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THE CRYOGENIC ENGINEERING CONFERENCE: 1954-1984

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INTRODUCTION

The first Cryogenic Engineering Conference was held at the National Bureau of Standards (NBS), Boulder, Colorado, in 1954. Timmerhaus¹ has given the early history of the NBS Cryogenic Laboratory and the Cryogenic Engineering Conference and has acknowledged the many contributions of Russell B. Scott of NBS to the early development of the Conference. The subsequent history of the Conference has been marked by the waxing and waning of several fields of cryogenic activity, for example, the AEC hydrogen program, the NASA space vehicle development program, and the LNG storage, transfer, and metrology work. These peaks and valleys are, however, superposed upon a generally increasing background of activity in refrigeration systems, cryogenic fluid and material properties, heat transfer, and applied superconductivity. At the present time the conference is characterized by many papers on superconducting applications, refrigeration systems for 1.8 - 5 K, and space science and technology.

This paper will present some Conference statistics of historical interest and will attempt to recognize those persons who have contributed to the success and growth of the Cryogenic Engineering Conference over the past three decades.

CRYOGENIC ENGINEERING CONFERENCE HISTORICAL DATA

There have been twenty-three Cryogenic Engineering Conferences. Commencing with the 1975 Conference, the Cryogenic Engineering Conference has met jointly with the International Cryogenic Materials

Conference. Table 1 shows the geographical distribution of the Conference sites and the many hosting institutions.

The Cryogenic Engineering Conferences have been planned and organized by a Conference Board, consisting of volunteers in the early history and later, of members elected by the Conference attendees. To provide continuity the elected members serve for a term of three consecutive conferences. Ad hoc members have often been appointed to the Board to serve as local arrangements chairmen, etc, for specific Conferences. It almost goes without saying that efforts of the Board members, elected and appointed, were crucial to the development of the Cryogenic Engineering Conference as the leading forum in cryoscience and cryoengineering. Table 2 recognizes those persons who have served on the Cryogenic Engineering Conference Board during the past 30 years.

RUSSELL B. SCOTT MEMORIAL AWARDS

In 1960 the Cryogenic Engineering Conference established an award for the best paper presented at the Conference, on the basis of both content and quality of the oral and written presentations. In 1966 the awards program was expanded into two categories; cryogenic engineering research and cryogenic engineering application. Following the death of Russell B. Scott of the NBS Cryogenic Laboratory in 1967, the awards became a memorial to Mr. Scott. A total of 28 papers have been recognized for excellence by receiving Russell B. Scott Memorial Awards. As can be seen from Table 3, the award winning topics span the entire field of cryotechnology.

Table 1. Cryogenic Engineering Conference Sites and Host Institutions.

Year	Host Institution	Site
1954	NBS, Boulder	Boulder, Colorado
1956	NBS, Boulder	Boulder, Colorado
1957	NBS, Boulder	Boulder, Colorado
1958	Massachusetts Institute of Technology	Cambridge, Massachusetts
1959	University of California, Berkeley	Berkeley, California
1960	University of Colorado; NBS, Boulder	Boulder, Colorado
1961	University of Michigan	Ann Arbor, Michigan
1962	University of Los Angeles, Los Angeles	Los Angeles, California
1963	University of Colorado; NBS, Boulder	Boulder, Colorado
1964	University of Pennsylvania	Philadelphia, Pennsylvania
1965	Rice University	Houston, Texas
1966	University of Colorado; NBS, Boulder	Boulder, Colorado
1967	Stanford University	Stanford, California
1968	Case Western Reserve University	Cleveland, Ohio

1969	University of California, Los Angeles	Los Angeles, California
1970	University of Colorado	Boulder, Colorado
1972	NBS, Boulder	Boulder, Colorado
1973	Georgia Institute of Technology	Atlanta, Georgia
1975	Queens University	Kingston, Ontario, Canada
1977	University of Colorado	Boulder, Colorado
1979	University of Wisconsin	Madison, Wisconsin
1981	General Atomic Company, General Dynamics Corporation	San Diego, California
1983	NBS, Boulder	Colorado Springs, Colorado

**Table 2. Cryogenic Engineering Conference Board:
Index of Members, 1954-1984**

L.K. Armstrong	1972,73,75,77	R.B. Jacobs	1954,59,60
K.R. Atkins	1964	J.E. Jensen	1972,73,75,77,79,
P.L. Barrick	1956		81,83
R.F. Barron	1979,81,83	V.J. Johnson	1954
B.C. Belanger	1977	A.J. Kidnay	1970,71,72
D.A. Belsher	1977,79,81	R. Kobayashi	1965
B.W. Birmingham	1954,57,58,71,72 73,75,77,79,81,83 1967,68,69,75,77,79	R.H. Krobschot	1967,68,69,70
		E.R. Lady	
E.R. Blanchard	1966,67,68	A.C. Leonard	1972,73,75
R.D. Blaugher	1981,83	H.M. Long	1962,63,64,65,66
R.W. Boom	1977,79,81	R.C. Longsworth	1979,81,83
W. Bowers	1969,70	M.S. Lubell	1981,83
J.C. Breedlove	1967	D.N. Lyon	1959,60
M.B. Clapp	1973,75,77,79	F.E. Maddocks	1969,70,71
A.F. Clark	1981,83	J.L. Mason	1965,66,67,68,69
A.L. Clark	1956	G.E. McIntosh	1961,62,63
S.C. Collins	1956,57,58	C. McKinley	1963,64,65,66,67
D.B. Crawford	1977,79,81	H.O. McMahon	1958
L.I. Dana	1956	P.V. Mullins	1956
W.N. Deaton	1963,64,65,66	L. Nesbitt	1959,60,61
F.W. DeMoney	1967,68,69	M.D. O'Neill	1967
G.R. Deppe	1966,67,68	P.M. Ordin	1965,66,67,68
J. Dillon	1969	M.A. Otavka	1981
J.F. DiStefano	1970,71,72	A.V. Pastukov	1964,65,66,67
R. Dixon	1968	H.G. Paul	1968,69,70
B.C. Dunnam	1961,62,63	F.E. Pavlis	1956
F.J. Edeskuty	1959,60,61	W.G. Pollack	1968
W.M. Fairbank	1967	R. Radebaugh	1983
R.W. Fast	1975,76,77,79,81,83	R.S. Rae	1956
R.B. Fleming	1971,72,73,75	R.P. Reed	1975,77,79
T.M. Flynn	1979,81,83	M.M. Reynolds	1954
R.J. Foley	1983	K.M. Ronan	1956
T.H.K. Frederking	1971,72,73	A.F. Schuch	1962,63,64,65,66
L. Garwin	1972,73,75	R.B. Scott	1954,56,57
J.M. Geist	1969,70,71 1969,70,71,72,73,75,	J.L. Smith	
D. Gibbons	1968		77,83

D.A. Haid	1975	R.S. Thurston	1968,69,70,71
E.F. Hammel	1957	K.D. Timmerhaus	1954-83
W.B. Hanson	1954	C.F. Tonjes	1959,60,61,62
W.H. Hartwig	1981	H.L. Tallman	1969
R.C. Hendricks	1970,71,72,73,75	R.W. Vance	1961,62
C.D. Henning	1979,81,83	G.J. VanWylen	1960,61,62
R.N. Herring	1981,83	D.I.J. Wang	1968
M.J. Hiza	1973,75,77,79	R.S. Warner	1958,59
W.H. Hogan	1973,75,77	L.A. Wenzel	1964,65,66,67
S. Houston	1969	W.T. Ziegler	1957,58,73,75,77
J.K. Hulm	1973		

Table 3. Russell B. Scott Memorial Award Winners.

PRESENTED	AUTHORS	TITLE
1960	J.T. Harding, R.N. Tuffias	The Cryogenic Gryo
1961	B.W. Birmingham, H. Sixsmith, W.A. Wilson	The Application of Gas-Lubricated Bearings to a Miniature Helium Expansion Engine
1962	F.C. Hurlbut, R.J. Manafield	Calculated and Observed Pumping Speeds of a Shielded Cryogenic Pumping Surface
1963	R.V. Smith, D.K. Edmonds, E.G.F. Brentari, R.J. Richards	Analysis of the Frost Phenomena on a Cryo-Surface
1964	R.S. Thurston	Probing Experiments on Pressure Oscillations in Two-Phase and Supercritical Hydrogen with Forced Convection Heat Transfer
1965	D.B. Mann, P.R. Ludtke, C.F. Sindt, D.B. Chelton	Liquid-Solid Mixtures of Hydrogen Near the Triple Point
1966	A.J. Kidnay, M.J. Hiza	High Pressure Adsorption Isotherms of Neon, Hydrogen and Helium at 76K
1966	C.T. Sciance, C.P. Colver, C.M. Sliepcevich	Pool Boiling of Methane Between Atmospheric Pressure and the Critical Pressure
1967	W.B. Streett, L.A.K. Staveley	The P-V-T Behavior of Liquid Nitrogen at Temperatures from 77 K to 120 K and to Pressures 680 Atmospheres
1967	W.D. Coles, E.R. Schrader, P.A. Thompson	A 14-Tesla 15-Centimeter-Bore Superconductive Magnet
1968	R.L. Merriam, R. Viskanta	Radiative Characteristics of Cryodeposits for Room Temperature Black Body Radiation
1968	R.B. Fleming	Compact Perforated-Plate Heat Exchanger
1969	D.E. Diller, H.M. Roder	Thermal-Conductivity Measurements on Fluid Hydrogen at 17 to 200 K and Pressures to 10 MN/m ²

1969	P. Thullen, J.L. Smith, Jr.	The Design of a Rotating Dewar and Field Winding for a Superconducting Alternator
1970	F.C. Vote, J.E. Meyers, H.B. Chu, T.H.K. Frederking	Near-Isothermal Dissipative Flow of Liquid He II at Supercritical Velocities
1970	W. Baldus	Helium II Refrigerator for 300 W at 1.8 K
1972	R.C. Hendricka, R.J. Simoneau, R.C. Ehlers	Choked Flow of Fluid Nitrogen with Emphaais on the Thermodynamic Critical Region
1972	D.E. Daney, P.M. McConnell, T.R. Strobridge	Low Temperature Nitrogen Ejector Performance
1973	G.P. Kuebler, C. McKinley	Solubility of Solid Benzene, Toluene, N-Hexane and N-Heptane in Liquid Methane
1973	J. Hord	Cryogenic Hydrogen and National Energy Needs
1975	K.R. Betts, A.C. Leonard	Free Convection Film Boiling from a Flat, Horizontal Surface in Saturated He II
1975	J.W. Dean, J.E. Jensen	Supercritical Helium Refrigerator for Superconducting Power Transmission Cable Studies
1977	T.R. Dali, J.C. Chato	Effects of Natural Convection on Heat Transfer in Porous Cryogenic Insulations
1977	C.J. Mole, et al (11 co-authors)	A Superconducting 0.54 MJ Pulsed Energy Storage Coil
1979	E.M.W. Leung, R.W. Fast, H.L. Hart, J.R. Heim	Techniques for Reducing Radiation Heat Transfer a Between 77 and 4.2 K
1979	A. Sherman, M. Gasser, M. Goldowsky , A. Benson, J. McCormick	Progress on the Development of a 3- to 5-Year Lifetime Stirling Cycle Refrigerator for Space
1981	L.J. Van Poolen, W.M. Haynes	New Approach for Analysis and Prediction of Liquid Vapor Coexistence Densities Including the Critical Region
1981	R. BeranRer, G. Bon Mardion, G. Claudet, C. Delpuech A.F. Lacaze, A.A. Lacaze	A Gadolinium Gallium Garnet Double Acting Reciprocating Magnetic Refrigerator

SAMUEL C. COLLINS AWARD

The Samuel C. Collins Award for outstanding contributions to cryogenic technology was established in 1965 by the Cryogenic Engineering Conference to honor Sam Collins, emeritus professor of mechanical engineering at Massachusetts Institute of Technology, who in 1946 invented the first practical helium liquefier. Dr. Collins, retired from MIT in 1964, received the initial Award in 1965. The Collins Award, presented to only four additional persons since 1965, is one of the more prestigious awards given to members of the American engineering community. The winners of the Award are given in Table 4.

“ADVANCES IN CRYOGENIC ENGINEERING”

As Timmerhaus has pointed out, the “Advances in Cryogenic Engineering” has grown from the initial paperback NBS report which was the proceedings of the first Conference to a 1200-page hard cover volume published by Plenum Press. All thirty volumes of the “Advances” series, including five volumes from the International Cryogenic Materials Conferences are still available from the publisher. Under the editorship of Professor Timmerhaus, “Advances” became much more than the usual conference proceedings. As a result of a comprehensive peer review system and careful, at times even severe, editing “Advances” has become accepted worldwide as the premier archival publication in the cryogenic engineering field. Figure 1 shows the growth of “Advances” and reflects the expansion of low temperature technology.

CONFERENCE ADMINISTRATION

The College of Engineering of the University of Colorado provided administrative support through Professor Timmerhaus office to the Cryogenic Engineering Conference from 1954 until 1967. Conference administration was provided by the U. S. Academy of Science from 1967 until 1971 when the administrative function was assumed by the Boulder laboratories of the National Bureau of Standards. L. K. Armstrong served as the Conference administrator from 1971 until 1977 and D. A. Belsher from 1977 until 1981.

Table 4. Samuel C. Collins Award Winners.

1965	Samuel C. Collins	Massachusetts Institute of Technology
1967	Klaus D. Timmerhaus	University of Colorado
1973	Edward F. Hammel	Los Alamos Scientific Laboratory
1979	Howard O. McMahon	Arthur D. Little, Inc.
1983	Joseph L. Smith, Jr.	Massachusetts Institute of Technology

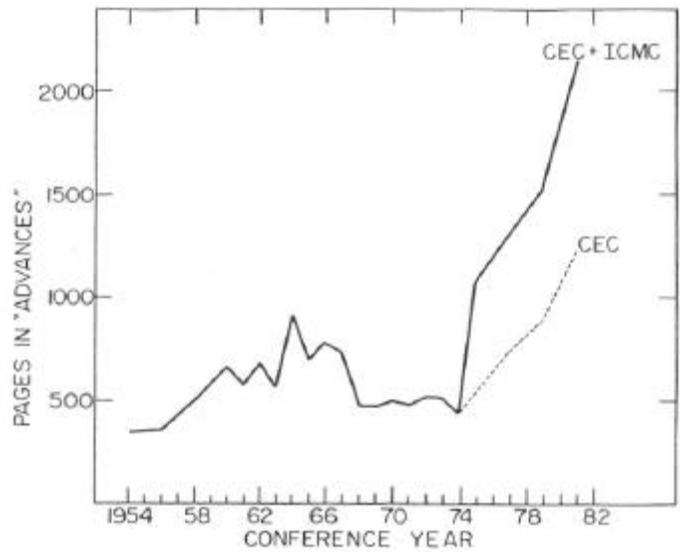


Fig. 1. Growth of "Advances in Cryogenic Engineering"

Fermi National Accelerator Laboratory, in Batavia, Illinois, a Department of Energy funded high-energy physics laboratory with a significant commitment to applied superconductivity and associated large-scale helium temperature refrigeration, became the Conference administrative agency in 1983. The Conference has become incorporated as a not-for-profit corporation in the state of Illinois, with a member of the Fermilab staff (R. W. Fast) as the registered agent.

SUMMARY

The Cryogenic Engineering Conference thanks to the efforts of many dedicated individuals has matured into the most authoritative forum in the field of applied cryoscience and cryoengineering. The "Advances in Cryogenic Engineering" is recognized as the most complete reference source in this field. The Conference moves forward with confidence and enthusiasm into its fourth decade of service to the cryogenic community.

REFERENCE

1. K. D. Timmerhaus, The Cryogenic Engineering Conference - a record of twenty-five years of low temperature programs, in: "Advances in Cryogenic Engineering, Vol. 27," Plenum Press, New York (1982), p. 1.