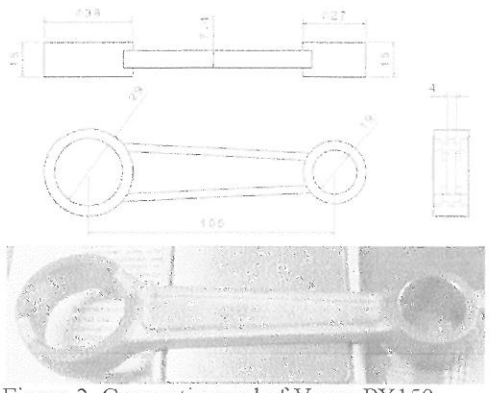
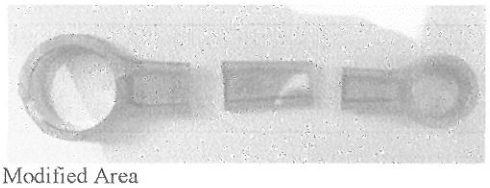
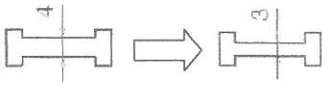


Figure 2. Connecting rod of Vespa PX150



Modified Area



Previous After Modification

Used model Martinez Model

Figure 3. Modified Area and Modification [13]

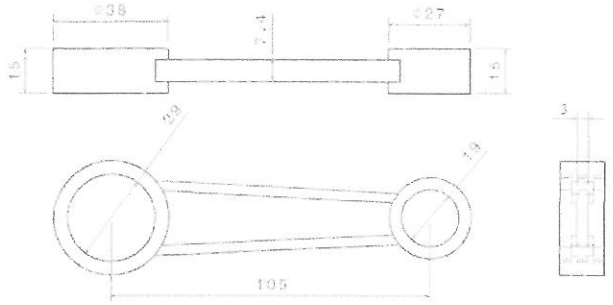
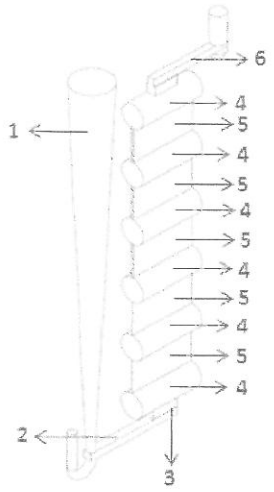


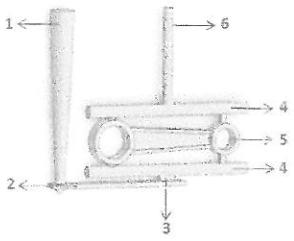
Figure 4. Dimension of the Rod [13]

All the designs were simulated using Z-Cast simulation for filling, solidification and defects. Z-Cast is a casting simulation developed by KITECH – South Korea. The simulation offers all functions to estimate the mold filling process and metal solidification. The boundary conditions of Z-Cast are cast material, mold material, pouring time, pouring temperature and heat transfer coefficient. The color scheme in simulation result for filling process indicates temperature of molten metal. The temperature units are Celcius degree (^{O}C) and degrade from white to blue color. Like in the filling process, color scheme in solidification process also indicates temperature and blue color in this process indicates phases changing from molten to solid metal. As in shrinkage process, blue and red color indicate shrinkage.

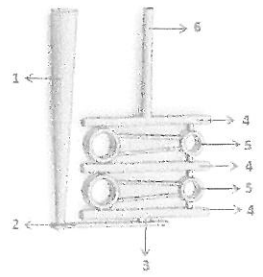
Design coding was presented in Table 1. The coding was separated into 2 categories. The first category, D-S1 to D-S4, were used in the first stage. The differences of every design in the first stage laid on numbers of rod produced. S1 for 1 rod, S2 for 2 rods, S3 for 3 rods and S4 for 4 rods for every mold. While the D-S1M to D-S4M were used for modified designs in the second stage.



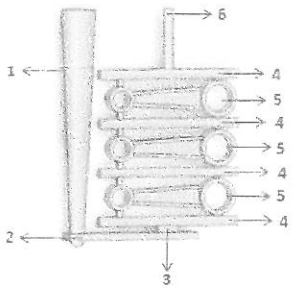
Design No. IDP000039503



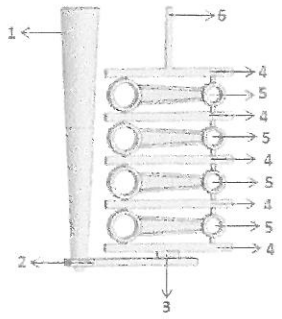
D-S1



D-S2



D-S3



D-S4

Figure 5. Casting Design [13] – 1. Down Sprue 2. Runner 3. Ingate 4. Riser 5. Plate or Connecting Rod 6. Gas Tunnel

Table. 1 Design Coding

Code	Description	Stage
D-S1	Basic Design – 1 rod in 1 mold	1st
D-S2	Basic Design – 2 rods in 1 mold	
D-S3	Basic Design – 3 rods in 1 mold	
D-S4	Basic Design – 4 rods in 1 mold	
D-S1M	Improved Design – 1 rod in 1 mold	2nd
D-S2M	Improved Design – 2 rods in 1 mold	
D-S3M	Improved Design – 3 rods in 1 mold	
D-S4M	Improved Design – 4 rods in 1 mold	

DISCUSSION

The design of TWDI connecting rod developed in this research differs with Martinez [3]. Martinez developed a hollow I-section connecting rod while this research developed reduction of I-section thickness. This model was chosen due to strength and manufacturing process simplicity [13].

Characterization process [13] of the original rod showed that it is made from chromium steel with 0,17% carbon, 0,80% chrom, 0,25% silicon. The microstructure is ferrite and chromium carbides. The standard ultimate tensile strength is 780 MPa (hardened), elongation is 15 % and Brinell hardness number is 217 to 302 MPa. The weight is 136 gr.

Dimension of the original connecting rod was showed by Figure 4. Following the work of Martinez [3], thickness modification is applied in I-section of the connecting rod. Thus, dimensional changing only happened in the thickness of I-section. In this research, the thickness is reduced for 1 mm. Casting design is calculated and built [13] based on the dimension of the original connecting rod except for the thickness of the I-section. Since the casting design is made based on Design No. IDP000039503, the connecting rod is placed between 2 cylindrical risers. As reported previously [13] the result of this showed that shrinkage formed in the big end. To deal with it, improvements are made in the design by enlarging the dimension ingate and riser. The enlargement is applied to push the shrinkage formation in riser and shorten the pouring (filling) time. The dimension of ingate and riser for original and improved designs are presented in Figure 6.

The simulation result for the improved designs were presented in Figure 7. And the comparison was showed in Figure 8 [13]. Simulation of filling showed that molten metal filled every part of the mold and the sign of premature solidification is not found. The molten metal temperature in ingate is high as shown by yellow to orange color. The lowest molten metal temperature in ingate was presented by D-S1M, while the highest is in D-S4M. Although D-S1M showed the lowest molten metal temperature in its ingate but the temperature is still high, marked by the red to orange color. Compared to the basic design, the improved design has higher molten metal temperatures.

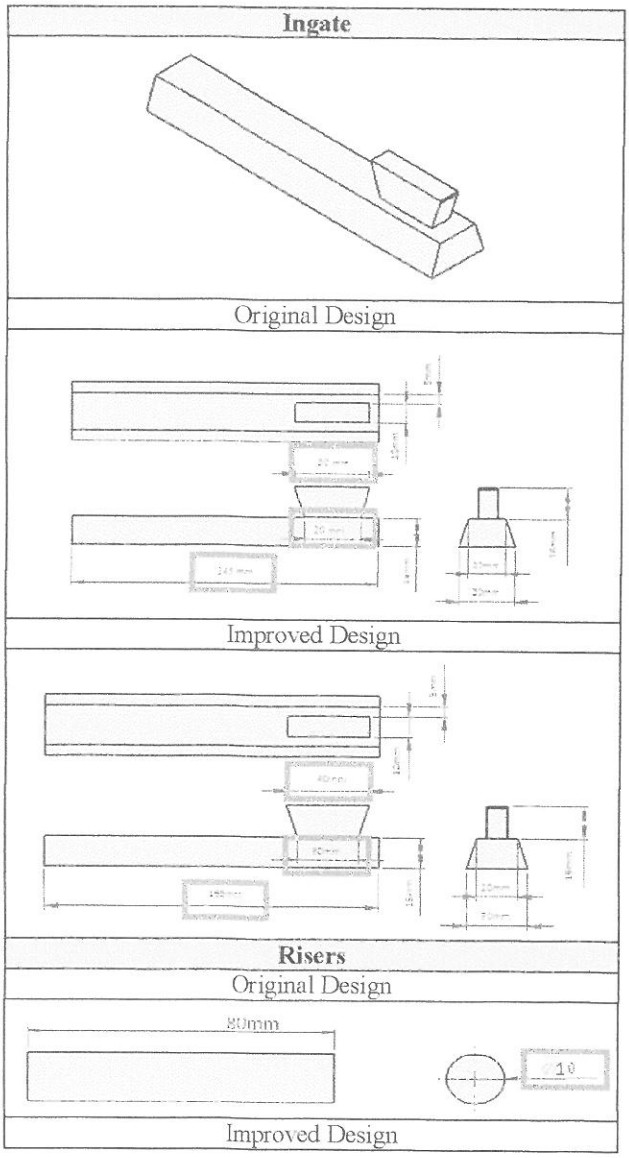
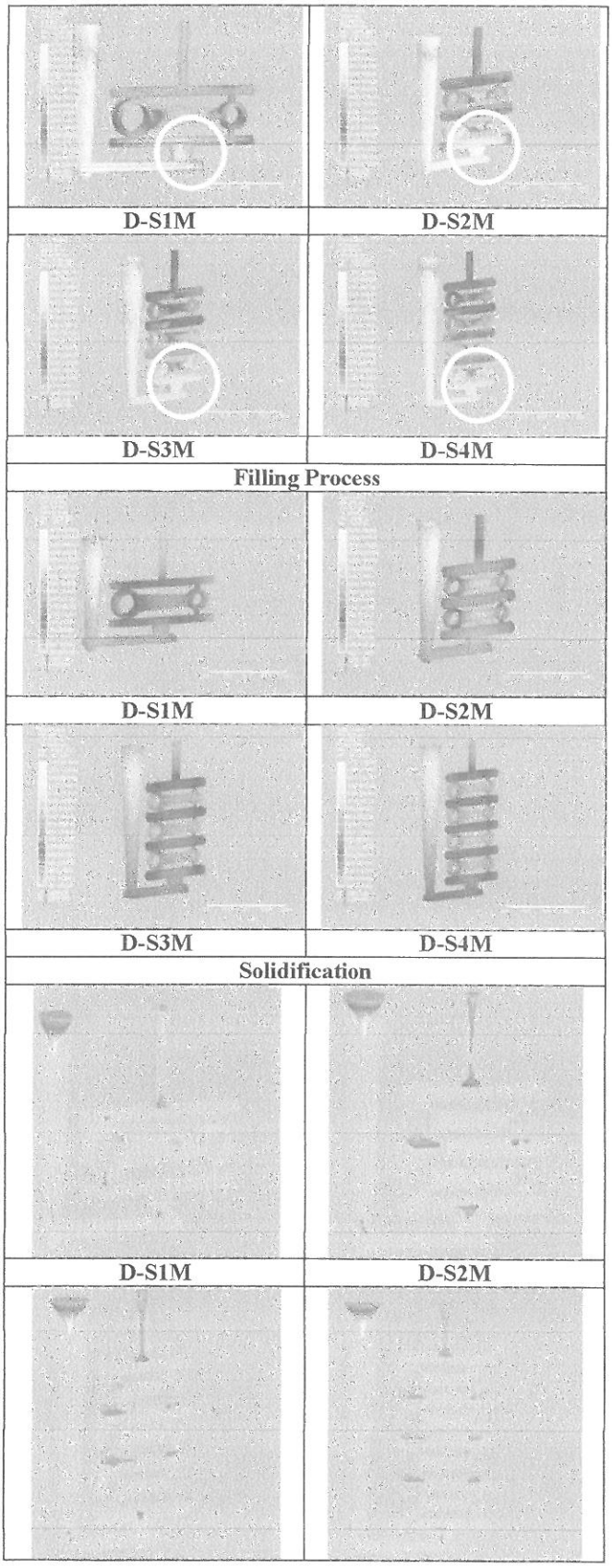


Figure 6. Dimensional Changes.



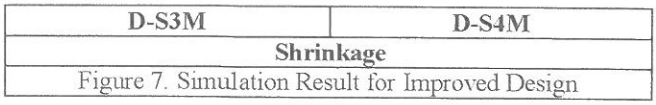


Figure 7. Simulation Result for Improved Design

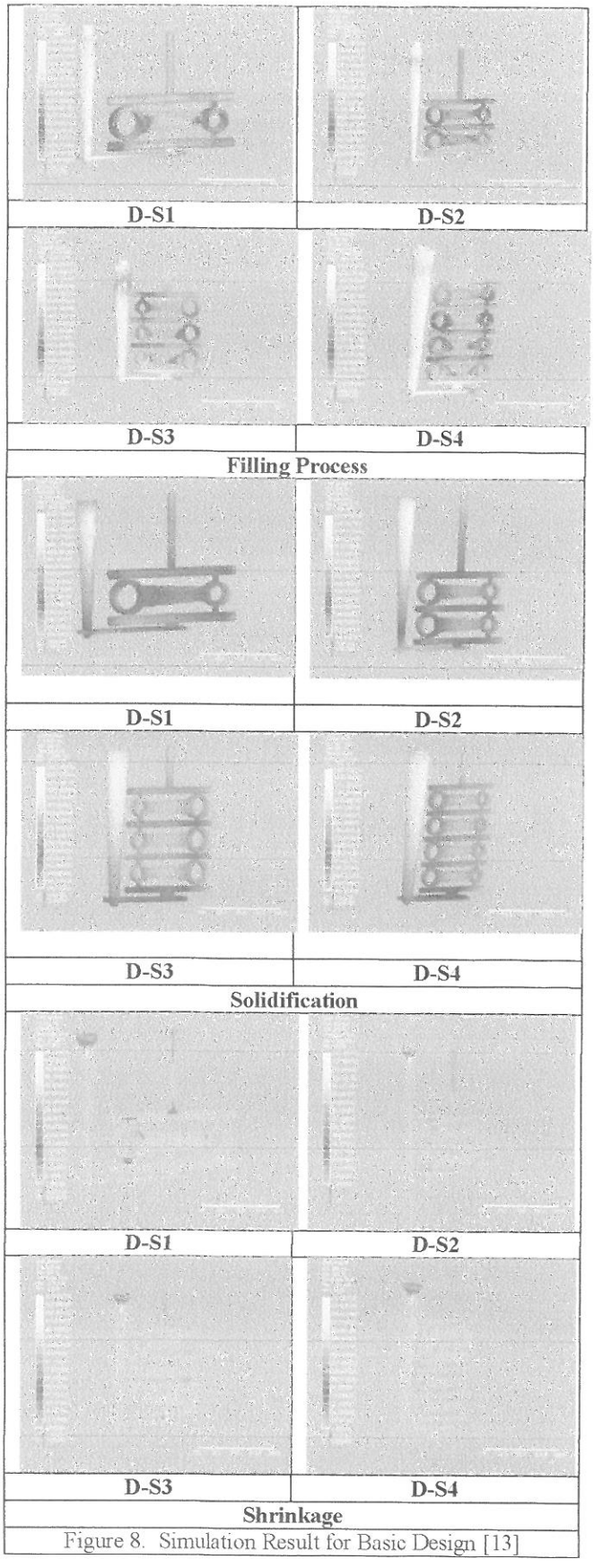


Figure 8. Simulation Result for Basic Design [13]

Solidification on the improved design showed that the last part to solidify is the riser. This result showed that the formation of shrinkage will move to riser. Improved design has higher temperature in risers compared to the basic design as shown in Figure 8. Risers in improved design have red color (Figure 7) while in basic design their colors are blue. The distributions of solidification temperature were not significant that ensure the uniformity in the solidified structures. The first part to solidified was I-beam. Depletion process is applied in this area. The solidification temperatures between both ends tend to be similar. The distribution of solidification temperatures in the improved designs were more even compared to the basic design especially in both ends.

The result of shrinkage simulation showed that shrinkage formation in the improved designs formed almost in risers. Shrinkages in the basic design is found in both ends while in the improved design only found in one end. The improved design has much more shrinkages compared to basic design but most of the shrinkage are formed in riser except for D-S1M. Shrinkages in D-S1M, as well as D-S1, are formed in both ends but still can be tolerated. Compared to D-S1, shrinkage in D-S1M are smaller. Enlarging diameter of the riser delays its solidification process and allows the casting product to solidify first. This condition makes the riser feeds the casting product to compensate for solidification shrinkage and the shrinkages form in the risers. Figure 7 shows that the shrinkage formed in big end of D-S2M, D-S3M and D-S4M is large. But careful observation revealed that most of the shrinkage formed in the risers. As mention previously, dimension of the connecting rod is constant. During improvement, changes are only made to the dimension of ingate and risers.

Table 2. Casting Yield – %

D-S1	D-S2	D-S3	D-S4
51	43	40	31
D-S1M	D-S2M	D-S3M	D-S4M
37	39	40	41

Casting yield is also known as casting efficiency. It is calculated based on the weight of casting product to total casting weight and the unit is percentage. Total casting weight consists of casting products, risers and gating system weights. Higher casting yield shows higher efficiency in material usage. The casting yield for both basic and improved design were presented in Table 2.

The casting yield in the improved designs increase as the number of components increase. This is in reversed to the result of the basic designs. Casting yield in improved designs were not as high as the basic designs. The highest casting yield for improved design was obtained by D-S4M, which is 20% below the highest casting yield in basic design. Casting yield in the improved design is lower than basic design because the dimension of ingate and risers were enlarged. Ingate and risers are part of gating system that increases the weight of total casting.

Determination on the chosen design was based on the analysis of filling, solidification, shrinkage, casting yield and number of components produced. Although basic designs have higher casting yield and smaller shrinkage area but the shrinkage formed in the end parts. The selected design for casting process was taken from improved design which is the D-S4M.

The casting result was presented in Figure 9. As showed in Figure 9 not all components are formed completely. The defective component was component in the top end as showed by Figure 10. This happened because the pouring process was not running continuously. Temperature in the ingate dropped during the discontinuity and caused premature solidification that stop the flow of molten metal.

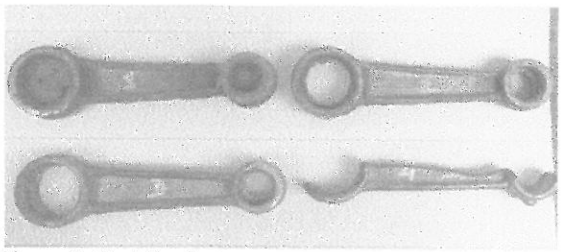


Figure 9. Cast Products

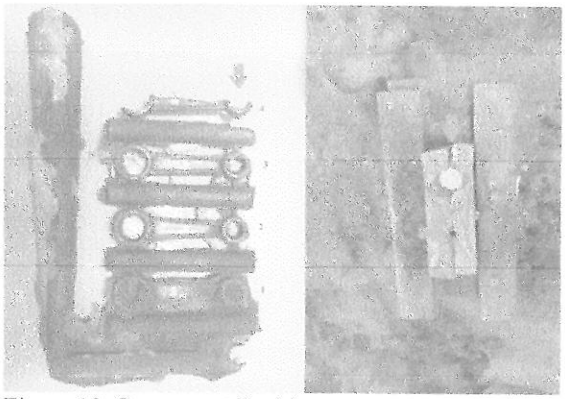


Figure 10. Component Position

Based on the calculation, the weight of TWDI connecting rod is 18.28 gr. Lighter than the original weight. The original weight of the connecting rod is 136.28 gr. and the TWDI connecting rod is 118 gr. The result of experimental work shows that TWDI connecting rod is lighter 36 gr. lighter. The original connecting rod is 136 gr. and the TWDI connecting rod is 100 gr.

CONCLUSIONS

This study shows that the casting design of TWDI plates can be applied to produce connecting rod component. Improvements were made in casting designs and when the simulation reported that premature solidification was not occurred and all parts can be fully charged, then the last part to solidify was riser and shrinkage were formed in riser. This is better compared to basic design. When the design was put in production, the simulation result was confirmed by the casting product. Defects occurred due to human error during the pouring. The weight reduce is 36 grams.

REFERENCES

1. K. K Schrems, J. A. Hawk, Ö. N. Dogan and A. P. Druschitz, "Statistical Analysis of The Mechanical Properties of Thin-walled Ductile Iron Casting", SAE Technical Paper 2003-01-0828, 2003.
2. S. Bočkus, A. Venckūnas and G. Žaldarys, "Relation Between Section Thickness, Microstrustures, and Mechanical Properties of Ductile Iron Castings", Materials Science, 2008. 14(2): p.115.
3. R. A. Martinez, R. E. Boeri and J. A. Sikora, "Application of ADI in High Strength Thin Wall Automotive parts", *2002 World Conference on ADI*, 2002, p. 143.
4. M. Caldera, M. Chapetti, J.M. Massone, and J.A. Sikora: Mater. Sci. Technol, Vol. 23 No. 8 (2007), pp. 1000.
5. D.M. Stefanescu, L.P. Dix, R.E. Ruxanda, C. Corbitt-Coburn, and T.S. Piwonka, AFS Trans, Vol. 110 (2002), pp. 1149.
6. J.W. Soedarsono, B. Suharno and R.D Sulamet-Ariobimo: AMM, 415-417(2012), pp. 831.
7. J.W. Soedarsono and R.D Sulamet-Ariobimo, AMM, 110-116(2012), pp. 3301.
8. B. Suharno, J.W. Soedarsono, T.P. Soemardi, and R.D. Sulamet-Ariobimo, AMR, 277(2011), pp. 66.
9. J.W. Soedarsono, B. Suharno dan R.D. Sulamet-Ariobimo, AMM. 152-154 (2012), pp. 1607
10. R.D. Sulamet-Ariobimo, J.W. Soedarsono and B. Suharno, AMR. 652-654(2013), pp. 2404.
11. R.D. Sulamet-Ariobimo, J.W. Soedarsono and B. Suharno, AMR. 702(2013), pp. 269.
12. R.D. Sulamet-Ariobimo, J.W. Soedarsono and B. Suharno, AMM. 752-753(2015), pp. 845.
13. R.D. Sulamet-Ariobimo, G. Yudha, Y. Oktaviano, Y. Mujalis and T. Sukarnoto, "*Penerapan Teknologi Pengecoran Dinding Tipis pada Batang Piston*", Proceeding Seminar Nasional Material dan Metalurgi, 2016.

CONTACT INFORMATION

Rianti Dewi Sulamet-Ariobimo
Email add : riantiariobimo@trisakti.ac.id

ACKNOWLEDGMENTS

The authors would like to show their appreciation to Universitas Trisakti for funding this research.