

*Proceedings of the
Thirty-Fourth
Turbomachinery Symposium*

Sponsored by the
Turbomachinery Laboratory
Texas Engineering Experiment Station
The Texas A&M University System

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with assistance from
The Advisory Committee
and
The Turbomachinery Laboratory Staff

September 2005



CHARLES M. (CHARLIE) RAMSEY
1930 – 2004

Dedication

“When all is said and done, more is said than done,” Charlie Ramsey

Charlie was born in Mart, Texas, and graduated with a BSME from the University of Texas. We never held it against him. After a brief stint with the Freeport Sulphur Company, Charlie spent 37 years with the Dow Chemical Company in Freeport, Texas.

These were exciting times in the turbomachinery industry, and he was involved in the first installations of centrifugal compressors, tilt pad bearings, nonlubricated couplings, and gas seals in Dow. Charlie and Bo Ross, at Dow Freeport, are credited with coining the phrase “Bernie ball” bearings after the first commercial installation of a set of ball and socket bearings in an IR compressor in the early 70s. — *David Littlefield, Dow Chemical Company*

Charlie Ramsey retired as a Mechanical Consultant for the Texas Division of Dow Chemical in Freeport, Texas. He graduated from the University of Texas in 1952 and went to work for the Freeport Sulphur Company before joining Dow Chemical in 1956.

I had the pleasure of working with Charlie on many projects over the years and coauthoring a paper about steam turbine blade failures with him in the *Proceedings of the Twenty-Third Turbomachinery Symposium*. Charlie was a long time member of the Turbomachinery Advisory Committee, and he asked me to become Dow’s representative in 1989 when he stepped down. I will always be grateful for this opportunity he gave me.

He always took the time to talk with me about rotating equipment issues and problems.

Charlie was one of the few rotating equipment engineers that I know who, when he retired, he retired. I remember calling him one day after he had retired and moved to Denton, Texas, and I asked him what he was doing. He told me that he was busy “squirrel-proofing” a bird feeder in his backyard. On another occasion, Charlie called me at the office and said his wife was making him clean out a closet and he wanted to know if I would be interested in having a set of “Singh Strings” (SAFE diagram for turbine blades by Murari Singh, refer to the paper in the *Proceedings of the Seventeenth Turbomachinery Symposium*). Charlie stopped on his way to visit friends in Freeport and gave me a nice wooden box with the “Singh Strings.” I still have this box in my office today. — *Terryl Matthews, Bechtel Corporation, Turbomachinery Symposium Advisory Committee Member*

Preface

These Proceedings contain papers from the lectures for the Thirty-Fourth Turbomachinery Symposium, held in Houston, Texas, September 12 to September 15, 2005. The Symposium is sponsored by the Turbomachinery Laboratory, of the Texas Engineering Experiment Station, The Texas A&M University System.

The Turbomachinery Symposium was established as a forum for users and manufacturers of industrial turbomachinery. Because of many overlapping areas of interest, the symposia are directed primarily to commercial users with the utility and petrochemical industries.

The Advisory Committee for the Thirty-Fourth Turbomachinery Symposium and past symposia have had a continuing influence on the content and direction of the symposia. The committee is composed of recognized leaders in the commercial turbomachinery field from users and manufacturers. Based on their experience and knowledge of the field, papers are solicited and selected to address contemporary problems of interest. Their continued assistance is wholeheartedly appreciated.

Essential elements of the symposia that are not entirely covered by this proceedings include five short courses that preceded the symposium, 16 case studies, 17 discussion groups, and a product exhibit show. The short courses are: Turbomachinery Alignment Overview; Metallurgy; Auxiliary Lubrication and Fluid Seal Systems—Design, Component Selection, and Predictive Maintenance Guidelines; Combined Cycle Gas Turbines; Review of API RP 684—The API Standard Paragraphs Covering Rotordynamics and Balancing.

This symposium includes a “case study” format. Presentations are made of a problem, its resolution, and the lessons learned. Persons attending the case studies receive a CD-ROM containing copies of the presentations.

The discussion groups are led by engineers with a great deal of experience in the subject areas, and they facilitate discussion from the floor. Attendees actively participate in the discussion groups, and many use this forum to get sound advice from their peers on problems of immediate importance. The discussion groups facilitate a quick transfer of information across industry boundaries.

The product exhibit show has more than 200 companies and features new products, accessories, and analysis tools. This aspect of the symposium has continued to improve over the past several years in the quality and range of products exhibited.

Again, the vigorous support of the Advisory Committee is appreciated. My very considerable thanks are also extended to lecture authors, short course speakers, tutorial leaders, case study presenters, and discussion leaders. Both personally, and on behalf of the Advisory Committee, a special “thank you” is extended to the exhibiting companies and their representatives.

Finally, the efforts of the Turbomachinery Laboratory staff in seeing through the detailed execution of the symposium are greatly appreciated, with particular thanks extended to Stephen Phillips. With regard to this proceedings, my personal thanks is extended to Joanne Burnett for her excellent work in editing, preparation, and organization.

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