

AN UNOFFICIAL HISTORY OF THE TEXAS A&M TURBOMACHINERY SYMPOSIUM

THE START AND THE EARLY DAYS

BY: MICHAEL J. DROSJACK





MICHAEL J. DROSJACK

received a B.S.M.E. degree from Carnegie Tech in 1970. He received an M.S. in 1971 and a Ph.D. in 1974 from The Ohio State University. He joined Shell Oil Head Office Engineering in 1975 in Houston and retired in 2009 as the Senior Principal Machinery Engineer from Shell Global Solutions. In 1975 (his first year with Shell), he attended The Turbomachinery Symposium in College Station, Texas and solidified his future as a machinery engineer. In 1986, he was elected to the Turbomachinery Symposium Advisory Committee and has been a member ever since. He is currently an Emeritus Member.



FOREWORD

When I arrived at Texas A&M University (TAMU) in 1980, Pete Jenkins was the Turbo Lab (TL) Director and Chair of the Turbomachinery Advisory Committee (TAC). Pete invited me to join the TAC sometime later. The symposia and meetings were held in the Shamrock Hotel in Houston. I remember going to my first abstract-review meeting, carefully reading all of the material in advance. Some abstracts were no more than a paragraph. Some were more detailed, running to several pages. I observed short comments between men who knew each other well and immensely enjoyed working together in a shared cause. A two or three line abstract would be greeted by, "This will be great. We must get this paper." On the other hand, a carefully detailed abstract might be dismissed out of hand. When I asked about the process, I was told, "We know these guys. So and so is a straight shooter who knows what he is doing, while this other paper will be a straight commercial."

I had met Charlie Jackson in connection with a Vibration-Institute short course I had attended in Chicago and a Bently-Nevada rotordynamics meeting in Minden Nevada before coming to TAMU. I don't think that I knew anyone else. I realized speedily that they were the cream of the crop in terms of Turbomachinery-User companies.

In 1984, when Pete left TAMU, I suddenly became the TL Director. We were really cramped at the Shamrock, running two parallel programs. The TAC members were very kind to me. I remember Charley Ramsey (DOW) coming to me with another advisory member. He said, Dr. Childs, "We have a problem with one of the exhibitors. A woman working in the booth doesn't have on enough clothes." I said, "Well, lead me down there." He responded, "No. We have already taken care of it. We just wanted you to know that it has been handled in case you get a complaint later."

Jack Essinger was the Shell representative when I came on board. Jack was a real pleasure to deal with, with a slow broad smile. He had invented the "Essinger Bars" for shaft alignment. The Shamrock was razed after the 1985 TURBO, and we moved to Corpus Christi for 1986. In Corpus, Jack said that we had to abandon the dual-track program concept, and the program that is offered today largely follows the schedule proposed by Jack in 1986. Jack was diagnosed with cancer soon after the 1986 TURBO and died shortly thereafter.

Mike Drosjack was voted in by the TAC to replace Jack Essinger for the 1986 symposium. He has been a steadfast friend, both to me and to TURBO ever since, first as an active member and subsequently as an emeritus member. His development of the attached TURBO history is representative of the devotion to TURBO that he has always displayed.

I have personally enjoyed reading about his origins of TURBO. Mike's history resonates with my memories of Charlie Jackson's and Ed Nelson's stories about TURBO's start. I particularly remember Ed's grin when he described the then Dean Fred Nelson turning down their request for financial support, followed by the positive response from the ME Department head, Cliff Simmang. As I remember Ed telling the story, he said that Simmang said that it was a surprisingly good idea, coming from them. Simmang also said that he had a young prof, Mehrewan Boyce, who might just work out as the lead from TAMU. Well that started a great program that continues to bring benefits to TAMU, the TL, and the turbomachinery industry at large.

As the saying goes, "Success has many fathers. Failure is an orphan." TURBO has been a great success and deserves many fathers. I hope that you enjoy reading Mike's history as much as I have.

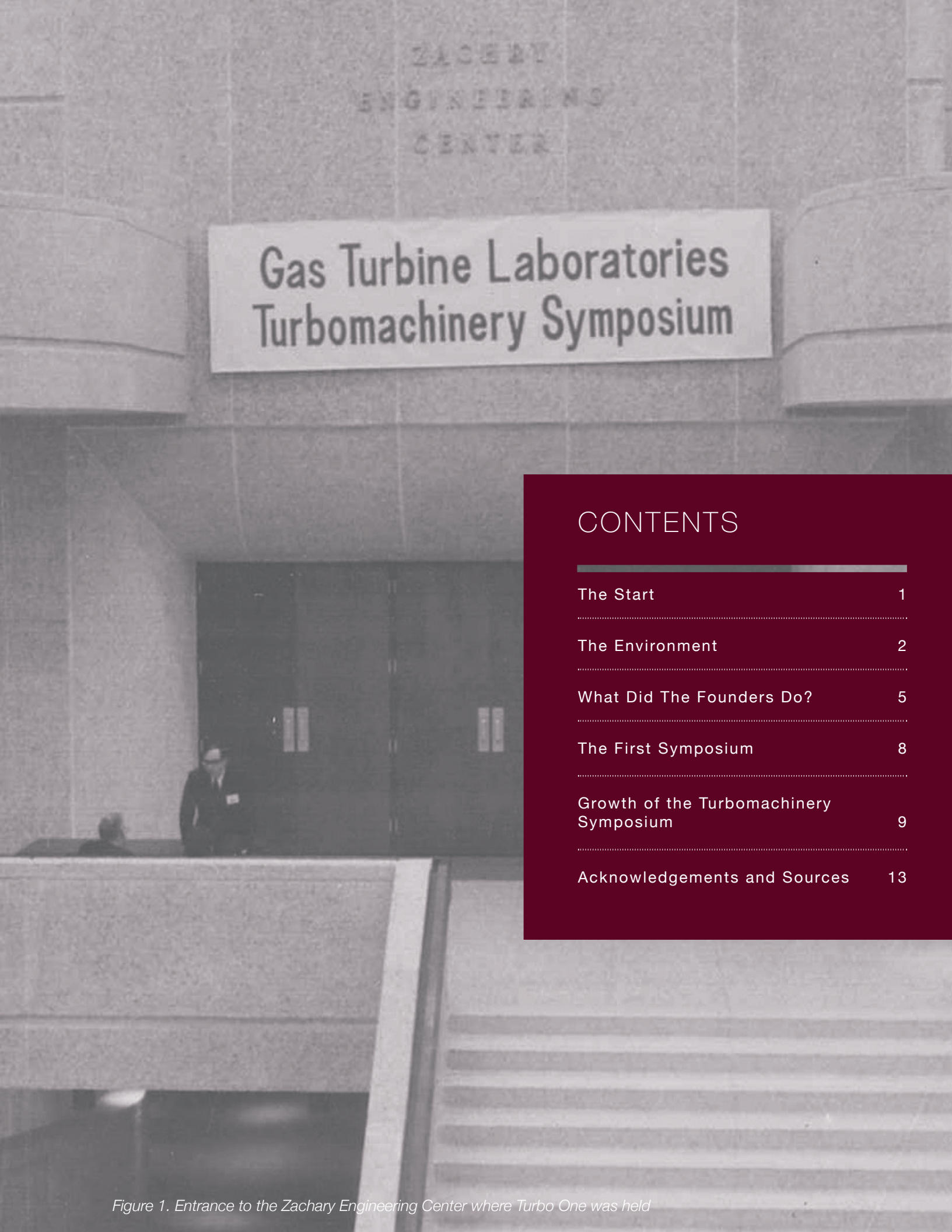
PREFACE

As an Advisory Committee Member since 1986, I had the opportunity to get to know and work with most of the men who started the Turbomachinery Symposium in 1972. Working with them let me hear the stories of how the Symposium was founded and the work that was performed to make it as great as it is today.

This early history was not well documented. In order to gather the information for this document, I used copies of the Symposia Proceedings and a considerable number of personal discussions with people who were either directly involved or had been told the stories by those who were. Sadly, many of those people are deceased. I felt a responsibility to get this story together as there are fewer and fewer of us who actually worked with many of the founders. Details of my information sources are shown at the end of the document.

While there may be some conflicting views on a few of the items in the history, I attempted to be as careful as possible and feel that all of my statements are backed up by multiple sources. I certainly appreciate all the support I received in this effort. However, it should be understood that I am taking direct personal responsibility for the views expressed.

I felt that it was important to get this story put together and released in order to honor all of the Founding Members who took a personal risk and, in the end, made a lasting change in the state of machinery technology in the industry. I believe that the men who started the Turbomachinery Symposium made a lasting impact on the direction of machinery technology and design. They were pioneers.



ZACHARY
ENGINEERING
CENTER

Gas Turbine Laboratories Turbomachinery Symposium

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Figure 1. Entrance to the Zachary Engineering Center where Turbo One was held

THE START

As early as 1969, Charlie Jackson of Monsanto was reported to be talking with machinery engineering leaders in the Gulf Coast downstream operations about the need for a conference or symposium on Turbomachinery along the lines of the University of Oklahoma sponsored Reciprocating Compressor Conference. In 1971 or 1972, the “Texas City Turbomachinery Mafia” (senior machinery engineering specialists from Texas City and Freeport) started seriously discussing the idea of a Turbomachinery Conference in which users and manufacturers could discuss the state of the business, problems, technology, and the future. The players were Charlie Jackson, Senior Fellow of Monsanto, Ed Nelson, Manager of Maintenance Services of Amoco Texas City Refinery, and George Gabriles, owner of Maencor (previously of Monsanto). There were others involved as this discussion developed but these three appear to be the ringleaders and the initiators. Charlie was the head of the band and the former Aggie Yell Leader and was well equipped for the job with seemingly boundless energy. Charlie appeared to know everyone in the industry. George was an entrepreneur who had started and run a number of companies in the machinery service and aftermarket field, was on the board at the OU Conference and knew the ropes of operating a conference. And, solid Ed was Chairman of the Board, respected by all.

Three appear to be
the ringleaders and
the initiators: Charlie
Jackson, Ed Nelson,
and George Gabriles.

THE ENVIRONMENT

At that time, there was a confluence of events in the turbomachinery segment of the Oil & Gas industry that generated demand and support for changes which these three felt could be addressed by a Turbomachinery Symposium.

The Oil and Gas Downstream (Refining, Chemicals, and Pipeline) was expanding dramatically following the strong economy and growth. Facilities were being designed that were larger (in some cases dramatically larger). Improved technology driven at the universities and NASA, the start of the computer explosion, and the availability of “cheap” hydrocarbons drove this. Economic demands were pushing for technical growth, and business demanded economies of scale.

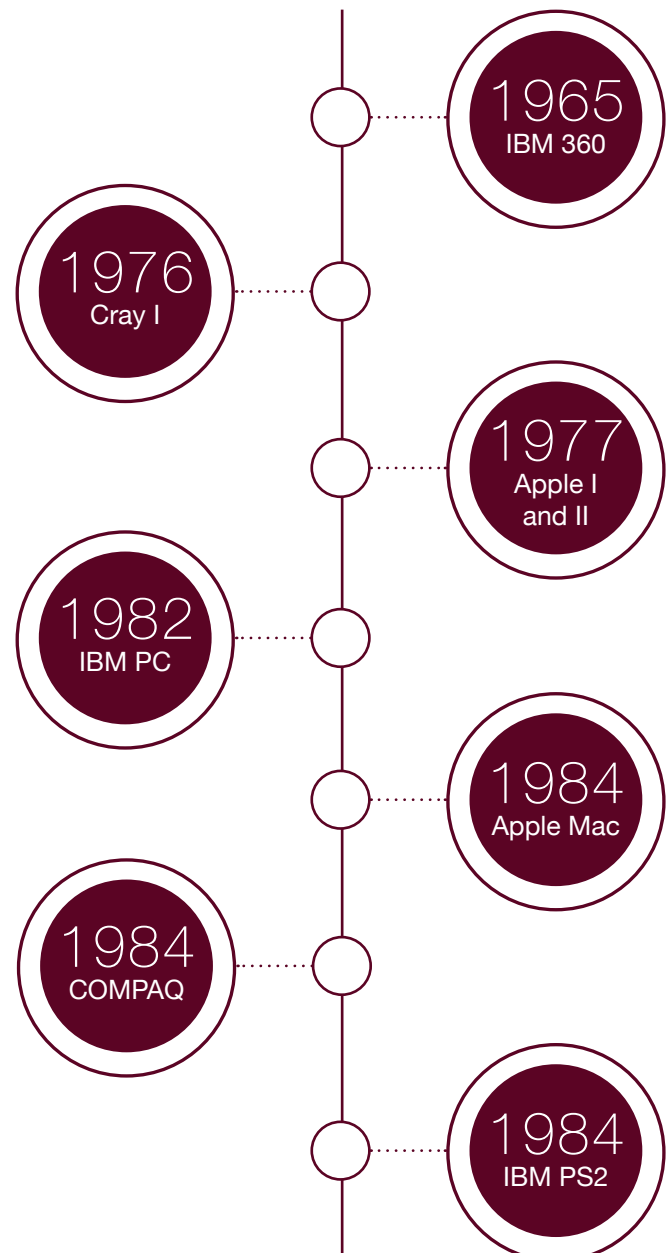
One of the measurable impacts was a significant increase in the capacity of Ethylene Plants being built. These plants were designed for 1-3 Million tons-per-day, several times the size of older plants. The major machines in these plants were process gas and refrigeration compressors. Prior to this time, the very largest compressors in process duty may reach 10,000 horsepower with most in the 1,000 – 5,000 horsepower range. These new plants were in the 20,000 – 35,000 horsepower range and employed 1,000-1,500 psi inlet steam for the steam turbine drivers. This turbine size existed in power generation. However, power-generation turbines operated at a constant speed while process compressor trains operated at variable speeds. Technically, this introduced orders of magnitude more complexity and challenge in design.

Using currently available design tools, a rash of turbine blade failures and unacceptably low machinery reliability resulted. As one example, Shell Chemical had multiple failures on the steam turbines driving their Ethylene Plant Compressors in the Deer Park Plant. One early 70's annual report identified a loss of \$1B from those failures.

In the Upstream, there were also technical issues. One of their demands was a large increase in

discharge pressure for injection compressors. Two major failures, Kaybob and Ekofisk, became legendary for the losses accrued and the difficulty in reaching a solution. These problems were related to rotor dynamics technology which was just starting to take off. Solutions to each of these instabilities took over a year with subsequent production losses.

Also, at this time, availability and use of computers was just starting its dramatic growth. To put this in perspective for those born in the Computer Age, a short time line may help:



In the early 70's, there was not easy access and use of computing power in "normal users" hands. And, in 1972, most computer applications used main-frame computers, "punch card" entry, and very limited or nonexistent graphics. Software often had to be written by the user.

The supporting technologies for the turbomachinery applications were developing. Without the easy access to computer power, many/most calculations had to be done by hand with slide rules or calculators or not at all. This was starting to change at the universities but was slower to change at the equipment manufacturers and turbomachinery operators.

Rotor dynamics technology and applications were expanding. The injection compressor stability issues that occurred in the mid-70's drove development and industry support. NASA was in full bloom at this time and drove rotor dynamics when the newly developed Space Shuttle Main Engines experienced some dramatic, catastrophic test stand failures in the late '70s attributed to rotor dynamics. Technical specialists were being developed around the world. The University of Virginia (UVA) with Professor E.J. Gunter was one of the leaders in this development. Dr. Gunter started a rotor dynamics research consortium (strongly supported by Charlie Jackson) that supported a number of Ph.D. students who became prominent in the Turbomachinery industry. Charlie Jackson was invited to help with this effort on the basis of a recommendation from Don Bently, founder of Bently Nevada. Charlie helped the consortium engage industrial users and support. The rotor dynamics consortium provided members with usable computer code that was widely applied. In latter years, Dr. Dara Childs and Dr. John Vance initiated the Turbomachinery Research Consortium (TRC) at Texas A&M which also provided computer codes as well as test facilities and considerable test data to support and expand the computer codes.

Other technologies like FEA and CFD were being driven for aerodynamic design. Application of these advanced technologies was still constrained by limits on computing power but this was improving daily. Manufacturers were attempting to develop and employ these technologies but they were quite expensive due to computing limitations and the need to hire specialized staff to use them.

An undercurrent in the industry was the belief that manufacturers weren't sharing well. This was a real or perceived notion that information was being withheld. Since many of these current technology sharing meetings and symposia were managed and funded by manufacturers, there was a perception that they weren't helping users as much as they could. The manufacturers' businesses were doing well and they had the challenge of growing and changing in a profitable market.

Along the Houston Ship Channel, repair shops were opened that did non-OEM work. Many (but not all) of these shops had very good engineers, most of whom initially came from OEM facilities and did quite remarkable, creative work. Will Hickham was a leader with Hickham Industries, a turbomachinery repair shop. Bernie Herbage opened the non-OEM bearing-manufacturing facility (CentriTech) that was advancing the technology in tilting-pad bearings. Shackelford-Wattner provided non-OEM couplings. Many others followed suit. There was a video prepared around 10 years ago, titled "Turbine Cowboys" that detailed a portion of the business.

Manufacturers strongly opposed non-OEM work and parts as this was cutting into their profits. And, if said repair failed, the OEM might still be called on to fix the failure. Non-OEM work was often done at a lower price than OEM work. Faster turn-around times were an additional benefit. These features were attractive, but not all of the non-OEM parts worked well.

THE ENVIRONMENT CONTINUED

At the same time, turbomachinery instrumentation was developing and becoming better and more accurate. Early instrumentation was crude as electronic monitoring technology was also a child of NASA. Bently Nevada introduced the 3000 Series in 1965. In 1976, API 670 Standard, the Vibration Alarm and shutdown standard was first introduced. In 1983, the Bently Data Manager analysis system was introduced. In the same frame, IRD Mechanalysis was expanding, and Spectral Dynamics was improving their Real Time Frequency Analyzers.

Without the easy access to computer power, many/most calculations had to be done by hand with slide rules or calculators or not at all.

WHAT DID THE FOUNDERS DO?

The group in Texas City was living with this situation when they decided that something had to be done. One of their primary drivers was to develop a venue in which free and easy sharing of technical information on Turbomachinery would be possible. They wanted to expand their own knowledge as well as teach the next generation of Turbomachinery Engineers. At this time, there was sharing done in small groups, e.g., ASME sectional meetings. However, larger gatherings were either operated by academia or manufacturers. Academia had rules that presentations had to “drive the state of the art”. Practicing industry engineers needed discussion of “state of the art” that could be applied today. Manufacturers drove discussions to their successes and often avoided criticism.

The Founders vision was a forum in which users could share operating experiences, successes, and failures openly with other users, manufacturers, consultants, etc. They decided to start a Turbomachinery Symposium on the order of the OU Reciprocating Compressor conference. They wanted to be able to share information across all users and suppliers. They also wanted to have a means to provide continuing education to those participants in the turbomachinery Industry to “grow” new turbomachinery engineers.

After deciding that a Turbomachinery Symposium should be held, they had to determine a venue. Charlie and Ed were absolutely “dyed in the wool” Aggies and had no question as to a school they wanted to associate with. They went to Texas A&M in an attempt to sell their idea.

First, they approached Dr. Fred Benson, the Dean of Engineering. He was not sold and wouldn’t offer support but didn’t veto it. Next, they went to Dr. Cliff Simmang, who was Department Chair in Mechanical Engineering. Dr. Simmang was an interesting man who graduated from A&M, joined the Army in WWII, returned to A&M to

get his doctorate, became an ME professor and department chair and also commanded the Aggie Corps of Cadets with the rank of general. Dr. Simmang bought the idea and offered both moral and financial support. (It turned out that the Symposium never needed the financial support).

In addition to that support, he had a young professor who had joined the A&M staff in August of 1969, Dr. Meherwan Boyce. Dr. Boyce had graduated from the University of Oklahoma and had some exposure to the Oklahoma Reciprocating Conference. His principal interest was in gas turbines and he started the Gas Turbine Laboratories in the ME Department. Dr. Boyce was named the First Chair of the Turbomachinery Symposium Advisory Committee (TAC) and was the principal university representative.

Organizationally, the founders had to recruit an advisory committee of industry leaders who were turbomachinery users. The (TAC) founding members of the Turbomachinery consisted of:

- E.F. “Mutt” Barnes, Principal Engineer, Union Carbide Corporation, Texas City, Texas
- Dr. Meherwan P. Boyce, Asst. Professor of Mechanical Engineering, Texas A&M University
- George A. Gabriles, President, Maencor Incorporated, Freeport, Texas
- Charles “Charlie” Jackson, Senior Fellow Monsanto Company, Freeport, Texas
- Ralph James, Jr., Exxon Chemical Company, Baytown, Texas
- Robert H. Miller, Manager Engineering Department Gulf Coast Regional Office, Beaumont, Texas
- W.E. “Ed” Nelson, Manager Maintenance Services, Amoco Texas Refining Company, Texas City, Texas
- Ivan G. Rice, Gas Turbine Manager of Deltex Shop of Delaval, Houston, Texas
- J.E. “Bo” Ross, Manager OSHA Relations, Dow Chemical Company, Freeport, Texas



Figure 2. Some of the Turbosymposium Advisory Committee at Turbo One.

WHAT DID THE FOUNDERS DO? CONTINUED

The Founding Members of Turbomachinery Advisory Committee (TAC) were all active Turbomachinery Engineers who had leading roles in the industry along the Gulf Coast Operating Companies and were recruited by the three ring leaders with the assistance of Dr. Boyce. Many/most/all of them knew each other through their work and other industry venues, e.g., ASME Details on each of the Founding Members is included.

There wasn't a detailed list of requirements to be a member of TAC except for considerable practice in Turbomachinery. One of the early rules was 50% or more of the TAC had to be Users (operators of Turbomachinery). They limited the selection representatives of major machinery manufacturers for fear of this becoming a manufacturer-controlled program. They did elect members from repair shops and parts fabricators. Founding Member, Ivan Rice worked at the Deltex Shop of Delaval at the time.

The TAC defined an Objective for the Symposium which is a clear description of their purpose:

Article II of the Turbomachinery Symposium Constitution

OBJECTIVE

This Symposium shall provide an opportunity for interested persons to learn the applications and principles of various types of turbomachinery and related subjects, to enable them to keep abreast of the latest developments in this field, and to provide a forum for the exchange of ideas. The Symposium shall be on a practical engineering level.

The group decided that the Symposium would hold an annual meeting or symposium that would include lectures, discussion groups, and exhibits. The lectures were being solicited from members of the industry and reviewed and accepted or rejected by the TAC. Note the emphasis of Practical Engineering Level in the objective. The symposium was to address current or near-term issues. The desire was that participants could take information away from the symposium and put it to immediate or near-term use. They felt that there was plenty to be discussed by the industry to immediately address problems of the current day.

Of particular interest and uniqueness were the discussion groups. Many participants have described the discussion groups as the symposium's most important component. The discussion groups included Discussion Leaders, who were experienced personnel well versed in the subject. They would lead a discussion with an audience that included users and manufacturers. These leaders knew the subject and most often knew some of the participants. They were able to share information and engage users and manufacturers. Participants drove the discussion by asking questions on areas of interest. Many existing problems were solved or avoided in these discussions as users and vendors swapped solutions and failures as well as practices.

These discussion groups also helped focus the manufacturers to better understand major issues. They provided a terrific means to help train the operating engineering personnel.

Lectures were published and reviewed carefully by the TAC. Authors offered abstracts which were reviewed in the fall of the year. After review, a sufficient number of manuscripts were invited to provide more than enough lectures for the symposium. A manuscript review meeting was held in the Spring of the year to select the best submissions for the papers to be presented at the symposium. Lectures are presented in a 45-minute slot followed by questions, time permitting. The format for selection, review, and approval was taken from the ASME Gas Turbine Conference. Dr. Boyce and Ivan Rice were both active in this organization, serving in leadership positions. They proposed this protocol to the TAC who accepted it.

The lectures come from users, manufacturers, consultants, and others with a good, useful story to tell. They were often a detailed review and solution to a turbomachinery problem or failure and a solution. They might also describe the introduction of new technology. To make sure the material was usable in the short term, the lectures on technical developments required actual field operating experience on the device prior to publication. A considerable number of the lectures have become industry groundbreakers. Paper number one, presented by John Sohre titled, "Turbomachinery Analysis and Protection", ended up being a basis for a Turbomachinery Expert System developed in the industry.

All Proceedings of the Turbomachinery Symposium are available to the public on the Turbolab website (turbolab.tamu.edu) as a service to the entire industry.

THE FIRST SYMPOSIUM

The first Turbomachinery Symposium was held in College Station, Texas in October 24-26, 1972. The technical sessions were held in the Zachry Engineering Center on the Texas A&M campus. There were 16 technical papers and 6 Discussion Groups led by 19 engineers who were leaders in the technical areas. An accompanying exhibit was held with 21 exhibitors. A bound proceedings of the lectures documented the symposium.

Prior to the event, attendance of about 50 was estimated for the 1st symposium. Instead, over 200 attendees showed up. This caused some logistical difficulty as the banquet facilities were overwhelmed. They had to add a second banquet site so that all could attend.

The Mechanical Engineering Department's Wife's Club provided donuts and sweets for the coffee breaks as an example of Texas A&M's welcoming spirit. The attendees were so appreciative that they "passed the hat, and the hospitality turned out to be a very good fund raiser for the Wife's Club.

The first Turbomachinery Symposium was so well received that it spawned an annual meeting. 2015 marked the 44th Symposium and the 45th Symposium is scheduled for September 2016. There is no evidence of the Symposium slowing down.

About 50 were
estimated for the 1st
symposium. Instead,
over 200 attendees
showed up.



Figure 3.



Figure 4.



Figure 5.



Figure 6.

GROWTH OF THE TURBOMACHINERY SYMPOSIUM

The program grew and was modified over the years. Lectures and Discussion Groups remained. In 1977, Tutorials were added to the program. These were 90 minute presentations to provide an extended lesson in Turbomachinery Technology to the audience. In 1985, one-day Short Courses were added, preceding the symposium. And, in 1999, Case Studies were added on the morning of the last day. These were less formal PowerPoint presentations of problems and/or solutions that were not (initially) published. Case Studies dealt with real engineering problems, on the format: Problem -> Solution -> Lessons Learned. Robert Perez, then at Koch Industries, led the effort to bring case studies into the program. Introducing case studies on Thursday morning greatly increased last-day TURBO attendance.

Dr. Meherwan Boyce was the Turbomachinery Advisory Committee (TAC) Chair from 1972-1978. Dr. Peter Jenkins was the Chair from 1979 – 1983. Dr. Jenkins started the Pump Symposium as a separate meeting in 1984. Prior to that time pumps were included with Turbomachinery. In recent years, they have rejoined Turbo. In 1984, Dr. Dara Childs became TAC Chair and holds that position to this day.

After several more Symposia in College Station, the meeting had outgrown the available facilities and was moved to the Shamrock Hilton in Houston. In 1986, the Shamrock Hilton was closed, and the Symposium had to look for a new location. It met for one year, 1986, in the Corpus Christi Convention Center. It then moved to Lowes Anatole in Dallas, Texas. In 1995, it moved to the George R. Brown Convention Center in Houston, Texas where it remains today.

In 2011, 2013, and 2015, Middle East Turbomachinery Symposium were held in Doha, Qatar. In 2016, an Asia Turbo and Pump Symposium was held in Singapore under the direction of Dr. Luis San Andrés, assistant director of the Turbo Lab.



Figure 7.



Figure 8.



Figure 9.



Figure 10.

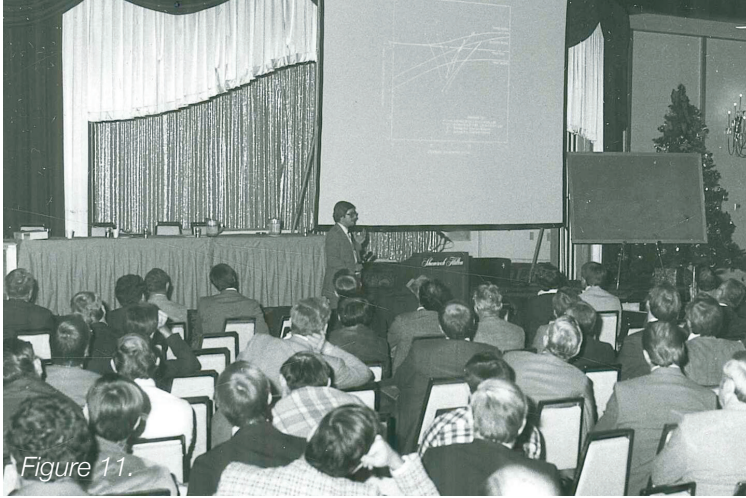


Figure 11.



Figure 15.



Figure 12.



Figure 16.



Figure 13.



Figure 17.



Figure 14.



Figure 18.



Figure 19 and 20.

AND PUMP

After several more Symposia in College Station, the meeting had outgrown the available facilities and was moved.



ACKNOWLEDGEMENTS AND SOURCES

A limited amount of published information exists on the early years of the Turbomachinery Symposia. Much was lost or thrown away over the intervening 40+ years. Thus, to pull the information together required the use of many sources. Among them are:

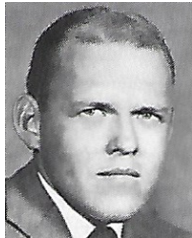
- Turbomachinery Proceedings which were published for every Symposium. However, the list of the Founding Members was not published until 1997.
- Discussions with Dr. Dara Childs, current Director. He had discussed the history with many of the Founding Members during the earlier years of his tenure.
- It is sad to say that most of the Founding Members have passed away. Only Dr. Meherwan Boyce and Ivan Rice are still with us today.
- Ivan provided an email with information on the early organization of the program, the use of ASME Gas Turbine Section paper-review protocol, and the use of the Deltex mailing list for the first Symposium.
- Jerry Wilkerson was asked to sit in on many of the first TAC Meetings by his boss, Bob Miller. Bob was an electrical engineer who recognized the value of the Turbomachinery Symposium but didn't feel qualified to participate in some of the more technical discussions, e.g., paper selection. Jerry provided many first-hand remembrances about the early actions and discussions of the Advisory Committee. Jerry became a full time Advisory Committee Member in 1975.
- Charlie Rutan was an early TAC Member and very close friend of Charlie Jackson and had his share of stories. He had attended the 1st Symposium.
- Malcolm Leader was a protégé of Charlie and also had discussed the founding with Charlie at length.

- Vern Maddox was a member of the Turbomachinery community at the time of the founding and discussed the concept of initiating the Turbomachinery Symposium with Charlie Jackson in the late 60's and early 70's.
- When I first joined the TAC in 1996, many of the Founding Members were still on board. I was able to have many first-hand discussions with them as well as to receive advice for continuing the work of the Advisory Committee.

Much was lost or
thrown away over
the intervening 40+
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APPENDIX

FOUNDING MEMBERS OF THE TURBOMACHINERY SYMPOSIU



E.F. "MUTT" BARNES

E.F. "Mutt" Barnes was a staff engineer with Union Carbide Corp.'s Chemical and Plastics Division, Texas City, Texas. He held a B.S. degree in mechanical engineering from the University of Texas at Austin. Mr. Barne worked in the Maintenance Departments' Machinery Group. Previous assignments were in Carbide's Engineering Department, polyethylene production, and process development.



MEHERWAN P. BOYCE

Meherwan P. Boyce received his Bachelor of Mechanical Engineering from South Dakota School of Mines in 1962, an M.S. in Mechanical Engineering from the State University of New York at Buffalo in 1964, and a Ph.D. in Mechanical Engineering from the University of Oklahoma in 1969. Following receipt of his Ph.D., Dr. Boyce joined the Mechanical Engineering Department of Texas A&M University in August of 1969. He founded the Gas Turbine Laboratories at Texas A&M and was appointed as the first Chair of the Turbomachinery Symposium Advisory Committee in 1972.

Dr. Boyce left Texas A&M to found Boyce Engineering, Intl. in 1979. He is Fellow of ASME, IMechE (UK) and IDGTE (UK). He is a P.E. in the state of Texas.

Dr. Boyce is the author of three engineering books including the Gas Turbine Engineering Handbook (Elsevier), Handbook for Cogeneration & Combined Cycle Power Plants (ASME Press), and Centrifugal Compressors, A Basic Guide (Penn Well Books).

Additionally, he has authored more than 150 technical papers and reports on gas turbines, compressors, pumps, fluid mechanics, and turbomachinery. He was chair of the ASME PTC 55 Aircraft Gas Turbines.

Dr. Boyce is past chair of the Plant Engineering & Maintenance Division of ASME, and Chair of the Electric Utilities Committee of the of ASME's International Gas Turbine Institute and Chair of the ASME Conferences Committee. He is the recipient of the ASME award for Excellence in Aerodynamics and the Ralph Teetor Award of SAE for enhancement in research and teaching.

Dr. Boyce is a Founding Member of the Turbomachinery Symposium and has served on the TAC from 1972 to the present date.

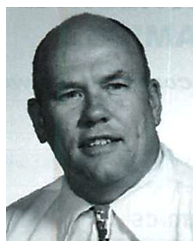


GEORGE GABRILES

George Gabriles was born in Barcelona Spain. He served in the U.S. Navy as a submariner in WW II. Upon discharge from the navy, he attended the University of Houston and received his ME degree in 1953. He then worked for Monsanto in Texas City for 15 years. George left Monsanto to pursue life as an entrepreneur and owned Maencor, Moore's Electric, Air-Tech, Tuff-Kote, and Brazoria Aviation Services.

George became a Dale Carnegie instructor and was sought after for his speaking skills. He served on the Advisory Committee of the University of Oklahoma Reciprocating Compressor Conference. He was a registered professional engineer in the state of Texas and served on numerous boards.

George was a Founding Member of the Turbomachinery Symposium and served on the TAC from 1972-1999. George passed away in 2013.



CHARLIE JACKSON

Charles “Charlie” Jackson graduated from Texas A&M University with a degree in Mechanical Engineering in 1950. He was a member of Pi Tau Sigma and Tau Beta Pi. He went to work for Monsanto Company and received the title of Distinguished Fellow retiring in 1985, becoming a quite active private turbomachinery consultant.

Charlie published the Practical Vibration Primer, a book that lived up to its title in 1979. It sold thousands of copies. He also wrote two chapters of the Handbook of Mechanical Design.

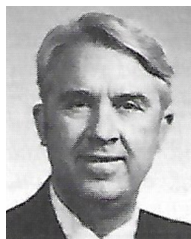
He was a Life Fellow of ASME. In 1992, he was a charter inductee in the Texas A&M Mechanical Engineering Academy of Distinguished Graduates. He was jointly honored with Ed Nelson with a TAMU Mechanical Engineering professorship. Charlie was also exceptionally active in the Vibration Institute and was honored by the Institute with the Diamond Award for excellence in technology. The Vibration Institute established the Charles Jackson Scholarship in the Mechanical Engineering Department at Texas A&M.

Charlie was a member of the API’s Subcommittee on Mechanical Equipment, past president of the Society of Experimental Stress Analysis, and past President of the American Institute of Plant Engineers.

Charlie was a Founding Member of the Turbomachinery Symposium and served on the Turbomachinery Symposium Advisory Committee from 1972-1992. He was one of the leading participants along with Ed Nelson and George Gabriles in developing the TURBO symposium and carried the idea to the engineering administration of Texas A&M to gain their support.

Charlie was a lifelong Aggie. While at Texas A&M he was a Yell Leader. He carried that practice with him as shown by his photo at a Turbomachinery Symposium.

Charlie passed away in 2010.



RALPH JAMES

Ralph James, Jr. was a Supervisor of mechanical technical services with Exxon Chemical Company, U.S.A in Baytown. He held a B.S. degree in Mechanical Engineering from the University of Texas at Austin and an M.S. degree in Mechanical Engineering from the University of Houston. He was a member of several professional societies and a registered professional engineer in the State of Texas.

Mr. James was a founding member of the Turbomachinery Symposium Advisory Committee and service on the TAC from 1972 – 1979.

Mr. James is deceased.



ROBERT H. MILLER

Bob was born in West Virginia. His father worked for E.I. du Pont de Nemours & Company. He earned a Bachelor of Science degree from Washington State University in 1955. He spent an additional year at the university specializing in instrument studies. In 1957, he began his professional career with DuPont in Wilmington, Delaware. He joined the U.S. Army in 1958. In 1960, he was discharged and rejoined DuPont in Delaware. In 1968, he moved to the DuPont facilities in Beaumont, Texas as Engineering Manager. While in that position, he was approached to participate in initiating the Turbomachinery Symposium. After participating in the Turbomachinery Symposium Advisory Committee for a little over a year, Bob was transferred back to Wilmington, Delaware as a manager in the Construction Projects organization.

Bob passed away in 1998.



ED NELSON

W.E. “Ed” Nelson was Manager of Maintenance Service for the Amoco Oil Refinery in Texas City. He received a B.S. degree in Mechanical Engineering from his beloved Texas A&M University in 1951. Upon graduation, he joined the U.S. Navy serving as an officer on destroyers. Discharged in 1954, he joined Amoco, retiring in 1991 after 37 years of service.

He co-authored a book, Centrifugal Pump Sourcebook with John Dufour which became a standard in the industry. He also authored a monograph for application in the industry titled, Rule of Thumb that detailed a considerable number of the facts, tables, etc. that are used day to day in the machinery maintenance practice, in effect, the experienced machinery engineers little black book.

He was honored with the ASME Henry Worthington Medal for accomplishments in pump engineering in 1995. He received the W.R. Woolrich Award as Engineer of the Year from the South Texas Section of ASME. He was a Charter Inductee into the Texas A&M Mechanical Engineering Academy of Distinguished Graduates in 1992 and in the same year a professorship in Mechanical Engineering was established for Ed, jointly with Charlie Jackson.

Ed was a co-Founder of the Turbomachinery Symposium and served on the TAC from 1972 – 1991. In fact, Ed was one of the co-conspirators, along with his great friend Charlie Jackson and side kick George Gabriles in developing the idea for a Turbomachinery Symposium to be initiated under the auspices of the Texas A&M Mechanical Engineering Department.

Ed was a shameless Aggie Alum doing all in his power to help Texas A&M. The “Gig Em” sign was part of his Rules of Thumb book.

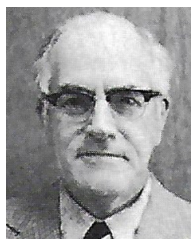


IVAN G. RICE

Ivan G. Rice was a 1950 graduate of the University of Arizona with a B.S. in Mechanical Engineering. He started his gas turbine career with General Electric Company testing their J-47 jet engine. In the 1950's, he moved to the Houston office to become application engineer of a special gas turbine marketing team. Mr. Rice joined Delaval in 1969 where he held the position of manager of Gas Turbine System Sales for their Deltex Division. In 1973, he left Delaval to become a private consultant in the area of turbomachinery.

He was the Past Chair of the south Texas Section of the ASME (1974-1975), past Chair of the ASME Gas Turbine Division (now IGTI) (1975-1976) and an ASME Life Fellow and Life Member of NSPE/TSPE. He authored many articles and ASME papers on gas turbines, intercooling, HRSGs, steam cooling, and steam injection.

Ivan was a Founding Member of the Turbomachinery Symposium Advisory Committee and served on the Turbomachinery Symposium Advisory Committee during 1972-1995.



J.E. "BO" ROSS

J.E. "Bo" Ross was Manager of OSHA Relations for the Texas Division of Dow Chemical Company. He had a B.S.M.E. from the University of Texas at Austin, was a member of ASME, and a registered professional engineer in Texas. After graduation, he worked for Reed Tool Roller Bit as a design and development engineer. Starting with Dow in 1942, he had worked in engineering, construction, maintenance, and technical services assignments.

Bo was a Founding Member of the Turbomachinery Symposium Advisory Committee and served through 1974.

PHOTOS

There were a limited number of photos of the first Turbomachinery Symposium. I have included those from Turbo One as well as a few from later Symposia. It is not clear who the people in the photos are (since they are so young).

Figure 1: Entrance to the Zachary Engineering Center where Turbo One was held

Figure 2: Some of the Turbosymposium Advisory Committee at Turbo One

Figure 3: Turbo Director Meherwan Boyce Introducing a speaker at Turbo One

Figure 4: Participants and wives at Turbo One Banquet

Figures 5: Lecture hall with Attendees for Lecture at Turbo One

Figures 6: Participants at the Banquet at Turbo One

Figure 7: Presenters and Advisory Committee at Turbo Nine

Figures 8 and 9: Charlie Jackson and Al Campbell getting ready to entertain the TURBO 11 participants with the "Aggie War Hymn" on bagpipe and kilts. This was repeated for many years and was looked forward to at each Symposium for as long as they were able and willing.

Figure 10: Future Director Dr. Dara Childs making a presentation at Turbo Eleven

Figure 11: Lecture at Turbo Eleven

Figure 12: Exhibits at Shamrock Hilton at Turbo Eleven

Figure 13: Director Peter Jenkins awarding a presenter at Turbo 11 a Turbo plaque

Figure 14: Exhibits at Turbo Fourteen

Figure 15: Exhibits at Turbo Thirty Seven

Figure 16: Welcoming Address at Turbo Thirty Seven

Figure 17: Exhibit Hall Turbo Forty-Four 2015

Figure 18: Exhibit Hall Turbo Forty-Four 2015

Figures 19 and 20: Group photo of Turbo Ten merged with Turbo Forty-Four 2015 banners

