

# Succeeding a 'graying' turbo faculty

**A GENERATION OF NEW JOBS IS AVAILABLE IN THE TURBOMACHINERY INDUSTRY, BUT WE NEED EXPERIENCED TEACHERS AND RESEARCH PROFESSIONALS TO LEAD THEM**

**H**ow are we going to get the oil & gas we need for the next 20 years? Or for that matter, how are we going to launch the next satellite or build the next generation jet engine without experienced academic support for the turbomachinery industry?

What triggered these questions was a comment made to me by one of our distinguished industry professionals that some of the universities that have traditionally specialized in the various turbomachinery disciplines are no longer offering tenure track appointments in the field. This intrigued me, so I made a few phone calls. It did not take long to realize that the "tenure" topic, in and of itself, was sensitive and, not unlike "term limit," a topic with strong, but divergent opinions.

I don't want to go there, but I am interested in raising the awareness that with the "graying" of the existing and highly respected tenured faculty, we are losing an extremely valuable resource, and seemingly without a viable succession plan to sustain it.

## Serving national interests

The underlying issue that seems to be driving us in this direction is that the universities themselves are becoming more business-like in their investment decisions. I guess that I never understood the university system, or maybe just took it for granted, but a tenure track appointment is a 40-year investment decision and there is a general reluctance to make such commitments when the pace of technology development itself can easily render obsolete those narrowly focused or less-than-adaptable specialists.

In addition, all the universities seek to maximize external R&D support for the same business reasons that apply to you and me. At the moment, "turbo" does not exhibit the return on investment potential of "nano," "bio" or "micro," nor is it considered a "national security" imperative, as are unmanned vehicles and some robotics. In short, turbomachinery does not attract the "big buck" R&D contracts because it is just not as glitzy or it is considered a "done deal."

To be fair, there is a continuing level of support for aero research and the associat-

ed Computational Fluid Dynamics (CFD) activity. The CFD initiatives tend to be in application support, rather than a code development and more in line with the activities of a university research scientist. Research scientists are those non-tenured faculty members that have a job as long as there is research funding to support them.

At the same time, the undergraduate demographics have shifted much of the interest in turbomachinery and related technologies to China and India, as the logical outcome of the continuing outsourcing of turbomachinery design and manufacture. The universities in both India and China are producing substantial numbers of graduates focused in these areas, and graduate programs to support continued development are not uncommon.

The practical consequence of this is that the turbomachinery industry — equipment manufacturers and users alike — may no longer have a readily available cadre of experienced teaching and research professionals to support its needs.

Part of the problem is that most folks do not understand the breadth and depth of turbomachinery and its impact on modern society. We are taking it for granted. At the same time, the limited federal funding sources seem to be focused on longer range technologies, which drive R&D funding and tenure track appointments toward the "nano," "bio" and "micro" developments, while the turbomachinery industry consortia funding drives interest towards applications and research scientists, but with a shrinking base of support as the industry consolidates.

In itself, this is not entirely wrong, but we are entering a period of significant and sustained investment in a variety of energy-related development, production and conservation technologies, all of which involve turbomachinery to one degree or another. There is a general shortage of qualified candidates and the resulting competition from industry for their services does raise the question about the ready availability of resources to both maintain U.S. economic vitality, and to address some of the world's pressing energy issues. And there are more than a few!

Many of these initiatives will push the current technology level faster, higher and hotter and into areas that have not yet

been explored. A few examples are:

- Liquefied Natural Gas (LNG) compressor trains will increase from current design levels of 75 - 100 MW to 250 MW
- Gas-to-Liquids facilities will increase 10 times in scale with 500 - 600 MW of Air Separation Unit feed air compression trains of 75 - 100 MW
- Gas injection will increase from the current 400 - 500 bar to 750 bar in the shallow water Caspian Sea Tengiz and Kashagan Fields
- The Shtokman Field will require solutions to the extreme cold and ice conditions that exist offshore in northwest Russia
- The Ormen Lange Gas Field "nothing-above-the-waves" Project located 120 km off the coast of Norway will require new sub-sea compression technologies and high-pressure underwater gas pipeline to transport the produced gas from Norway to Scotland

Given the energy issues that abound in today's world, there is good reason, but little time, to address this strategic issue and to insure some level of control over our own destiny. The energy companies do have an interest, but they are also global entities and often-times appear to be without any particular national allegiance. They can also be sold.

As a group, we need to encourage U.S. Department of Energy and National Science Foundation to raise the visibility of this issue and ask that they address it through political and funding initiatives designed to replenish the skill and experience of this critical human resource, as a means to sustain the economic vitality of our industry.

There is at least another generation of jobs available in the turbomachinery industry, but we do need someone to lead them. ■

## Author

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