NTF
NORDIC TEST FORUM

invites to

TestForum 2018

*A Nordic event for exchange of experience and know-how
within the field of production test of electronics.*

*Meet colleagues and experts, gain knowledge about trends
and best practices in the area of test of electronics.*

Tuesday and Wednesday, November 27th and 28th, 2018

Comwell Conference Center, Snekkersten, Denmark

TestForum 2018 November 27th & 28th Comwell, Snekkersten, Denmark

On behalf of the Nordic Test Forum committee, it is my pleasure to invite you to Comwell Conference Center, Snekkersten, Denmark to the annual NTF conference, TestForum 2018. This is the fourth time of visiting Denmark for our annual conference. Snekkersten is located close to Elsinore (Helsingør), part of Greater Copenhagen, and located about 1 hour by direct train from Copenhagen Airport, Kastrup, or by taxi or car. The conference facility also accommodates hotel, which we recommend for the stay in Denmark.

Again this year, we have managed to put together an excellent technical program for TestForum, focusing on test automation, test strategies, test quality, structural test, functional test and JTAG based test. Not least the challenge in industry with growing automation is reflected in the program, and we are particularly proud of having a major focus on robots, or should I say cobots (collaborative robots). The Keynote focusses on this theme, followed later on in day 1 by 2-3 papers on the subject. The day 1 technical programme ends with a panel session on how to balance the use of robots against more classic automation. No question that the topic is one of the hot issues for many of us in test engineering in present years.

Among the presenters, we find experts from Denmark, Finland, Germany, Norway, Sweden, Belgium, Italy, UK and USA.

This year we have also managed to add a workshop on Industrial IoT to the program. This event is an add-on and run by the partners of a NordForsk project on R&D on IIoT (also referred to as I2OT or I²OT), HI²OT a Nordic university collaborative project. Participants of the TestForum 2018 are invited to stay on in the late afternoon of day 2 to join in on the workshop. During the workshop there will also be wine & cheese refreshments.

This year's Keynote speaker is Søren Peter Johansen, Department Manager, Robotics Technology, Technological Institute. Søren Peter Johansen comes from the Nordic Robotic melting pot in Odense Denmark, an area where many companies in the robotics sector have emerged in recent years and grown to large companies. Companies like Universal Robots, MIR, Blue Ocean Robotics and others are part of this robotics adventure. Søren Peter Johansen will speak about testing - using robotics. The title of the keynote is "Trends in the use of robotics in the electronic production and test of devices"

The conference, the conference dinner and the mini exhibition offer great opportunities for technical and business discussions and networking.

On behalf of the committee, I wish to welcome you to TestForum 2018!

Yours sincerely

Knut Båtstoløkken

Knut Båtstoløkken
Chairman of *Nordic Test Forum*

Key Note Speaker

"Trends in the use of robotics in the electronic production and test of devices"

Søren Peter Johansen**,**
Technology Manager, Danish Technological Institute, Robot Technology

Søren Peter Johansen is born and raised on a farm in the early sixties. From childhood he learned innovative methods, i.e. how to fix machines with available tools and parts, and why playing with LEGO is good for you when you later need to stack straw bales into large structures. During primary school he learned himself how to fix TV-sets based on simple tests of radio tubes, capacitors and resistors. The technical curiosity led him to the local university where he became a Master in Computer Science and Physics.

Since the mid-nineties he has been commercial active in the implementing automatic machines and robots at production sites of electronics including the companies Danfoss, Grundfos, Flextronics, Ericsson, Enermet and even IBM in the USA. At the beginning as programmer - latest as CTO and co-founder in a start-up company.

Since 2010 he has worked for DTI (Teknologisk Institut) as Technology Manager in Odense – the largest eco-system for robotics development in Northern Europe. With his frequent visits to companies and his participation in research and innovation projects at a European level, he can tell where the commercial demands meet the available technologies.

Nordic Test Forum in Brief

TestForum is an annual event that *Nordic Test Forum (NTF)* runs every fall/early winter. *TestForum* typically has 4-6-thematic areas and cover a broad balance of test and inspection.

TestForum has its roots back the late eighties, where it originated as an event for the Norwegian electronics industry. However, from the late part of 2001 a group of people from Norway, Sweden and Denmark established the network, *Nordic Test Forum*. Later on, this activity (including the *TestForum* event was extended to include all the Nordic countries. The language of the official presentations is English. Content and focus of the TestForum varies over time, but always within topic areas in focus at a given point in time.

TestForum has its main emphasis on issues relevant to production managers, engineers and technicians working in the fields of production, test, inspection and validation of electronics. At TestForum events we offer technically relevant presentations on methodology, tools, modules/instruments and available technology. The interaction between users and suppliers within the focus areas is an important asset of TestForum, and this balance and interaction is pursued in presentations, panel discussions, and in the planning of the events.

TestForum Aims at:

- Creating and sustaining a relevant, balanced and coherent interaction between users as well as between users and suppliers of solutions for test, inspection, validation and production of electronics.

- Providing an up-to-date view on new methodologies and tools for relevant test, inspection, validation and production of electronics.

- Establishing a relevant and balanced view on equipment, systems, tools and software from tool vendors in the domain.

Target Audience of TestForum

Engineers and technicians, managers and planners within the fields of electronics production and test, inspection and validation. Includes also decision makers in organizations that procure equipment, tools and systems for production and test, inspection and validation of electronics.

Executive Committee of TestForum event and NTF organization

Knut Båtstoløkken	Kitron AS, Norway (Chairman)
Birger Schneider	CHAMAJ ApS, Denmark (Treasurer)
Bjørn B Larsen	NTNU, Norway (Secretary)
Stig-Gunnar Jensen	Eltek AS, Norway
Mick Austin	JTAG Technologies Finland, Finland
Artur Jutman	Testonica Lab, Estonia
Erik Larsson	Lund University, Sweden
Lars Kongsted-Jensen	EP-TeQ A/S, Denmark
Magnus Rönnqvist	Syntronic Test Systems AB, Sweden
Mauri Aalto	Neste Engineering Solutions OY, Finland
Mattias Ericsson	AddQ, Sweden
Paulius Musteikis	UAB Kitron, Lithuania

Become a Member of Nordic Test Forum

If you are involved in production test, validation test, and inspection of electronics and your professional work is related to activities in the Nordic countries as a test professional, design engineer, manufacturer, supplier of solutions, consultant, etc., you may register as member of Nordic Test Forum (NTF) in order to benefit from:

- Exchange of know-how in testing
- Increased contact network in the Nordic countries
- Surveillance and information of International activities in the area of test and inspection
- Discounts at NTF seminars and TestForum events
- Membership list

Please register on the WEB page: http://www.NordicTestForum.org

TestForum 2018 Local Organizer

The local organizer is:

Birger Schneider
CHAMAJ ApS
Skovgraensen 3,
DK-2960 Rungsted Kyst
Denmark

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Technical Program of TestForum 2018

Nordic Test Forum (NTF) Annual Assembly, Monday November 26th 2018

The NTF organization holds an annual general assembly a day before the TestForum conference. This year it will be held on **November 26th at 20:00**. The agenda and motions will be dispatched to the members in a separate mailing.

Tuesday, November 27th, 2018

Time	Titles	Speakers or additional info
08:30-08:50	Registration	
08:50-09:00	**Welcome / Introduction**	Knut Båtstoløkken
09:00-10:00	**Key Note Session**	*Chairman: Knut Båtstoløkken*
09:00-10:00	"Trends in the use of robotics in the electronic production and test of devices"	Søren Peter Johansen, Danish Technological Institute, Denmark
10:00-10:30	**Exhibitor Forum:** short presentations	*Chairman: Mick Austin*
10:30-11:00	Coffee Break / Exhibition	
11:00-12:30	**Session 1: Test Strategies 1**	*Chairman: Stig-Gunnar Jensen*
11:00-11:30	"In-line PCBA testing"	Henrik Frost, Danfoss Peder D. Lomborg, DSE
11:30-12:00	"PCB Design for Test and Implementation of Test Strategies"	Mark Laing, Mentor, A Siemens Business
12:00-12:30	"Defect free-products: what is the best DfT flow in order to deliver defect-free PCBA"	Christophe Lotz, Aster
12:30-13:30	Lunch	
13:30-15:00	**Session 2: Structural Test**	*Chairman: Mattias Ericsson*
13:30-14:00	"How to test Power Electronics?"	Lothar Diez, Spea
14:00-14:30	"Increasing ICT coverage with Powered Frame-scan and protect your devices with Safe Test"	Peter Kuhlemann, Teradyne
14:30-15:00	"The Next Generation of Manufacturing Board Test: Testing the technologies of the future"	Jun Balangue, Keysight Technologies
15:00-15:30	Coffee Break / Exhibition	
15:30-16:30	**Session 3: Cobots in Test Automation**	*Chairman: Magnus Rönqvist*
15:30-16:00	"The Automation challenge - The Usage of Collaborative Robots in Testing and In-Circuit Tests "	Thomas Goetz Keysight Technologies
16:00-16:30	"Flexible automation supported using Cobots (Collaborative robots)"	Per Kloster Poulsen, Universal Robots
16:30-17:00	**News from conferences**	*Chairman: Artur Jutman*
17:00-17:30	Fruit & Refreshments / Exhibition	
17:30-19:00	**Panel debate:** "Robotics in testing vs traditional automation?"	*Panel moderator: Birger Schneider*
19:30	**Dinner**	

Wednesday, November 28th, 2018

Time	Titles	Speakers or additional info
09:00-10:30	**Session 4: Test Strategies 2**	*Chairman:* Paulius Musteikis
09:00-09:30	"To Software Platform or Not to Software Platform"	Mattias Ericsson, AddQ
09:30-10:00	" Embedded Functional Test and Measurement"	Artur Jutman, Testonica Lab
10:00-10:30	"A Soft Approach to Manufacturing Execution Systems"	Vidar Grønås, Virinco
10:30-11:00	Coffee Break / Exhibition	
11:00-12:30	**Session 5: Reliability, RF & Other Challenges**	*Chairman: Birger Schneider*
11:00-11:30	"Reliable product development based on physics of failure"	Suzanne Otto, FORCE Technology
11:30-12:00	"Reliable Electronics? Precise Current Measurements May Tell You Otherwise…"	Hans Manhave, Ridgetop
12:00-12:30	"Production PCBa RF testing @ Cobham Satcom"	Torben Krogsgaard, Cobham Satcom
12:30-13:30	Lunch	
13:30-15:00	**Session 6: JTAG Based Test & Interconnects**	*Chairman: Lars Kongsted-Jensen*
13:30-14:00	"Synthetic Instruments for design validation and production test"	Jan Heiber, GÖPEL Electronics
14:00-14:30	"Concurrent IJTAG a next Step in IJTAG-based Test"	Rene Krenz-Baath, Hochschule Hamm-Lippstadt
14:30-15:00	"New Innovative and Modular Mass Interconnect Solution with Electromechanical Locking ODU-MAC® Black-Line"	Markus Rochau, ODU GmbH & Co KG
15:00-15:10	Closing Session: TestForum concluding remarks	*Knut Båtstoløkken Kitron*
15:10-15:20	Break	
15:20-18:25	Workshop on HI2OT: "Nordic University Hub on Industrial Internet of Things" See details on next page for the IoT workshop	*Chairman: Erik Larsson*
	Wine & cheese served at a convenient time during the IoT workshop	

Exhibition

As usually, a mini exhibition will take place in frames of TestForum event where vendors are welcome to present their tools and methodologies related to production test. Exhibitors can make arrangements with NTF about exhibition space. If nothing special has been agreed, a table of about 60x120 cm^2, as well as space for posters or similar material will be provided. Every exhibitor will be given 7-8-minute slot in the program for a brief introduction.

Workshop on Industrial Internet of Things (IIoT)

A follow up event, Workshop on HI2OT: "Nordic University Hub on Industrial Internet of Things" has been arranged in conjunction with TestForum 2018. When TestForum 2018 ends around 15:00 hours on the second day (Wednesday November 28), the workshop on Industrial IoT starts and runs until 18:00 hours. During this period, there will also be a wine and cheese party. All participants of TestForum 2018 are invited to join the workshop on IIoT (also referred to as I2OT or I²OT)

The workshop is arranged by HI^{2}OT, a Nordic University collaboration on Industrial IoT aiming at increasing capacity in the participating organizations in Industrial IoT research by creating a critical mass to facilitate the development of a world-leading Nordic research environment

The HI^{2}OT, Nordic University collaboration includes the following universities:

- DTU, Technical University of Denmark, Denmark
- Lund University, Sweden
- KTH – Royal Institute of Technology, Sweden
- Aalto University, Finland
- NTNU – Norwegian University of Science & Technology, Norway

The workshop will include members of the partner organizations, invited industrialists and participants of TestForum 2018.

Wednesday, November 28th, 2018
IoT Workshop

Time	Titles	Speakers or additional info
15:20-18:25	**Workshop on HI2OT: "Nordic University Hub on Industrial Internet of Things"**	*Chairman: Erik Larsson*
15:20-15:30	Opening	Erik Larsson, Lund University
15:30-15:55	"Secure Industrial IoT"	Christian Gehrmann, Lund University
15:55-16:20	"Safe and secure wireless communication for cooperative systems"	Stig Petersen, SINTEF, Norway
16:20-16:45	"Reliability in Resource-Constrained Wireless Networks with IEEE 802.15.4 TSCH"	Xenofon Fafoutis, Danish Technichal University, Denmark
16:45-17:05	Wine & cheese break	
17:05-17:30	"Fault-tolerant topology and routing synthesis for IEEE time-sensitive networking"	Bahram Zarrin, Danish Technichal University, Denmark
17:30-17:55	"Fault management; chip to system"	Erik Larsson, Lund University
17:55-18:20	Panel: How to securing the supply-chains at PCB manufacturing? Panelists: Christian Gehrmann, Lund University Stig Petersen, Sintef, Norway Xenofon Fafoutis, DTU, Denmark Bahram Zarrin, DTU, Denmark	Moderator: Erik Larsson
18:20-18:25	Closing and wrap-up	Erik Larsson, Lund University

Registration and hotel booking

The **Conference Fee** for participation in TestForum 2018 are as Follows:

- A: NTF Member   EUR 450
- B: Non-Member   EUR 525
- C: Student (with valid student ID)   EUR 250
- D: Exhibitor, i.e. want to exhibit in the small exhibition   EUR 850

Please indicate, when you register, which category you register in.

The fee includes participation, food (lunch & dinner) and refreshments from Tuesday morning to Wednesday after-noon as well as forum proceedings (available on USB memory stick). The Exhibitor fee of EUR 850 also includes the participation of a single person.

The seminar fee will be invoiced directly to the organization, from which the participant comes. In the event of cancellation after the final registration date, or in the event of failure to appear, the entire fee is still due. On request, another person from the same organization can participate instead.

Hotel accommodation is available at the conference hotel. The hotel rooms are booked through the TestForum 2018 seminar registration, but the room rate is paid directly by each participant to the hotel (i.e. not included in the seminar fee). The room rate is DKK 1238 (EUR 166) single room and DKK 1538 (EUR206) double room per night, including breakfast.

Booking of rooms at the conference hotel is not mandatory for participation at the seminar

The r**egistration deadline is Thursdayay 25th, October, 2018**, in order **to guarantee hotel room**. **Registration after this date is also possible**. However, we cannot guarantee that hotel rooms are available at the conference hotel and the special room rate may no longer be valid.

Registration for TestForum 2018 can be done through the NTF website by using the following link.

- http://www.NordicTestForum.org

Alternatively, one can contact the TestForum secretariat at

Att.:   Suzanne Holte
Tel.:   +45-2088 5972
Email: suzanne@nordictestforum.org

Comwell Borupgaard, Snekkersten, Denmark

Located in beautiful North Zealand (Nordsjælland), you find one of the most attractive hotel and conference centers in Denmark. An old manor house with the addition of a new, modern-style wing creates a unique atmosphere combining old fashioned charm with completely modern facilities.

Comwell Borupgaard offers 158 bright, comfortable rooms including 4 suites, two fine restaurants and a banqueting hall (seating capacity 450), indoor pool, fitness center and beautiful surroundings. The charming city of Elsinore (Helsingør) with Hamlet's castle Kronborg, Sweden and Louisiana Museum of Modern Art are all close by.

Transport to Comwell Borupgaard

Comwell Borupgaard is located 400 m from Oeresund (Øresund), about 40 km North of Copenhagen (København) and 3½ km South of the city center of Elsinore (Helsingør).
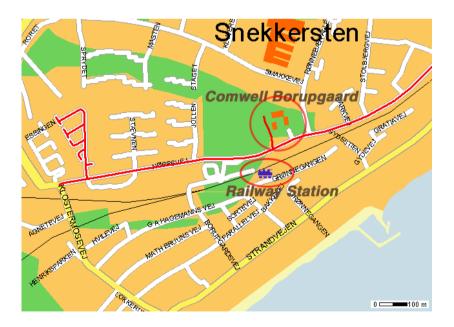
Copenhagen(København). If you arrive from Copenhagen, it is quite easy to come by public transportation. Take the train on the coastal route (Kystbanen), direction Elsinore (Helgingør). You may leave from the Central Station, from stations at Nørreport or Østerport or other stations on the costal line. Trains are leaving every 20 minutes. The trip to Snekkersten is about 45 minutes. Snekkersten is the second but last station before Elsinore. Upon arrival at Snekkersten, leave the station towards North, step across the street and here you see the small lane leading up to Comwell Borupgaard. You will have to walk about 250 m.

Kastrup, Copenhagen Airport. You may take public transportation. Take the train, one level down from the arrival hall, direction Elsinore (Helgingør) via Copenhagen Central Station. The trip takes 1:05 hours. Normally you need not change at Copenhagen Central Station but can remain in the same train. Follow the same procedure as above (Copenhagen).

Elsinore (Helsingør). Take the train Southbound for Copenhagen one station and get off at Snekkersten, or get a taxi for the 3½ km ride. (Ferries to and from Sweden leave every 20 minutes from Elsinore to Hälsingborg in Sweden. The ferry to Oslo may be boarded at Hälsingborg).

By Car via Motorway E47/E55. Drive North, direction Elsinore (Helsingør). When the motorway ends, continue straight on towards Elsinore on the Kings Road (Kongevejen). At the second roundabout turn right towards Snekkersten following O3, "Klostermosevej". Drive about 1½ km until you reach a railway viaduct. Do not go under this but turn left on "Nørrevej". After about 800 m you reach the entrance for Comwell Borupgaard on your left.
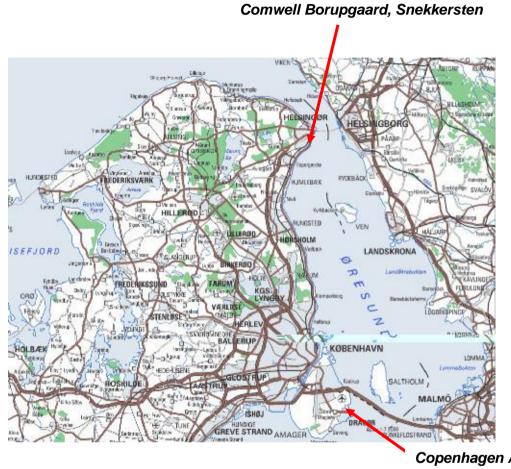
By Car on the Coastal Road (Strandvejen). Halfway between the 38 km milestone, at Skotterup, og the 39 km milestone, at Snekkersten, you see a road, "Klostermosevej" leaving in the direction of Northwest (opposite th coastal side). Follow this about 650 m until you have passed under two railway viaducts. Now turn right on "Nørrevej". After about 800 m you see on your left the entrance to Comwell Borupgaard.

Time tables for public transportation between e.g. Copenhagen Airport ("Kastrup Lufthavn") and Snekkersten (Comwell-Borupgaard) can be found from:

http://www.rejseplanen.dk/bin/query.exe/en?L=vs_html5&

Comwell Borupgaard, Snekkersten

Copenhagen Airport, Kastrup

Train tickets from Copenhagen Airport

Train ticket from Copenhagen airport to Snekkersten station costs 116 DKK (15,60 Euro) one way (unless you have a "Rejsekort" for frequent travels in Denmark, which will allow a price of 73 DKK one way). Tickets can be purchased at the station, but not on the train. It is also possible to purchase in advance over the Internet:

https://www.rejseplanen.dk/webapp/index.html?language=en_EN

Select: "Buy ticket"