Taking Stock of the Gas Turbine Industry ... The Wall Street Perspective

(Published in the Global Gas Turbine News of July 2000 ... #2)

by Wolfgang H. Demisch

The following is the text of Mr. Demisch's excellent Keynote presentation at ASME TURBO EXPO 2000 in Munich, Germany. Managing Director of Wasserstein Perella Securities, Inc., Mr. Demisch has over 20 years experience as a senior analyst and is responsible for coverage of aerospace, defense, and high technology industrial companies. His comments present an interesting perspective on our industry's development and future. Section titles have been added for clarity. (Ed.)

INTRODUCTION

State Minister Wiesheu, Mayor Monatzeder, fellow members of ASME, honored guests: It is a real pleasure to have the opportunity to speak with you here, in beautiful Bavaria, to help kick off TURBO EXPO 2000, the 45th gas turbine conference sponsored by ASME. It is fitting that this first 21st century TURBO EXPO should take place in Germany, the country where the aeronautic gas turbine first took flight, some 60 years ago.

That event took place within the lifetime of some of us here. Indeed, just yesterday I was privileged to attend an award ceremony for Martin C. Hemsworth, who has been active in gas turbine technology since 1940. Marty was a driving force behind GE's TF39, the world's first high bypass jet engine. As his presence illustrates, we have our history present here with us. Since that first flight, gas turbines have passed many milestones. Forty years ago, gas turbines began to transform commercial air transport. Thirty years ago travel became a mass market by virtue of efficient high bypass engines and widebody jets. Twenty years ago deregulation began in the U.S. airline sector and utility industry, making cost a central issue. Ten years ago the cold war ended and the global economy began to integrate more fully, spurred by ongoing deregulation and privatization worldwide.

TURBO EXPO 2000, here at the beginning of a new decade and a new century, is an appropriate occasion for taking stock. This conference exists not only to look forward to the new capabilities that the new technologies you are creating make possible, but also to provide a wider view ... to look at the framework in which the global gas turbine industry is set to grow. We do ourselves a disservice if we fail to step back for a periodic reality check, especially in an industry as multifaceted in its relationships, as complex in its technologies and as long term in its product life cycle as the gas turbine business is today.

TAKING STOCK

> In Wall Street's eyes, the gas turbine industry constitutes a critical enabling technology that ... has never been able to adequately exploit the economic value of its technology.

For any industry, stocktaking must begin with an assessment of its markets, the customers it serves and hopes to serve, followed by an examination of how the customers' needs and challenges translate into requirements and priorities for that industry. Such assessments are an ongoing requirement in the financial community. Wall Street, which we can use as shorthand for the entire finance and investment component of the economy, is as you know primarily a futures discounting mechanism. Investors value businesses based on the discounted present day value of their projected future earnings stream. Greater expectations bring about higher values. Of course, investors discount their expectations more severely if there is greater political, technological or operational uncertainty than is the norm for securities in general. These uncertainties are very familiar in the gas turbine business.

So my objective this morning is to provide a Wall Street perspective on the industry as it enters this new era of 21st century peace and prosperity, and to lay out some possible implications for this sector of the transition to a global economy now underway.

HISTORICAL VIEW

In Wall Street's eyes, the gas turbine industry constitutes a critical enabling technology that has also been intimately linked with government controlled markets for most of its existence. It produces the military engines that were critical to national security, powering aircraft, helicopters, warships and tanks, plus it opened the world to large scale global air transport service, offered by both private as well as nationally owned carriers. In addition, its compressor and power generators have carved out a substantial and growing share of the gas and electric utility capital budgets, thanks to their efficiency, reliability and relatively speedy construction cycle.

This relationship with government customers has been technically constructive. The U.S.'s DOD, the UK's MOD and their counterparts elsewhere fostered the development of gas turbine technology, as have a host of other agencies, such as NASA, DARPA and EPRI in the U.S. Government requirements and funds have provided most to the push that has lifted the capabilities and performance of gas turbines from the initial 1000 lb thrust engines to over 100,000 lbs. today, while boosting overhaul cycle times from tens of hours to tens of thousands of hours along with a tripling of fuel efficiency.

The downside to these government relationships is that the industry has never been able to adequately exploit the economic value of its technology. With multiple sponsored suppliers and customers, the industry has recapitulated the experience of the semiconductor industry, another enabling technology that was deemed vital for national success by numerous governments. "Industrial rice" was the term used, and as a result, that industry, which has maintained over 20%/year productivity improvement for the past 40 years, still consists mostly of intermittently profitable suppliers earning under 20% from operations. Only Intel, which almost uniquely made the transition to a system provider, has been able to achieve and to maintain the 40-50% margins that appear appropriate for a world leading producer of critical technology products. While the rest of the semiconductor industry still faces a difficult adjustment now that the Asian economic crisis has curtailed its capital sources, Intel carries a P/E in the forties and enjoys a market valuation approaching 10 times annual sales. The gas turbine producers unfortunately have not achieved similar recognition. In fact, Rolls-Royce, the most focused supplier, carries a barely double digit P/E, while critical component producers such as Precision Castparts or Howmet sell for less than 20 times. Only GE has won the financial markets unreserved endorsement, probably because GE has long stressed the financial performance of its business as much as their operating quality. In any case, the gas turbine industry faces a transition, perhaps less abrupt than do semiconductors, but no less far reaching.

RECENT CHANGES

The end of the Cold War and the collapse of the centrally planned economy model combined imply a dramatic change in the industry's business framework. First and most obviously, there has been a brutal slump in military purchases. While overall budgets have dropped only 20-40%, equipment purchases have fallen to a third or less of prior norms. Production is averaging 1-2% of the active inventory versus 6-10%, and new program developments are being stretched over 15-20 years. Keeping design teams intact and production lines open in this framework is problematic at best.

Apart from the obvious volume impacts, the ending of the global confrontation has opened previously blocked avenues for global teaming and rationalization. The Rolls-Royce Allison merger and the UTX-PERM cooperation illustrate the possibilities opened up. By extension, the national security umbrella over this sector is being withdrawn, so local industry can become global, if required, but must also face up to global competition.

There is a similar transition for the commercial customers. Air transport has become a purely economic activity with the arrival of peace. Much as the 1930s vintage national shipping lines have in peacetime been overtaken by private enterprises such as Maersk or Carnival Cruises. The world's national air carriers are well along in a process of privatization and consolidation.

Starting with the tremendous success of deregulation in the U.S. in the late 1970s airlines worldwide have increasingly become profit oriented rather than nationally sponsored entities. Their growth continues, but profit is now the key.

Similarly, the world's power industry, which how represents the fastest growing market for gas turbines, is stepping out of its long established regulatory framework, and embracing a private market competitive structure. As Asia gradually recovers, and as U.S. and European producers act to restore supply margins and to meet lower emission requirements, this sector

should continue to grow handsomely but with global competition to serve its equipment needs.

The clear implication of the above changes in the customer environment is that we are now in a buyers' market. Economic return is becoming the primary driver for the world's airlines and for the world's utilities, rather than political or social priorities. Likewise for the military, overburdened with responsibilities that mandate a high operating tempo in peacetime, cost will increasingly be the crucial variable in purchasing decisions.

This shift in customer priority from performance to cost is not entirely unexpected. The industry has in any event begun to reach practical technical limits to the benefits from its historic priorities of more powerful, more economical to run and more durable. For one, there is no aircraft in prospect that would justify an all new engine beyond the GE90/115B, nor is there much likelihood of a much greater fuel efficiency. While an unducted fan might offer a good gain, as could an engine with much higher temperatures or pressure ratios, the price of the extra complexity and capital required might require a $100/bbl oil price to justify the needed investments. That price fortunately still appears some ways off. Nor is durability as much of an issue, at least in aviation, as the airframe itself typically needs an overhaul after 5 years or 15,000 hours, much as engines do now. Only a life of the aircraft maintenance free engine, which would appear to be within reach during the next decade, probably initially for corporate jets, might well become an economically attractive proposition for both military as well as civil users, subject to regulatory approvals.

IMPLICATIONS AND FUTURE STRATEGIES

The implications for the industry are profound. It means the gas turbine product space is now broadly defined in size and performance, so that future gains here can only be achieved by taking share from a competitor. Of course, this does imply a further intensified struggle for competitive advantage, but the impact is felt more in the equity market. Financial markets, as noted earlier, focus on future earnings prospects. If those prospects come under pressure, so does the share price. To the extent that any of your firms use options as a compensation tool, or as a recruitment incentive, or you carry company stock in your retirement accounts, this is a very burdensome development.

To avoid these undesirable consequences, the gas turbine industry must do one or more of the following:

1. **develop new markets,**
2. **serve its existing markets much more cost effectively,** or
3. **restructure to capture more of its economic value than it does at present.**

Develop New Markets

Of these options, the first is perhaps the most uncertain, not because there is no market, but because it is brutally difficult. There is in fact an enormous market for smaller power sources, starting with local generators, power sources and long haul rail and truck engines, and eventually going down to automotive engines. Indeed, there is even research underway for micro scale gas turbines to act as battery substitutes. Considering that we are selling hundreds of millions of portable devices per year, whose battery prices are in the $100 class for computers and cell phones, this implies a market in the $10 billion class. There is clearly plenty of opportunity even at the smallest end, if we can produce a workable design to address it.

More broadly, there is plenty of room in the mid range, the 50-500 hp class. Even before factoring in speculation about multi-billion dollar markets for distributed power generation, bypassing the increasingly unreliable grid, as has been an element in supporting new industrial sites in China and elsewhere in Asia, there are huge opportunities in the automotive market. With a third to a half million heavy trucks sold annually worldwide, powered by engines whose prices are in the $20,000 class, there is a large business opportunity for a low emission, low vibration, ultra reliable lightweight turbine. The gap is the turbine's much higher cost relative to that of the reciprocating engine. Even though investors would certainly flock to support a venture that offered a plausible and adequately inexpensive alternative to the diesel, probably a regenerative design centered on a ceramic hot section, it currently seems painfully far from reality. Sam Williams, whose Williams Research is probably the best small engine supplier in the world today, helped pioneer the 1950s vintage Chrysler turbine car. Even he is not yet claiming to be close to a commercial solution. But the opportunity remains open.

Better Serve Existing Markets

Systems cost reduction is a much more workable alternative, if only because it aligns the interests of the shareholder and the engineers so closely. The gas turbine industry is still living in the paper age, at least in the eyes of outside investors, rather than leading the way into the electronic era. The entire process, beginning with the parts definitions, the design documentation plus the sales contracts, the installation procedures, the maintenance records and the repair documentation should be a seamless, integrated whole, on line, universally accessible and cross linked, rather than requiring the kilograms of documents that it does today.

The entire system is crying out for standards. Yet even for an item as simple as fasteners the part identifier may be different at Pratt than at Fairchild or at Huck, so that duplication and non value added cost is the order of the day. Multiply these costs by factoring in the repetitive paperwork of documentation, which is peculiar to each industry major, and the lack of common processes, results in a non-economic cost which has been estimated at as much as 30%. As long as these were mandated by governments and regulators, they were largely unavoidable; but at least they were non-discriminatory.

With deregulation and the de-emphasis on mil spec however, the opportunity exists to achieve significantly improved productivity by streamlining the processes and linking the technologists, the regulators and decision makers online. Unfortunately, we appear to be about to reinvent the tower of Babel, as GE launches its web based data integration, distinct from a similar Honeywell/UTX initiative, which in turn is distinct from either the Rolls-Royce or the Boeing - Bae - Lockheed Martin - Raytheon e-commerce efforts.

It is easy to understand the reason for these parallel efforts. The task is hard enough to be barely manageable just for one firm and urgent enough to mandate immediate progress, whereas it would possibly take forever if everybody else had to be integrated simultaneously. It remains that the end result may be a jumble of incompatible solutions wherein neither the regulators nor the customers, both of whom deal with a broad cross section of the gas turbine industry, will be well served. There needs to be at least a neutral forum to try to ensure some basic standards before too much money is spent. We need ASME/DIN templates for e-commerce in the aerospace/gas turbine world.

It should be possible to get some agreement to coordinate on the standards simply because it is in everyone's interest to do so. A non standard process impedes cooperation and forces customer/supplier communications back into paper, a higher cost alternative. Of course, the longer term implication is that while these process upgrades can help shift resources towards new product development and manufacturing efficiency improvements as well as profit and away from administrative overheads, there is unlikely to be sustainable competitive advantage from this change. Everyone will have the new systems, in some form, as a matter of survival. Hence the industry may become leaner and quicker with these new tools, but remain just as inadequately profitable if the participants surrender these gains in the pursuit of market share.

Capture More Economic Value

The best hope then is the third option for the industry, to restructure, to capture more of its economic value. We noted earlier that gas turbines represent an enabling technology, but that presumably by virtue of its government gestation, it has not learned to capture the value added it provides to its customers. An extreme illustration was the suicidal three way contest to power the 777, which ensured that neither Boeing nor its engine suppliers are in near term danger of earning any return on their investment here. At least Boeing and Airbus have clearly taken these lessons to heart, as evidenced in the more recent sole source engine supply arrangements on the 777-X and the A340-500/600. Even here, however, the engine suppliers remain substantially at risk, having granted launch financing and considerable price concessions.

In short, from a financial perspective, the gas turbine industry is not structured right. The OEMs compete ferociously to win commercial order, but have not adequately tied up the aftermarket which has historically been their ticket to financial survival. This suggests two solutions. One might be to sharply reduce the number of OEMs, perhaps linking other major aero engine makers with heavy turbine builders, following the GE experience. However, the recent Boeing/Airbus experience proves that even two suppliers are still quite sufficient for a price war, so reducing the number of OEMs may be an inadequate response.

A more promising solution would be for the OEMs to emphasize capture of the aftermarket, to retain the highly profitable spares and support tail generated by engine overhauls. This aftermarket emphasis, although long the source of the industry's profitability, has eroded over time as third party suppliers have captured Parts Manufacturing Authority (PMA's) for individual high volume components and as subcontractors have broadened their presence. In the developing global supply chain, linked by electronic data bases of design and manufacturing parameters, it is likely that such competitive pressures will increase, despite regulatory constraints.

To reverse these trends, the OEM suppliers are already moving aggressively to evolve their customer relationship from a one time sale into a long term supply agreement. The objective is to balance the volatile and price sensitive new product sales with the less volatile and better margined services volume generated by the installed base. The active inventory of engines represents about 15 years of OEM production. Given a 3-5 year overhaul cycle and a 25-40% overhaul cost, it follows that turbine manufacturers' sales could double if they capture the entire service business. Towards that end, the engine makers' strategy to date has centered on acquiring comprehensive aftermarket service capacity, by rolling up independent and airline operations. In addition, the OEM's are seeking to tie the customer into a much more comprehensive performance monitoring network. Together, this allows much better focused preventative maintenance, improving reliability while lowering cost. However, the need to provide not only engine but also airframe maintenance, and to do so for multiple types, even from competing suppliers, will be burdensome for the OEM's. It is a much more challenging management responsibility to coordinate the flow of disparate but complex tasks. One blessing is that it should sharply increase the OEM's interest in the more integrated e-business framework suggested earlier, because that would help contain the costs of the more extensive services they are committing to.

CONCLUSION

> **Probably there will be more industry consolidation ... surviving firms, however, will flourish mightily ...**

From an engineering perspective then, the gas turbine industry is truly in transition. The broad customer focus has shifted from performance to cost, or at least, performance at a cost, while the suppliers are adapting to global from local sourcing, to embracing e-commerce and commercial practices instead of mil spec, conscious of the need to demonstrate competitive returns in an open marketplace without guarantees. Probably there will be more industry consolidation as part of this adaptation.

The surviving firms, however, will flourish mightily because the core benefits of the gas turbine remain unmatched, and are still fueling well above GDP growth for this sector in the global economy. As the industry harmonizes with these new requirements, you will find the financial community quick to reward the successful adapters with the kind of substantial valuation premium that your talents and skills should command.