

EXPLORE THE

# ENORMITY OF THE SMALL



**MicroManufacturing**  
Conference & Exhibits

**March 28-29, 2012**

Hynes Convention Center  
Boston, Massachusetts

• Make connections • See innovations • Find solutions

Society of  
Manufacturing  
Engineers



**MICRO  
MANUFACTURING**  
CONFERENCE & EXHIBITS

[sme.org/micro](http://sme.org/micro)

# EXPLORE THE **ENORMITY** OF THE **SMALL**

## **MicroManufacturing Conference & Exhibits**

**March 28-29, 2012**

Hynes Convention Center | Boston, Massachusetts

**W**hether the challenge is creating micro features on micro parts or on macro parts, participants in this event will be looking for ideas to improve their process. Exploring the many processes available, this conference brings together industry professionals to discuss the latest developments to improve your process today.

### **Featuring:**

- Precision Micro Machining
- Micro Molding
- Micro Assembly
- Micro Forming
- Micro Metrology
- Emerging Technologies & Applications

## **2 Events — 1 Location**

The MicroManufacturing Conference & Exhibits is co-located with the NanoManufacturing Conference & Exhibits ([sme.org/nanomanufacturing](http://sme.org/nanomanufacturing)). Your registration includes admission to both events.

### **Attend to:**

- Obtain insightful information on cutting-edge technology
- Improve part quality and lower production costs
- Gain a better understanding of the proper techniques and applications
- Learn effective solutions to real world problems
- Network with experts and peers in the micromanufacturing
- Have your specific questions answered and problems solved by industry experts
- Find solution vendors for nearly every micromanufacturing challenge

## **Meet Your Event Advisors**

- Carol Barry, University of Massachusetts – Lowell
- Donna Bibber, Micro Engineering Solutions
- Andre Claudet, Sandia National Laboratories
- Kornel Ehmann, Northwestern University
- Thomas Kurfess, Clemson University
- Chas Manning, SME Student Chapter, Boston University
- J. Rhett Mayor, Georgia Institute of Technology
- Jerry Mraz, SmalTec International
- Brianna Nelson, SME Student Chapter, Boston University
- Erik Novak, Bruker
- Frank Pfefferkorn, University of Wisconsin – Madison
- John Wallace, Deringer-Ney

# Exhibits in the Round

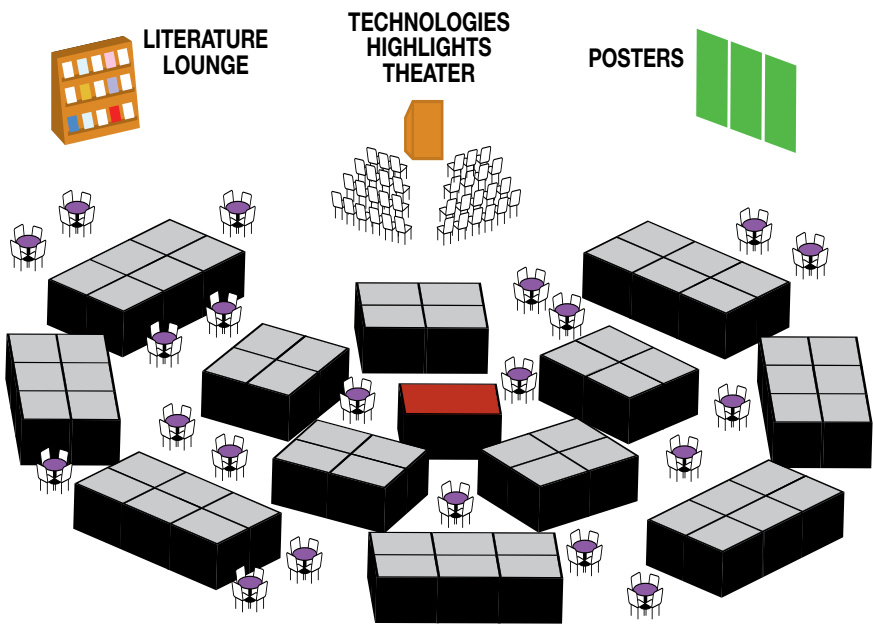
**Wednesday, March 28**

10:00 a.m. – 6:30 p.m.

Reception: 4:30 p.m. – 6:30 p.m.

**Thursday, March 29**

9:00 a.m. – 2:00 p.m.



**SHOW  
ENTRANCE**

↓ CONFERENCE  
SESSIONS ↓

## Technology Highlights Theater

Find the latest solutions available from industry leaders by attending one of the many sessions at the Technology Highlights Theater on the show floor. Several exhibitors will provide quick updates on latest technology available throughout the show. Each session will include at least three updates and are open to ALL event participants. Plan your schedule to make sure you attend these valuable information programs.

**Wednesday, March 28**

10:00 a.m. – 10:30 a.m.

1:00 p.m. – 1:30 p.m.

3:00 p.m. – 3:30 p.m.

**Thursday, March 29**

10:30 a.m. – 11:00 a.m.

1:30 p.m. – 2:00 p.m.

## Poster Session

A select group of poster presentations will be available to view and discuss during the exhibit hours. You will see some of the best work taking place at both industry and university research centers in micromanufacturing and nanomanufacturing. The poster session is open to all conference and exhibits participants.

Media Partner

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ENGINEERING**

Media Sponsor



# Pre-Conference Opportunities

## Tuesday, March 27

Choose a workshop, tour, or a half-day workshop and tour combo to add even more value to your conference experience.

### WORKSHOPS

New to the technology, need a refresher or just want to explore the topic in more depth? Join us for one of these pre-conference workshops!

#### MicroManufacturing Fundamentals

##### MEET YOUR WORKSHOP LEADER

*J. Rhett Mayor, Georgia Institute of Technology*



##### WORKSHOP OUTLINE

*8:30 a.m. – 8:40 a.m.*

##### Introduction to the Workshop

*J. Rhett Mayor, Georgia Institute of Technology*

*8:40 a.m. – 9:25 a.m.*

##### Introduction to Micro Machining: Mechanical Removal and Ablative Removal Processes

*J. Rhett Mayor, Georgia Institute of Technology*

*9:25 a.m. – 10:10 a.m.*

##### Introduction to Micro Machining: Electric Discharge and Electrochemical Removal Processes

*J. Rhett Mayor, Georgia Institute of Technology*

*10:10 a.m. – 10:30 a.m.*

##### BREAK

*10:30 a.m. – 11:30 a.m.*

##### Introduction to Micro Molding: Current Processes and Techniques

*Carol Barry, University of Massachusetts – Lowell*

*11:30 a.m. – 12:30 p.m.*

##### GROUP LUNCH

*12:30 p.m. – 1:30 p.m.*

##### Introduction to Micro Forming: Current Processes and Techniques

*Gap Yong-Kim, Iowa State University*

*1:30 p.m. – 2:30 p.m.*

##### Introduction to Fixturing and Workholding

*Gloria Weins, University of Florida*

*2:30 p.m. – 2:45 p.m.*

##### BREAK

*2:45 p.m. – 3:45 p.m.*

##### Micro/Meso Metrology: Characterizing Micro/Meso Products

*Thomas Kurfess, Clemson University*

*3:45 p.m. – 4:45 p.m.*

##### Current State of Micro/Meso-Scale Machining and Machine Tool Systems Research

*Kornel Ehmann, Northwestern University*

*4:45 p.m. – 5:00 p.m.*

##### WRAP-UP

#### Metrology for MicroManufacturing and NanoManufacturing

##### MEET YOUR WORKSHOP LEADER

*Thomas Kurfess, Clemson University*



##### WORKSHOP DESCRIPTION

More than just presentations on the available technologies, this workshop will delve into understanding how and where to use the metrology approach for your challenge. Through case studies and interactive discussions, you will explore real life uses and understand the best fit as well as those that are better suited using other approaches. Participants are strongly encouraged to submit their questions and specific challenges before the workshop. This is your opportunity to have your questions answered by a variety of metrology experts.

*8:30 a.m. – 8:45 a.m.*

##### Welcome & Introduction

*Thomas Kurfess, Clemson University*

*8:45 a.m. – 10:00 a.m.*

##### Atomic Force Microscopy

*Erik Novak, Bruker*

*10:00 a.m. – 10:15 a.m.*

##### BREAK

*10:15 a.m. – 11:30 a.m.*

##### Developing Micro-Robotic Insects with Confocal Microscopy

*Mario Gislao, Olympus America*

*11:30 a.m. – 12:30 p.m.*

##### GROUP LUNCH

*12:30 p.m. – 1:45 p.m.*

##### Process Development and Control of Surface Finish, Features, and Films Using 3D Optical Profiling

*Erik Novak, Bruker*

*1:45 p.m. – 2:00 p.m.*

##### BREAK

2:00 p.m. – 3:15 p.m.

**Cutting “Edge” Methods in Video Metrology**

*Tom Groff, Optical Gaging Products*

3:15 p.m. – 3:30 p.m.

**BREAK**

3:30 p.m. – 4:45 p.m.

**Solve the 3D Metrology Challenge Using Micro CMM Technology**

*Andre Claudet, Sandia National Laboratories*

4:45 p.m. – 5:00 p.m.

**WRAP-UP**

**TOURS**

12:30 p.m. – 4:00 p.m.

**iRobot**

iRobot designs and builds robots that make a difference. Founded in 1990 with the vision of making practical robots a reality, iRobot has made some of the world’s most important robots. From their home robots (Roomba®, Scooba®, Vero®, Looj®) to their combat-proven government and industrial robots, iRobot is driving innovation, serving as an industry catalyst and changing the world by fueling the era of robots. Participants will see the iRobot

Museum, including 20+ years of robotics history, and a demonstration of some of iRobot’s latest products.

**NSF Center for High-rate Nanomanufacturing and the Kostas Nanomanufacturing Research Center**

The NSF Center for High-rate Nanomanufacturing (CHN) is developing tools and processes to conduct fast massive directed assembly of nanoscale elements by controlling the forces required to assemble, detach, and transfer nanoelements at high rates and over large areas. The center has many applications such as a nonvolatile memory switches using (SWNTs) or molecules have been assembled on a wafer level. Participants on this tour will see the George Kostas Nanoscale Technology and Manufacturing facility which has a full six inch wafer fabrication line consisting of class 10 and class 100 clean room spaces, the capability for nano-lithography processes (e-beam, nanoimprint, etc.), and other nanofabrication and nanoscale characterization tools.

*NOTE: All tour participants are subject to final approval by the host facilities, which reserve the right to PRESCREEN and DECLINE attendance for the tour. Cameras are not allowed on either tour.*

# Conference Agenda

## Day One — Wednesday, March 28

**A new way to look at the conference schedule**

Visit the event website ([sme.org/micro](http://sme.org/micro)) for complete descriptions of each presentation. Below you will find key “CHALLENGES” each presentation helps you address as well as indicators for those that include a case study and new information.

8:00 a.m. – 9:00 a.m.

**REGISTRATION/CHECK-IN**

9:00 a.m. – 10:00 a.m.

**KEYNOTE: Challenges in Real World Manufacturing**

*Dr. Mark da Silva, Product Development Team Leader, Micromachined Products Division, Analog Devices, Inc.*



Analog Devices (ADI) specializes in technologies used to convert, condition, and process real-world known phenomena, such as light, sound, temperature, motion, and pressure into electrical signals. As Product Development Team Lead at Analog Devices, da Silva is responsible for development of new MEMS inertial sensor products for consumer and medical markets. He will share some of his

experiences and challenges faced when using micro and nanotechnologies in production. Discussion will include nanostructures, optics, and microfluidics.

10:00 a.m. – 10:30 a.m.

**Break/Technology Highlights Theater**

**MICRO MACHINING**

10:30 a.m. – 11:15 a.m.

**Effect of Coating Properties and Cutting Edge Geometry on Micro End Milling**  
*Frank Pfefferkorn, University of Wisconsin-Madison*

CHALLENGE: How to prevent cutting tip fracture in micro end milling by understanding the influence of cutting edge radius and process forces.

**NEW PROCESS**

11:15 a.m. – 12:00 p.m.

### Multi-Material Micro Machining of Ultra-High Aspect Ratio Features

*Murali Meenakshi Sundaram, University of Cincinnati*

CHALLENGE: High aspect ratio micro machining freeform metallic micro machining using high speed micro abrasive machining

CASE STUDY NEW TECHNOLOGY NEW PROCESS

12:00 p.m. - 1:00 p.m.

### Group Lunch on the Show Floor

1:00 p.m. – 1:30 p.m.

### Technology Highlights Theater

1:30 p.m. – 2:15 p.m.

### How to Master Micron Accuracy in LED Production

*Gisbert Ledvon, AgieCharmilles*

CHALLENGE: Accuracy throughout the entire process chain of building miniature molds for the LED industry using new cutting tool measuring for HSM and in process quality on EDM.

CASE STUDY NEW TECHNOLOGY NEW PROCESS

2:15 p.m. – 3:00 p.m.

### Precision Electrolytic Machining

*Don Risko, PEM Technologies*

CHALLENGE: Micro machining of metal parts in production volumes without burrs eliminating post processes such as polishing and deburring.

NEW PROCESS

3:00 p.m. – 3:30 p.m.

### Technology Highlights Theater

3:30 p.m. – 4:15 p.m.

### Bench-Top Laser Tool for Precisions Micro Machining

*Andrew Webb, Optek Systems*

CHALLENGE: Case studies present applications developed for solar, micro-electronics and sensors using a small laser machining tool

CASE STUDY NEW TECHNOLOGY

4:15 p.m. – 5:00 p.m.

### Application-Specific Customizable Architecture of Nueral Interfaces

*Rohit Sharma, University of Utah*

CHALLENGE: Design and fabrication of advanced neural interfaces capable of communicating with individual neurons for closed-loop prosthetics control and new therapeutic applications, implementation of novel array geometries on demand, and some invitro and invivo applications

CASE STUDY NEW TECHNOLOGY

## MICRO MOLDING

10:30 a.m. – 11:15 a.m.

### Micro Molding Needles and Drug Arrays

*Donna Bibber, Micro Engineering Solutions*

CHALLENGE: Stainless steel needles can be ground to a sharp point; however, polymer micro injection molded needles can provide three-dimensional geometry with less pain to the patient.

NEW TECHNOLOGY NEW PROCESS

11:15 a.m. – 12:00 p.m.

### Five Things You Need to Push the Limits in Micro Molding

*Chip Leri, Accumold*

CHALLENGE: Through discussion of real-world application, achieving fantastic results with micro molding will be demonstrated.

CASE STUDY NEW PROCESS

12:00 p.m. - 1:00 p.m.

### Group Lunch on the Show Floor

1:00 p.m. – 1:30 p.m.

### Technology Highlights Theater

1:30 p.m. – 2:15 p.m.

### Microshot Molding of Powder Injection Materials

*John Ward, Arburg*

CHALLENGE: Parts with internal threads, difficult undercuts and high surface quality can be manufactured on injection molding machines simply, reliably and with a high degree of automation.

CASE STUDY NEW APPLICATION

2:15 p.m. – 3:00 p.m.

### Micro Molding in Medical Devices

*Patrick Kavanaugh, SMC*

CHALLENGE: When to use micro molding, component validation, material selection, final assembly

CASE STUDY NEW PROCESS

3:00 p.m. – 3:30 p.m.

### Technology Highlights Theater

3:30 p.m. – 4:15 p.m.

### Microstructured Extrusion Tooling Enables High Performance Microstructured Products

*William King & Andrew Cannon, Hoowaki*

CHALLENGE: Products extruded using micro extrusion tools have properties and performance that cannot be achieved with other technologies.

CASE STUDY NEW PROCESS NEW APPLICATION

4:15 p.m. – 5:00 p.m.

**Polymer-Tooling Compatibility for Injection Molding of Microstructured Surfaces**

*Carol Barry, University of Massachusetts – Lowell*

CHALLENGE: Determining compatible tooling materials

NEW PROCESS

**MICRO EMERGING TECHNOLOGIES AND APPLICATIONS**

10:30 a.m. – 11:15 a.m.

**Recent Advances in Micro Manufacturing**

*Jun Ni, Wu Manufacturing Research Center, University of Michigan*

CHALLENGE: Improved formability, rapid fabrication of micro features

NEW TECHNOLOGY NEW PROCESS

11:15 a.m. – 12:00 p.m.

**Microforming Processes and Innovations**

*Brad Kinsey, University of New Hampshire*

CHALLENGE: Producing microformed components that are dimensionally accurate and cost effective with electromagnetic and electrical-assisted forming

CASE STUDY NEW TECHNOLOGY

12:00 p.m. – 1:00 p.m.

**Group Lunch on the Show Floor**

1:00 p.m. – 1:30 p.m.

**Technology Highlights Theater**

1:30 p.m. – 2:15 p.m.

**Arrayed Microchannel Manufacturing: Case Studies and Opportunities**

*Brian Paul, Oregon State University*

CHALLENGE: Microchannel process technology has great potential for reducing the size and weight for a host of chemical and thermal system components currently sold in mass markets.

CASE STUDY NEW TECHNOLOGY

2:15 p.m. – 3:00 p.m.

**Flex Manufacture of Microfluidic Devices**

*Leanna Levine, ALine*

CHALLENGE: Complex microfluidic disposable that has a price point compatible with reimbursement schedules for diagnostic tests

NEW PROCESS

3:00 p.m. – 3:30 p.m.

**Technology Highlights Theater**

3:30 p.m. – 4:15 p.m.

**Micro Laser Sintering for Series Production of Micro Parts**

*Joachim Goebner, EOS*

CHALLENGE: Overcome micromanufacturing limits, reduce manufacturing cost of micro parts, serve trends to customization, functional integration and miniaturization — all in one

NEW TECHNOLOGY

4:15 p.m. – 5:00 p.m.

**Metallurgical Solutions for MicroManufacturing**

*Edward Smith, Deringer-Ney*

CHALLENGE: Improved electrical performance under extreme environmental conditions with new material.

CASE STUDY

5:00 p.m. – 6:30 p.m.

## Reception & Exhibits

Increase your networking opportunities by attending the program's reception on March 28 and mingle with other micromanufacturing and nanomanufacturing professionals. Representatives will be available at the exhibits to answer questions about new and existing technologies. Network with top suppliers, speakers, and participants in a relaxed atmosphere.

**MICRO METROLOGY**

9:00 a.m. – 9:45 a.m.

**Relevant, Accurate Surface Measurements of Micro-Scale Components**

*Erik Novak, Bruker*

CHALLENGE: Comparing technologies for surface measurement including various 3D microscopes, SEM, AFM, and stylus. Ways to confirm system accuracies and capabilities from both a hardware and software standpoint will be explored as well.

CASE STUDY NEW PROCESS

9:45 a.m. – 10:30 a.m.

**Applications of Microscopy in Micro and NanoManufacturing**

*Michelle Cavaliere, MVA Scientific Consultants*

CHALLENGE: Complete analysis/problem solving by complementary microscopy techniques

CASE STUDY NEW PROCESS

10:30 a.m. – 11:00 a.m.

**Technology Highlights Theater**

11:00 a.m. – 11:45 a.m.

**The Future is Optical Inspection and Measurement**

*Steve, Chirichella, Keyence*

CHALLENGE: Reduce time, cost, and errors associated with product inspection using a combination of lighting, optics, imaging/pixel processing, and software algorithms.

CASE STUDY NEW TECHNOLOGY NEW PROCESS

11:45 a.m. – 12:30 p.m.

**3D Cross-Sectional Scanning Technology**

*Craig Crump, CGI*

CHALLENGE: Diagnose molding problems in small, complex molded parts that have internal features.

NEW APPLICATION

12:30 p.m. – 1:30 p.m.

**Group Lunch on the Show Floor**

1:30 p.m. – 2:00 p.m.

**Technology Highlights Theater**

2:00 p.m. – 2:45 p.m.

**Micro Machining Technologies and 3D Metrology Solutions**

*John Bradford, Makino*

CHALLENGE: Solutions to pre-plan the micromachining process by incorporating pre-process and in-process 3D measurement, and how to incorporate the measured results to increase accuracy, and throughput efficiency

NEW TECHNOLOGY

2:45 p.m. – 3:30 p.m.

**Low Energy, Non-Contact Electrical Discharge Measurement System on a Micro-Machining Platform**

*Jerry Mraz, SmalTec International*

CHALLENGE: Measuring parts on the same platform as they are machined

CASE STUDY NEW TECHNOLOGY

3:30 p.m.

**Conference Concludes**

**REGISTRATION OPTIONS**

- Call SME Customer Care at 800.733.4763 or 313.425.3000, M–F, 8:00 a.m. – 5:00 p.m. EST
- Register online at [sme.org/micro](http://sme.org/micro)
- Download a PDF from [sme.org/micro](http://sme.org/micro) to fax or mail your registration

All registrations include entrance to the exhibits March 28-29, 2012.

Conference registration includes lunches, exhibits, reception, keynote, poster session, and an interactive tour. Your registration also includes a one-year membership or renewal to SME with the purchase of a full conference registration.

Receive a \$150 savings on your general conference registration when you use MICRB as your promo code.

	SME MEMBERS	NONMEMBERS
<b>FULL CONFERENCE &amp; EXHIBITS March 28-29, 2012</b>		
Early registration through March 5, 2012	\$945	\$945
Standard registration beginning March 6, 2012	\$995	\$995
<b>PRE-CONFERENCE WORKSHOPS March 27, 2012</b>		
Early registration through March 5, 2012	\$445	\$545
Standard registration beginning March 6, 2012	\$495	\$595
<b>TOUR March 27, 2012</b>	\$59	\$69
<b>HALF-DAY WORKSHOP (morning) and TOUR March 27, 2012</b>		
Early registration through March 5, 2012	\$295	\$345
Standard registration beginning March 6, 2012	\$345	\$395
<b>EXHIBITS ONLY</b>	\$25	\$45
Includes Technology Highlights Theater, Poster Session, and Reception.		

# Featured Exhibitors



## EARLY CONFIRMED EXHIBITORS

3D Micromac America	FineLine Prototyping	Makino Micro Waterjet
Accumold	First Nano, a division of CVD Equipment	Microolution
Aerotech	Heidenhain	microPEP
AgieCharmilles	Holographix	Micro-Vu
ALine	IBAG North America	Mitutoyo America Corp.
American Swiss Products	Infinite Graphics	PEM Technologies
BIG Kaiser Precision Tooling	Jesse Garant & Associates	Photron
Bruker	Judge Tool & Gage	Plastic Design
CGI Inspection	KERN Precision	Sarix SA
Coast Wire & Plastic Tech	Kugler of America	SmalTec International
Datron Dynamics	Kyocera Micro Tools	SMC
Deringer-Ney		Teamvantage
		Valtronic USA

### Interested in Exhibiting?

Exhibit opportunities are limited so reserve your space today! Contact SME Expo Sales at 800.733.3976 or email [exposales@sme.org](mailto:exposales@sme.org) for more information.

## FREE Webinars Before the Event

Catch these FREE webinars on demand (and many others) by visiting [sme.org/micro](http://sme.org/micro) and clicking the **FREE Webinars Before the Conference** link under special features.

- Micro Molding with Resorbable Materials
- Micro Molding: Differences Beyond Size to Traditional Molding

While there, check out the schedule of upcoming live webinars including: MicroManufacturing: Getting Even Smaller on February 15, 2012 at 1:00 p.m. EST.

## LOCATION

John B. Hynes Veterans Memorial Convention Center, 900 Boylston Street, Boston, MA 02115

## LODGING

Sheraton Boston Hotel, 39 Dalton Street, Boston, MA 02199  
P: 617.236.2000

A very limited number of rooms are available at a reduced rate of \$235/per night (single/double) at the Sheraton Boston for attendees of this event. Rooms in the block not reserved by March 5, 2012 will be released. After this date, reservations will be accepted but cannot be guaranteed at SME's group rate.

Attendance is limited and only preregistered, prepaid registrants will be guaranteed access to the program. Registrations made less than two weeks prior to the program should be made by calling 800.733.4763. Upon receipt of your paid registration, you will be sent a registration confirmation.

**ON-SITE REGISTRANTS:** On-site registration is on a space-available basis. Payment is due on-site.

**CANCELLATIONS:** Cancellations will receive a full refund if made on or before March 5, 2011. Beginning March 6, 2012, cancellations will only receive a 50% refund. You must obtain a cancellation number from our registrar to verify your cancellation. Confirmed registrants who fail to notify SME of his/her cancellation are not eligible for a refund.

**PROGRAM CHANGES:** SME has the right to amend this program as necessary. In the event of a cancellation, SME is not responsible for incidental costs incurred by registrants. We recommend purchasing refundable airline tickets.



Please call 800.733.4763 should you require assistance.  
Complete registration policy is available at [sme.org/micro](http://sme.org/micro).



Society of  
Manufacturing  
Engineers

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