

TC 9.9 Mission Critical Facilities -- Detailed Program History & Schedule

City	Type	Paper Seq	Forum	Seminar	Program Title	Chairman	Speakers	Paper Topic
			Seq	Seq				
A	B	C	D	E	F	G	H	I
Kansas City	Seminar 1			1	Data Center and Telecommunication Room Cooling of High Density Heat Loads	Don Beaty	Magnus Herrlin	GR-3028-CORE: Thermal Management in telecommunications Offices
6/26/03 to 6/30/03				2			Roger Schmidt	Data Center Environmental Requirements
				3			Christian Belady	Data Center Air Cooling Guidelines
				4			Allen Buskirk	Measuring and Reporting Computing equipment Heat Loads
				5			Donald Beaty	Best Practices in Data Center and Telecom Room Design
Anaheim	Symposia	1			High Density Electronic Equipment Facility Cooling	Don Beaty	Roger Schmidt, et. al.	Evolution of Data Center Environmental Guidelines
1/24/04 to 1/28/04		2					Michael Wilson, et. al.	A Thermal Bus System for Cooling Electronic Components in High Density Cabinets
		3					Lennart Stahl	Cooling of high heat density rooms today and in the future
		4					Cullen Bash, C. Patel, R. Sharma	Efficient Thermal Management of Data Centers - Immediate and Long-term Research Needs
Anaheim	Forum 23		1		High Density Heat Loads in Data Centers and Telecommunications Facilities	Don Beaty	none	
1/24/04 to 1/28/04								
Nashville	Symposia	5			High Density Cooling Loads Update June 2004	Dave Copeland	Suhas Patankar	Distribution of Cooling Airflow in a Raised-Floor Data Center
6/26/04 to 6/30/04		6					Roger Schmidt	Thermal Profile of a High Density Data Center
		7					Donald Beaty	Liquid Cooling of Electronic Equipment: Friend or Foe
Orlando	Symposia	8			High Density Cooling Loads Update January 2005	Roger Schmidt	Neil Chauhan	High-Density Cooling of Data Centers and Telecom Facilities - Part 1
2/05/05 to 2/09/05		9					Dan Dyer	High-Density Cooling of Data Centers and Telecom Facilities - Part 2
		10					Gamal Rafai-Ahmed	Thermal Roadmap for Telecom Equipment
Orlando	Forum 16		2		Thermal Guidelines - One Year Later: Has it worked for you, and what else is needed?	Don Beaty		
2/05/05 to 2/09/05								
Denver, CO	Symposia	11			High-Tech Facility Cx	Rich Rose	Charles Kieffer	Commissioning of Bio-Containment Facilities
6/25/05 to 6/29/05		12			(Co-sponsor with TC7.9)		Don Beaty, Roger Schmidt	Commissioning combined with CFD for Datacom Performance, Adaptability & Reliability
		13					William McCartney	Electronic Test Room Commissioning

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		14					Terry L. Rodgers	An Owner's Perspective on Commissioning of Critical Facilities
Denver, CO	Symposia				High Density Cooling Loads Update June 2005	David Copeland & Neil Chauhan		
6/25/05 to 6/29/05		15					Christopher Kurkjian, Jack Glass	Air Conditioning Design for Data Centers – Accommodating Current Loads and Planning for the Future
		16					Magnus Herrlin	Rack Cooling Effectiveness in Data Centers and Telecom Central Offices: The Rack Cooling Index (RCI)
		17					Paul Leonard & Fred Phillips	The Thermal Bus Opportunity: A Quantum Leap in Data Center Cooling Potential
		18					Yumi Maeda, Seshimo Yu, and Takashi Okazaki	Study of a Cooling System for the Telecommunication Base Site
		19					Vali Sorell, Steve Escalante, and Jun Yang	A Comparison of Underfloor and Above-floor Air Delivery Systems in a Data Center Environment Using CFD Modeling
		20					Roger Schmidt	Thermal Profile of a High Density Data Center -Hot Spot Heat Fluxes of 512 watts/ft ²
Denver, CO	Seminar				Datacom Cooling: Equipment and Facility Perspective	Roger Schmidt		
	34			6			Christian Belady	Equipment Perspective: Part 1
6/25/05 to 6/29/05	34			7			Roger Schmidt	Equipment Perspective: Part 2
	34			8			Robin Steinbrecher	Equipment Perspective: Part 3
	34			9			Donald Beaty	Facilities Perspective: Part 1
	34			10			Christopher Kurkjian	Facilities Perspective: Part 2

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Denver, CO	Seminar				Best Practices Identified through Benchmarking Data Centers	Roger Schmidt		
	58						Fred Stack	Liquid Cooling Technologies: Energy and Performance Comparisons
	58						Mukesh Khattar	Energy Considerations in Selecting Cooling Equipment in Data Centers
Chicago	Forum		3		Mission Critical Facilities: Issues and Roadmap	Don Beaty		
1/21/06 to 1/25/06								
Chicago	Symposia				High Density Cooling Loads Update January 2006	Don Beaty		
1/21/06 to 1/25/06		21					Joe Prisco	Contamination Sources and Prevention in Data Processing Environments
		22					Vali Sorell	An Analysis of the Effects of Ceiling Height on Air Distribution in Data Centers
		23					Budy D. Notohardjono	Seismic Considerations of Datacom Equipment
Quebec City	Transactions 8				High Density Cooling Loads Update June 2006	Mike Patterson		
6/24/06 to 6/28/06		24					Roger R. Schmidt	Thermal Profile of the World's Third Fastest Supercomputer: IBM's ASC Purple Cluster
		25					Tahir Cader	Airflow Management in a Liquid-Cooled Data Center
Quebec City	Forum 9		4		Data Centers and Direct Evaporative Cooling: Are they Compatible?	Michael Sherber, Mike Scofield		
6/24/06 to 6/28/06								

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Quebec City	Seminar				Energy Efficient Data Center Design, Part 1	Reinhard Seidl		
6/24/06 to 6/28/06	52			11			Mark Hydeman	Achieving HVAC Efficiency in Data Centers: Obstacles and Opportunities
	52			12			Magnus Herrlin, Ph.D.	Energy Efficiency and Effective Equipment Cooling in Data Centers
	52			13			Vali Sorell	A Study of the Effects of Supply Air Temperature on Overall Data Center Energy Usage
Quebec City	Seminar				Energy Efficient Data Center Design, Part 2	Reinhard Seidl		
6/24/06 to 6/28/06	58			14			William Tschudi	Best Practices Identified through Benchmarking Data Centers
	58			15			Fred Stack	Liquid Cooling Technologies: Energy and Performance Comparisons
	58			16			Mukesh Khattar	Energy Considerations in Selecting Cooling Equipment in Data Centers
Dallas	Transactions 4				Liquid Cooling in the Data Center	Jeff P. Trower		
1/27/07 to 1/31/07		26					Herb Villa	Liquid Cooling Strategies
		27					Tahir Cader	Performance of a Rack of Liquid Cooling Servers
Dallas	Transactions 5				High Density Cooling Issues Update:	Kishor K. Khankari		
1/27/07 to 1/31/07		28			Part 1		Roger Schmidt	Comparison Between Raised Floor (Underfloor Supply) and Non-Raised Floor (Overhead Supply) Data Centers for High Density Clusters
		29					James Van Gilder	Capture Index: An Airflow-Based Rack Cooling Performance Metric
		30					Joseph Prisco	Characterization of a High-Density Data Center

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Dallas	Transactions 8				High Density Cooling Issues Update:	Kishor K. Khankari		
1/27/07 to 1/31/07		31			Part 2		Madhusudan Iyengar	Best Practices for High Density Air-Cooled Data Centers
		32					Kailash Karki	Prediction of Distributed Air Leakage in Raised Floor Data Centers
Dallas	Forum 4				Advances in Cooling of High Density Electronic Equipment	Donald L. Beaty		
1/27/07 to 1/31/07			5					
Dallas	Transactions 18				Data Center Cooling: Efficiency Improvements and Total Cost of Ownership	Terry L. Rodgers		
1/27/07 to 1/31/07		33					William Tschudi	Best Practices for Energy Efficient Data Centers Identified through Case Studies and Demonstration Projects
		34					Robert F. Sullivan	The Impact of Moore's Law on the Total Cost of Computing
Long Beach	Transaction 6				High Density Cooling Issues Update	Jeff Rutt		
6/23/07 to 6/27/07					Deadline for Paper Submission: September 29, 2006			
		35					Jeffrey Rambo, Graham Nelson, Yogendra Joshi	Perforated Tile Flow Distribution in Close Proximity to Computer Room Air Conditioning Units
		36					Michael J. Ellsworth, Roger R. Schmidt, Prabjit Singh, Richard Chu	Liquid Cooling Architectures for High Availability Systems

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Long Beach	Seminars							
6/23/07 to 6/27/07					Utilizing Economizers in a Data Center	Fred Stack		
	69			17			Jeff Sloan	Full Time Air Economizer
	69			18			Ron Spangler	Air vs. Fluid Economizer
	69			19			Mike Scofield	Adiabtic Economizers
					Energy-Efficient Controls for Data Centers	Christian Belady		
	71			20			Mukesh Khattar	Moving to Supply Air Temperature Control from Conventional Return Air Control in CRACs in a Data Center
	71			21			John Bean	Dynamic Fan Management Energy Savings for Row-Level Cooling
	71							
					Electronics Cooling: Techniques and Applications	Don Beaty		
	74			22			Tim Shedd	Compact Impingement Cooling Systems for Electronincs Thermal Management
	74			23			Michael Ohadi	An Innovative Liquid Cooling Heat Exchanger for Cooling of Chips with Various Heights and Power Densities
	74			24			James Bryan	Effect of Jet Arrays and Structured Surfaces on Two-phase Impingement Heat Transfer
	74			25			David Copeland	Total Power Reduction Through the use of Refrigeration for Thermal Management
New York City	Transactions 1				High Density Cooling Issues Update	Terry Rodgers		
1/19/08 to 1/23/08		37					Roberet Sullivan	Some Worst Case Practices in Data Centers (NY-008-001)
		38					Budy Notohardjono, Roger Schmidt	Monitoring Vibration at Data Centers (NY-008-002)
		39					Vali Sorell	Current Best Practices in High Density Cooling Applications (NY-008-003)
		40					Magnus Herrlin, Kishor Khankari	Method for Optimizing Equipment Cooling Effectiveness and HVAC Cooling Costs in Telecom and Data Centers (NY-08-004)

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New York City	Transactions 2				Energy Efficiency and Sustainability of Mission Critical Facilities	Jeff P. Trower		
1/19/08 to 1/23/08		41					Joe Prisco, Pamela Lembke, and Marvin M. Misgren	Electrical and Heat Load Planning: Keep Your Data Processing Environment Running (NY-08-005)
		42					John W. Lane, Daryn Cline	Evaporative Cooling Choices to Maximize Waterside Economizer Use in Datacom Installations (NY-08-006)
		43					Dennis Landsberg, Doug McLellan, Christopher W. Kurkjian	Geothermal Heat Rejection Systems for Data Centers (NY-08-007)
		44					Christopher G. Malone, Christian L. Belady	Optimizing Data Center TCO: Efficiency Metrics and an Infrastructure Cost Model (NY-08-008)
New York City	Forum 2		6		Long Term Data Center Planning: The Push toward Net-Zero Energy and other Considerations	Donald L. Beaty		
1/19/08 to 1/23/08								
New York City	Seminars				Energy-Efficient Designs for Data Centers: Oxymoron or Reality?	Leon Shapiro, TC5.7		
1/19/08 to 1/23/08	45			26			Stephen Fok	Improving Industrial Competitiveness by Using the Environment for Free Cooling in Data Centers: Eliminating the Fear Factor
	45			27			Nicholas H. Des Champs	Is there a Cost Benefit to Using Indirect Evaporative Cooling for Data Centers?
	45			28			Jeff Sloan	University of Washington: A Case Study in Recovering from Rejection
	53			29			Michael Conner	Retrofit of a Mid-80's Data Center Designed for 45W/sf to Support 300 W/sf through Energy Efficient Design
	53			30			Donald L. Beaty	Data Center Cooling: 5 Steps to "Right Sizing"
	53			31			Christopher Kurkjian	Energy Efficiency and Reliability: Are they Compatible? How do we design and operate highly efficient data centers without compromising reliability?

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New York City	Seminar				Data Centers in the Spotlight: National Energy Perspectives and Recent ASHRAE Publications	Jack Glass		
1/19/08 to 1/23/08	69			32			Bill Tschudi	Demonstrations to Illustrate Energy Efficiency Opportunities
	69			33			Paul Scheihing	U.S. Government Programs to Advance Data Center Energy Efficiency
	69			34			Andrew Fanara	U.S. EPA Report to Congress in Response to PL 109-431
	79			35			Budy D. Notohardjono	Overview of New ASHRAE Publication: Structural and Vibration Guidelines for Datacom Equipment Centers
	79			36			Thomas A. Davidson	Overview of New ASHRAE Publication: Best Practices for Datacom Facility Energy Efficiency
	79			37			Joe Prisco	Overview of Upcoming ASHRAE Publication: Continuation in Datacom Facilities
Salt Lake City	Transaction 7				Modeling Data Center Airflow and Cooling Performance	H. Ezzat Khalifa		
6/21/08 to 6/25/08		45					James van Gilder and Xuanhang (Simon) Zhang	Course-Grid CFD: The Effect of Grid Size on Data Center Modeling
		46					Magnus K. Herrlin	Airflow and Cooling Performance of Data Centers: Two Performance Metrics
Salt Lake City	Seminar 46				Panel of Existing Benchmarking and Metrics Affecting the Data Center	Christian Belady		
6/21/08 to 6/25/08				38			Michael Patterson	Climate Savers Computing Initiative
				39			Tahir Cader	The Green Grid
				40			Kushagra Vaid	SPEC
				41			William Tschudi	Data Center Energy Efficiency Metrics

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Chicago	Transaction 3				High Density Cooling Issues Update	Jeffrey P. Rutt		
1/23/09 to 1/27/09		47					Prabjit Singh, Joseph F. Prisco, Roger R. Schmidt,	Particulate and Gaseous Contamination: Effect on Computer Reliability and Monitoring
		48					Robert Tozer, Christopher Kurkjian, Munther Salim	Air Management Metrics in Data Centers
		49					Thomas A. Davidson	Analysis of Ambient Conditions Suitable for Air-Side Economizer Operation with High Supply Air Temperatures in Datacom Environments
Chicago	Transaction 10				Liquid Cooling Issues Update	Jeff P. Trower		
1/23/09 to 1/27/09		50					Tahir Cader, Vali Sorell, Levi Westra, Andres Marquez	Liquid Cooling in Data Centers
		51					Daniel Sisk, Mohammad Khaleek, Andres Marquez, Darrel Hatley, Tahir Cader, Roger Schmidt	Real-time Data Center Efficiency at Pacific Northwest National Laboratory
Chicago	Seminar				Application of ASHRAE Standards and Guidelines to Improve the Sustainability of Data Centers	Michael Patterson		
1/23/09 to 1/27/09	14			42			Roger R. Schmidt	History, Overview, and Improved Sustainability with the 2008 ASHRAE Thermal Guidelines
	14			43			Michael Patterson	Implications of the 2008 Thermal Guidelines to the Server Manufacturer
	14			44			Vali Sorell	Implications of the 2008 Thermal Guidelines to the Architect and Engineer
	14			45			Christian Belady	Implications of the 2008 Thermal Guidelines to the End User
	19			46			Mark Hydeman	ASHRAE Standard 90.1's Implications for Sustainable Data Centers
	19			47			Fred Stack	ASHRAE Standard 127's Implications for Sustainable Data Centers
	19			48			William Tschudi	Data Center Rating System for Improved Energy Efficiency: LEED, Energy Star, DOE and Others

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Chicago	Seminar				Innovations in Airflow Management within Rack Enclosures	Kishor Khankari		
1/23/09 to 1/27/09	40			49			Kishor Khankari	Airflow Management within Rack Enclosures: An Overview
	40			50			James Fleming and Rhonda Johnson	Cable Management Considerations for Equipment Using Side-to-Side Airflow
	40			51			Ian Seaton	Breakthrough in Return Air Containment
	49			52			Joe Kramer	Rack Enclosures Role in Isolating the Hot and Cold Aisle in the Datacenter
	49			53			John Consoli	Enhancing Airflow Efficiency at the Cabinet Level via Deployment of Variable Speed Fans with Dynamic Controller
	49			54			Mark Germagian	Rack Air Dynamics Trends: Past and Present
Louisville	Transaction 5				Free Cooling Opportunities for Data Centers	Terry L. Rodgers		
6/20/09 to 6/24/09		52					William Tschudi, Steve Greenberg, Amit Khanna	High Performance Computing with High Efficiency
		53					Robert Sullivan, Marcel Van Dijk and Mees Lodder	Introducing Using the Heat Wheel to Cool the Computer Room
		54					Jeff Stein	Waterside Economizing in Data Centers: Design and Control Considerations
Louisville	Transaction 6				Cooling of Telecom Centers	Magnus K. Herrlin		
6/20/09 to 6/24/09		55					David Quirk	Convergence of Telecommunications and Data Centers
		56					Herman Chu	Hurdles in Deploying Liquid Cooling in NEBS Environments
Orlando	Transaction 2				High Density Cooling issues Update	Ecton English		
1/23/10 to 1/27/10		57					Magnus Herrin, Craig Compaino	Top-Level Energy and Environmental Dashboard for Data Center Monitoring
		58					Lennart Stahl	System Architecture and Fluids for High Heat Density Cooling Solutions
		59					Herb Villa	Cold Aisle Containment Re-thinking The Data Center Space

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Orlando	Transaction 5				Climate Impact On Data Center Efficiency	Terry L. Rodgers		
1/23/10 to 1/27/10		60					Yury Lui	Design Consideration Of Applying Airside And Waterside Economizer To Data Centers
		61					Munther Salim	Data Center Energy Auditing And Benchmarking: Progress Update
		62					Bruce Hellmer	Numeric Analysis Of Telco And Data Center Cooling And Humidifications Options
Orlando	Transaction 9				Contamination Issues In Datacom Environments	Joe Prisco		
1/23/10 to 1/27/10		63					Christopher O. Muller	What's Creeping Around In Your Data Center?
		64					J. Stack, Daniel Fannin	Contamination In The Data Center; The Impact Of CRAC Belt Dust
Orlando	Seminar 56				Intergration Of Sercver And Facilities Controls In Data Centers For Lower Costs And Higher Efficiency	Michael K. Patterson		
1/23/10 to 1/27/10				55			Michael K. Patterson, Prasad Pusuluri	Server Data For The Facility; The Holy Grail
				56			Dennis A. Nasont, Bill Storey	Connectivity And Control For Servers And The Building Management System
				57			Vali Sorell, Michael K. Patterson	Designing Efficient Sustainable Data Centers With Enhanced Visibility To The Server Status
Albuquerque	Seminar 4				Data Center Heat Rejection at Altitude by Evaporative Cooling	Clifford M. Scofield		
6/26/10 to 6/30/10				58			Daryn S. Cline	Reduce Data Center PUE Utilizing Cooling Towers in the Free Cooling Mode
				59			Keith Dunnivant	The "Indirect" Air-Side Economizer Cycle: A Winning Strategy for the Rejection of Data Center Heat
				60			Sarah Ferrari	Water Treatment for Evaporative Cooling

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Albuquerque	Seminar 7				Commissioning Mission Critical Data Centers	Roger Lautz		
6/26/10 to 6/30/10				61			Yanzheng (Don) Guan	Reliability-Centered Commissioning Service for Mission Critical Data Center Facilities
				62			James Vallort	Data vs. Dorm: Mission Critical Data Centers and Residential Hall LEED Gold Case Studies
Las Vegas	Seminar 17				Codes and Standards that Influence Mission Critical Facilities	Craig A. Crader		
1/29/11 to 2/2/11				63			Michael K. Patterson	An Overview of the European union Code of Conduct for Data Centers
				64			Jeff Stein	Energy Codes for Data Centers
				65			Rhonda Johnson	Telecommunication Standards for Data Centers
				66			Doug McLellan	U.S. Green Building Council LEED Guidelines and the Impact for Mission Critical Facilities
Las Vegas	Forum		6		Failure Mode and Effects Analysis and Risk Management in Data Centers...And Other Important Matters to Consider	Vali Sorell		
1/29/11 to 2/2/11								
Las Vegas	Transaction 8				Data Center Studies	Ecton English		
1/29/11 to 2/2/11		65					Michael Lloyd and Leon Glicksman	unique Airflow Visualization Techniques for the Design and Validation of Above-Plenum Data Center CFD Models
		66					Kishor Khankari	Rate of Heating Analysis of Data Centers During Power Shutdown

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Montreal	Transaction 1				Discovering Data Center Energy; Use with Dynamic Modeling, Working with Standard 90.1; and a New Energy Reuse Metric	Nick Gangemi		
6/25/11 to 6/29/11		67					Dustin W. Demetriou, H. Ezzat Khalifa, Roger Schmidt, Madhusudan Iyengar	Development of a Dynamic Energy Use Modeling Tool for Data Center Cooling Infrastructure
		68					David Quirk	Navigating ASHRAE SSPC 90.1,-2010 Requirements for Economizers in Datacom
Montreal	Transaction 2				Computer Room Cooling? Liquid Cooling Shifts the Focus to Cooling the Equipment	Rick Pavlak		
6/25/11 to 6/29/11		69					Kailash Karki, Shlomo Novotny, Amir Radmehr and Suhas Patankar	Use of Passive, Rear-Door Heat Exchangers to Cool Low to Moderate Heat Loads
		70					William Tschudi, Phil Hughes	Energy Efficient and Lower Capital Cost: An Alternative Data Center Cooling Strategy
Montreal	Seminar 19				Latest Data Center Environmental Guidelines	Jeff Trower		
6/25/11 to 6/29/11				67			Roger Schmidt	IT Equipment Power Trends to 2020
				68			Robin Steinbrecher	Expanded T and H Environmental Guidelines for Data Centers
				69			Prabjit Singh	Gaseous Contamination Limits for Data Centers
Chicago	Seminar 3				Liquid Cooling Technologies To Enable High Density And Improve Energy Efficiency Of Information Technology Data Center Facilities	Roger Schmidt, Madhusudan Iyengar		
1/21/12 to 1/25/12				70			Roger Schmidt	Liquid Cooling Guidelines Developed by the ASHRAE TC9.9 Committee
				71			Madhusudan Iyengar	Economizer Based Server Liquid Cooling to Enable Significant Data Center Energy Savings
Chicago	Seminar 23				Design Best Practices from the Server to the Data Center, What the Operator Should Know	Michael K. Patterson		
1/21/12 to 1/25/12				72			Robin Steinbrecher	IT Equipment Thermal Management: What Should a Data Center Operator Know?
				73			Michael K. Patterson	A Comparison of Hot-Aisle and Cold-Aisle Containment Strategies, Which Is More Efficient?
San Antonio	Seminar 4				Power Trends of Information Technology Equipment and the Usage of ASHRAE's Thermal Guidelines in Data Center Design and Operation	Robin Steinbrecher		
6/23/12 to 6/27/12				74			Robin Steinbrecher	Datacom Component Power Trends

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				75			Roger Schmidt	Datacom Equipment Power Trends
				76			Michael K. Patterson	A Methodology for Determining the Optimum Data Center Temperature for Energy Efficiency
San Antonio	Seminar 12				Data Center Containment, Control and Modeling: Interactions and Optimization Opportunities	David Moss		
6/23/12 to 6/27/12				77			David Moss	Data Center Containment and Control: Data Center and ITE Interactions
				78			Michael K. Patterson	Optimization of Containment Control Strategies Using Wireless Technology
				79			Mark Seymour	Data Center Operational Management: Evaluating Data Centers and Avoiding Stranded Capacity
San Antonio	Forum 2		7		Will Standard 90.1 Help or Hurt the Data Center Industry?	David Quirk		
6/23/12 to 6/27/12								
San Antonio	Seminar 32				Ramification of Aisle Containment and Server Airflow Design in New and Existing Data Centers	Nick Gangemi		
				80			Daniel B. Kennedy	Ramification of Aisle Containment and Server Airflow Design In New and Existing Data Centers
San Antonio	Seminar 60				Datacom Space Technology Advances; From Containment Fire Protection to Oil Immersion Cooling	Michael K. Patterson		
6/23/12 to 6/27/12				81			David Quirk	Datacom Aisle Containment Systems and Associated Fire Protection Requirements
				82			Michael K. Patterson	Oil Immersion Cooling and Reductions In Data Center Energy Use
San Antonio	TPS 3				Modeling and Simulation for Data Center Cooling, Rack Boundary Conditions, Central Chiller Plant Loop Delta T	Nick Gangemi		
6/23/12 to 6/27/12		71					Gardson Githu, Bob Arno and Christopher W. Kurkjian	Reliability Modeling for Data Center Cooling Systems
		72					John Zhai, Knud A. Hermansen, and Salah Al-Saadi	The Development of Simplified Rack Boundary Conditions for Numerical Data Center Models
		73					Zhiqin Zhang and Jingjing Liu	Simulating Central Chiller Plant Loop Delta-T with Quadratic Regression Models
Dallas	Forum		8		Improving Data Center Efficiency with a Better Match of HVAC and IT Systems	Bill Dietrich		
1/26/13 to 1/30/13							Katie L. Pizzolato and Arden L. Moore	Server Interaction in the Data Center; A Discussion On Delta T Trends and Effects of External Pressure
							Jon Fitch	Thermal Guidelines and Best Practices for It Networking Equipment
							David Moss	Methods of Volumetric Control within Containment Systems

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Dallas	TPS 5				Optimizing Air-Cooled Systems for Data Center Applications	Nick Gangemi		
1/26/13 to 1/30/13		74					Yosuke Udagawa, Keisuke Sekiguchi and Tsuneo Uekusa	Development of an Outdoor Air Cooling-Type Air-Cooled Package Air Conditioner for Data Centers
		75					Keith Dunnivant	The Impact of Barometric Pressure, Temperature, and Operating Temperature Difference on Air Cooled Data Centers
Dallas	Seminar		9		CFD Modeling, Control Scheme Efficiency & IT Ride through for Cold Aisle Containment	Nick Gangemi		
1/26/13 to 1/30/13				83			Saurabh Shrivastava	CFD Modeling and Control Scheme Efficiency Measurements for Cold Aisle Containment
				84			Saurabh Shrivastava	IT Equipment Ride Through Time in Cold Aisle Containment Configuration
Dallas	Seminar 48		10		The Mission Critical Data Center: Resetting the Definition and the Human Element	Nick Gangemi		
1/26/13 to 1/30/13				85			Herb Villa	The Mission Critical Data Center: Resetting the Definition
				86			Robert Tozer	Data Centers: The Human Element
Dallas	CPS 6				Designing for Energy Conservation and Operational Cost Reduction	Steven Rosen		
1/26/13 to 1/30/13		76					John C. Peterson and Doug McLellan	Comparison of Data Center Classes on Energy Use
Dallas	Seminar 66				Reliability Concerns for Data Center IT Equipment: Contamination Issues, Standards Actions, and Case Studies	Christopher O. Muller		
1/26/13 to 1/30/13				87			Prabjit Singh	Particulate and Gaseous Contamination in Data Centers: Recent Developments
				88			Christopher O. Muller	Data Center Case Studies: Contamination Assessment, Control, and Monitoring
Denver	CPS 13				Research and Developments Impacting Total Cost of Ownership (TCO) for Data Centers	Nick Gangemi		
6/22/13 to 6/26/13		77					Niru Kumari, William J. Kosik and Tahir Cader	Impact of Allowable Server Air Conditions on Data Center Economics
		78					Reza Ghias, Kris Xu, Member, Richard Ellison, and Curt Eisenhower	Use of Numerical Simulation and Optimization to Analyze the Design and Performance of a Chilled Water Thermal Storage Tank
		79					Vali Sorell, Phillip Tuma and Liam Newcombe	Liquid Cooling in Data Centers: Part 2
Denver	TPS 2				Thermal Comfort Design Conditions	Samir Traboulsi		
6/22/13 to 6/26/13		80					Walter Bemby IV, Lance E. Basgall, and Donald Fenton	Thermal Energy Storage for Emergency Cooling, Part 1

TC 9.9 Mission Critical Facilities -- Detailed Program History & Schedule

City	Type	Paper Seq	Forum	Seminar	Program Title	Chairman	Speakers	Paper Topic
			Seq	Seq				
A	B	C	D	E	F	G	H	I
		81					Walter Bemby IV, Lance E. Basgall, and Donald Fenton	Thermal Energy Storage for Emergency Cooling, Part 2
Denver	Keynote 3				Trends in Data Center Design: ASHRAE Leads the Way to Large Energy Savings	Otto VanGeet		
6/22/13 to 6/26/13				89			John C. Peterson and Doug McLellan	Comparison of Data Center Classes on Energy Use
Denver	Seminar 36				Modeling Transient Conditions	Amy Musser		
6/22/13 to 6/26/13				90			Xuanhang (Simon) Zhang	Real-Time Data Center Transient Analysis
Denver	TPS 9				Additional Concerns for the Mission Critical Data Center	Herb Villa		
6/22/13 to 6/26/13		82					Fayu Wan, Michael Hillstrom, Carlton Stayer, David Swenson and David Pommerenke	The Effect of Humidity on Static Electricity Induced Reliability Issues of ICT Equipment in Data Centers: Motivation and Setup of the Study
		83					James VanGilder, Christopher M. Healey, Xuanhang (Simon) Zhang, and Zachary Pardey	A Compact Server Model for Transient Data Center Simulations