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# What's Happening in the Compressor Business (keynote speech from 1992 International Compressor Engineering Conference)

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Keynote speech given at the Opening Session of the  
1992 International Compressor Engineering and Refrigeration Conferences

**WHAT'S HAPPENING IN THE COMPRESSOR BUSINESS**

John Waters, President  
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Good afternoon, it gives me great pleasure to have the opportunity to speak to an outstanding group of compressor industry associates. This is particularly true since the compressor side of the business is still relatively new to me. Most of my previous experience was that of a user in the air-conditioning and appliance side of the business.

I must admit, however, that I learned very quickly the compressor industry was no staid business. I soon started to become more involved in EER, CFC's, Energy Reduction and incentive programs. I observed that a once very conservative industry had a lot happening in the last (5) years.

Energy reductions seemed to be at the forefront of these changes as national, state and utility industry efforts began to focus on energy reduction in the appliance industry. You are well aware of the 1990 NAECA reduction requirement followed by the 1993-30% reduction requirement. The compressors seemed to be the leading candidate to help the refrigerator and freezer manufacturers meet these challenges. In fact, all the data that I have seen suggests that the compressor is one of the most effective ways to reduce energy in a refrigeration unit versus such alterations as thickening walls and adding foam insulation or the refrigerant circuit itself.

I saw the great progress that a company such as Americold has made in reducing the energy by increasing EER. As you can note, we have production compressors today at 5.5 EER level and plan to be even higher by next year. I think it was a quote from my Engineering V.P., Ken Taulbee, who mentioned that "back in the 60's, college text books said that the maximum carnot cycle energy efficiency was 25%." Today, we are building compressors at 50%.

It is these fine developments by our industry that helped refrigerator and freezer manufacturers meet these 1993 NAECA standards. Once again, as you can note by some typical size refrigerators as listed here, the 1993 requirement of a 30% reduction is quite an achievement.

This chart from a recent issue of *Appliance Magazine* further emphasizes the great strides our customers have taken in the last 18 years. In fact, some manufacturers, using today's available compressor technology, are actually beating the 1993 standards in some models. This is highlighted by their ability to meet the current rebate programs. Programs such as I have listed here generally require energy reductions of 10-15% beyond current NAECA standards.

In terms of energy reduction, the industry has done very well, better than I think most expected back when the laws were drawn up.

But is this the end? No way! NAECA meets again in 1995. The plan is to determine new standards for 1998. Of course, in today's world 1998 could move much closer. We are already experiencing this in the world of CFC phaseout.

Speaking of "today's world," I feel the recent meeting in Rio was another indication of how issues such as energy reduction and environmental improvement are being addressed, not by a single country like the U.S., but by all countries and these countries are influencing U.S. policy.

One such proposal batted around, with a great deal of support, was the challenge for the U.S. and other major countries to reduce CO<sub>2</sub> emission levels by the year 2000 back to 1990 levels. This basically means zero or negative growth in emission levels over the next 8 years. It's too complex an equation to calculate in terms of impact on our industry, but you can bet that the impact would be major, and it is not going to go away. I bet it will be on the table when NAECA reconvenes in 1995. While energy reduction seems to be the driver over the past 5-10 years, there are many new drivers in this industry that I was soon

introduced to as part of my continuing orientation. It wasn't long before I started to hear about global warming and ozone depletion. Sure, I would often read about these phenomenon in the newspaper. I was now deep in the middle of these issues as a compressor manufacturer.

A whole new vocabulary of "alternate refrigerants" began to appear before me. I have listed some here, but the choice seemed to grow monthly. Again, the compressor industry seemed to be forced to take a leadership position not only in energy reduction but also in protecting the atmosphere.

Americold started to research these alternate refrigerants in the late 80's. We began testing alternates in 1988 and 1989. In 1989 we offered a refrigeration compressor line utilizing HCFC22. However, as recent as 1990, we didn't think we could offer a suitable and reliable R134A compressor. But, thanks to our suppliers, especially the lubricant manufacturers, we found a solution in the polyester based lubricants and in early 1990, we introduced R134A quantities to our major customers.

Since 1990 the list of these alternate lubricants has grown to include a multitude of suppliers. I'm sure I haven't captured everyone here, but the industry has really helped all of us in the compressor business.

We still need a lot of experience with these new alternatives and time is fleeing. As you know, European countries are required to convert to R134A by the end of 1992. Here in the United States the new date for CFC phase out is 1995. With some manufacturers hoping to beat this deadline, Americold is ready to support them now.

Once again, the industry must rise to the environmental challenge, but let me mention one more challenge.

I have mentioned energy reduction and alternate refrigerants but there is one more area in the "quality of life" category, as I call it and that is noise. More and more, I am reading about noise reduction throughout the industry. I see it in consumer report ratings everywhere for all industries. It's always been there, but it seems to be one of the continuous improvement type items that the manufacturers must get better at to continue to meet the customer's needs. It's not going to go away.

Although I mention noise only briefly here, it becomes increasingly important when I start to bring all these compressor challenges together into a more, true to life, dynamic model.

The fact is that, energy reduction, ozone depletion, global warming, CFC's and noise reduction efforts overlap each other and at times may be in conflict with each other.

Let me pursue this conflict through a few examples. When we first started our development of alternate refrigerants, the whole industry was afraid that refrigerants such as R134A would reduce energy efficiencies. All the progress this industry had made in recent years was about to be set back. Fortunately, the industry has been able to offset this and hold equal efficiency levels for 134A compressors. This, of course, may not hold true for other alternates, such as blends that are being suggested, but it does highlight one of these important design conflicts.

One problem we still have, however, is that of noise. The fact that R134A and others run at higher pressure, has shown noise increases in the 2 to 4 DB range. This is not good, since once again our challenge is to reduce noise, regardless of refrigerant. Fortunately, companies such as Americold have found ways to bring the R134A noise levels back to CFC12 levels. Not acceptable in the long run but a tribute to our engineer's efforts.

We can also have conflicts between the ozone depletion and global warming factors. This chart shows that some alternate refrigerants affect both problems to varying degrees. At the top of the chart is CFC 12 and its ODP and GWP affect. As you move down the chart, you will note the improvement in ODP with HCFC 22. Further down R134A has zero ODP affect, but still has some impact on GWP. One such alternative, R152A, reduces both ODP and GWP but it has been proven to be flammable in recent tests.

In an industry that has 50 years of experience with CFC12, we find ourselves trying to "optimize" a whole new set of refrigerants while further improving energy efficiencies and all the while keeping the consumer's household quiet.

It is quite a challenge and I think it is the kind of problem that this industry is attacking very well.

These 4 or more design criteria, I have listed here, will shape the future of our industry. The industry is not only attacking these challenges through existing technology but through some very exciting and innovative approaches.

Here is a list of some of these advance technologies available in our industry today. In fact, I saw many of these topics on your agenda for the duration of this conference. The list is by no means inclusive, but all these technologies address one or more of the design challenges I mentioned earlier.

The list includes compressors that use helium instead of the many alternate refrigerants listed earlier. One system even operates with no gas or liquids at all. There are advancements such as variable speed which not only offers improved efficiency but possibly lower noise levels. Plus, advancements in new materials and motor technology continues to help us improve.

Let me return here to one remaining conflict that will be with us forever and that is the cost conflict. Every dynamic equation in any competitive industry must address some sort of cost framework. In this case, our customers, the final consumers, have paid very little for the improvements which you have helped make feasible in the refrigerator and freezer products.

Here is a look at the prices of major appliances over the period 1982 through 1990. You will quickly note that refrigerators and freezer prices have increased less than 3% over this 8 year period. A well known fact for all of us who have tried to obtain any kind of price increase in the past decade. If you look at the chart a little closer you will note that new car prices have increased 7 or 8 times as much as appliances. I wouldn't dare mention medical costs.

Our final challenge then is to meet these energy reduction, environmental and quality of life requirements without significantly impacting the cost of the appliance.

It's a mighty challenge, but once again, you have dealt with it before and the results have shown that the costs have been contained.

Believe me, this industry is by no means dull. Companies like Americold are ready to accept these technological and environmental challenges and our record indicates that we can meet them.

It won't be easy, we'll need some help from our engineers, our suppliers, the appliance manufacturers and the government agencies, but I don't think anyone is walking away.

I'm excited by the challenge and I hope over the next 4 days your collective intelligence can help this industry continue to lead the attack on these major issues.

I'm proud to be a part of this industry and I hope you will find this conference to be as rewarding for yourselves as I'm sure it will be for me.

Thank you for your time.