

MagnaDrive

Market Progress Evaluation Report

prepared by

quantec

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Final Report

MagnaDrive Adjustable Speed Drive Status Report

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Executive Summary

Introduction

MagnaDrive Corporation is located in Bellevue, Washington, and develops and commercializes patented torque transfer technology with applications in industry, public works, transportation, and consumer products domestically and internationally. The Northwest Energy Efficiency Alliance (the Alliance) and MagnaDrive formed a public/private partnership to help commercialize the MagnaDrive adjustable speed drive (ASD), an innovative speed-control device that transmits torque through an air gap by using powerful permanent magnets. MagnaDrive sells magnetic couplings, as well as its ASD, and offered its first ASD for sale in October 1999.

The MagnaDrive Corporation and the Alliance began working together in 1999. The Alliance's initial involvement included testing and comparing the performance of MagnaDrive's ASD to variable frequency drives (VFDs) and other speed control devices, development of case studies at four industrial sites, and a market assessment study. In Phase 2, the Alliance provided funding to help MagnaDrive increase sales in selected applications and markets, expand the ASD into the larger motor market, and expand the ASD into the irrigation market. The Alliance's funding support ended in December 2004.

As described by the Alliance, the market transformation strategy of this project was

. . . to expand the adjustable speed control market, rather than replace variable frequency drives (VFDs), by introducing the MagnaDrive coupling in applications where VFDs have not penetrated or are not applicable The project strategy includes: accelerating the commercialization and market penetration of the MagnaDrive Coupling in targeted market segments – pulp and paper, HVAC and wastewater – and confirming the performance of the MagnaDrive Coupling in the high horsepower and irrigation markets.¹

On behalf of the Alliance, Quantec, LLC, prepared three Market Progress Evaluation Reports (MPERs) to document the progress of the project. This current report is a status update on MagnaDrive's progress from 2003 through early 2005, with an emphasis on the ASD and the Northwest market. It

¹ Northwest Energy Efficiency Alliance. February 2004. *Alliance Accomplishments – Alliance Accomplishments Towards Its Strategic Mission-1997 to 2002*. Portland, Oregon.

examines current product offerings, changes in production, marketing strategies, sales, market barriers, and customer satisfaction.

Quantec conducted this status update by reviewing MagnaDrive materials, interviewing MagnaDrive corporate staff, and conducting interviews with MagnaDrive distributors and customers in the Northwest.

Findings

Program Goals and Strategic Progress

Although progress toward transforming the speed control market may be slower than the Alliance's original expectations, the basic strategy of accelerating the commercialization and market penetration of the MagnaDrive ASD is working. The technology has clearly been commercialized and is being delivered through an established distributor network. Distributor comments indicated that customer awareness of MagnaDrive has grown considerably in the past four years. Nevertheless, market penetration is still relatively small. It is possible that penetration could be increased by focusing more directly on the end uses that can benefit from speed control rather than using a targeting approach based on customer types.

It is more difficult to assess how well the Alliance's objective of expanding the overall adjustable speed control market is being accomplished. MagnaDrive is entering some markets where VFDs have made little headway in the past, such as Navy ship applications. On the other hand, MagnaDrive's marketing approach and message appear to be as much directed at going after the existing VFD market as increasing the overall speed control market.

Overall, this project has demonstrated that market transformation with relatively new products, particularly in the industrial sector, is unpredictable and can take a considerable amount of time – perhaps 10 years or more. In addition, the course of market adoption is difficult to predict. The Alliance's support has helped the company develop and market its adjustable speed product to a growing market, but at the same time the company has placed an emphasis on sales of its non-adjustable coupling. While product sales have grown significantly outside of the Northwest, sales in the region declined significantly in 2003 and 2004. Much of the decline in the Northwest appears to be attributable to regional market conditions.

The length of time required to transform a market like this and the unpredictability of market conditions and the behavior of market actors are important lessons for the Alliance to take into account in its project planning, expectations, and forecasts.

Phase 2 Findings

During the second project phase, the primary goals of the Alliance's support were to

1. Increase sales in the markets pursued in Phase 1 (pumps, fans, and blowers; pulp and paper; water/wastewater treatment; and HVAC)
2. Expand the ASD into the larger motor market (500 to 1000+ horsepower, medium- and high-voltage equipment)
3. Expand the ASD into the irrigation market

Notable progress occurred in accomplishing the first two goals. MagnaDrive's marketing strategy has targeted pumps, fans, and blower applications. Sales to the Northwest pulp and paper industry grew considerably when the industry was doing well. Inroads have been made in the Northwest water/wastewater treatment market as well, with sales to at least five smaller cities and plans to tackle the larger cities. MagnaDrive did not indicate, however, that they have made significant sales for HVAC applications.

MagnaDrive has expanded its product line to include both larger (up to 2,600 HP) motors and smaller (down to 10 HP motors). Products that would apply to motors up to 5,000 HP are under development. MagnaDrive has made steady progress developing products for the large motor market. This is an example of a market where VFDs have not had significant market penetration and MagnaDrive's products are expanding the market for energy-efficient speed control.

Sales for irrigation applications, however, have not grown very much. Nevertheless, MagnaDrive still considers this a viable target market although the Alliance's review has shown only a fairly limited market potential.

Other accomplishments through 2004 included:

- Implementation of a new distributor plan in December 2003, targeting Original Equipment Manufacturers (OEMs) and licensing arrangements as a strategic growth opportunity
- A common stock equity offering in September 2003
- A financing round completed in February 2004 that raised \$4.7 million
- Citation as 2001 "Technology of the Year" in Industry Week and receipt of the "Editor's Choice Award" in Controls Engineering
- Installation of a new management team

MagnaDrive has continued to increase the role played by distributors. The increased role (distributors now conduct the majority of the sales, installation,

and support activities) has allowed MagnaDrive to successfully decrease staffing and internal costs.

To address the persistent first-cost issue, management has strategically redefined the marketing message, focusing on total cost of ownership. MagnaDrive has developed their own total cost of ownership model used to estimate and display the life cycle cost benefits of MagnaDrive ASDs.

Although management has moved away from discussing first cost by presenting the total cost of ownership model, all of the responding distributors stated that first cost is still the primary reason that customers would not purchase a MagnaDrive. By relying more on distributors and by implementing production and material cost saving measures, MagnaDrive is taking steps to reduce unit costs. To a large extent, however, significant cost reductions will probably be possible only when production levels can be increased enough to capture significant economies of scale.

A number of respondents mentioned that utility or other third-party incentives could help reduce the first cost disparity and promote MagnaDrive sales. Utilities could include MagnaDrive in existing programs and in the design of new programs, particularly for applications where VFDs may not be well suited.

The customers we spoke with are generally quite satisfied with the installation and performance of their MagnaDrive and the support provided by the company or its distributors. One strong piece of evidence is that five of the seven customers had purchased more than one drive, and many of the customers were planning on purchases in the future.

Risk of unproven or unfamiliar technology has been a market barrier faced by MagnaDrive since the company was started. MagnaDrive is addressing this, in part, by developing and implementing a marketing strategy designed to reduce the likelihood that MagnaDrives are applied in situations where they are unsuited or risks are unknown. As installations continue to grow and the number of success stories increases, MagnaDrive should be able to leverage this experience to ameliorate concerns about technology risk with potential buyers in the future.

I. Introduction

MagnaDrive Corporation is located in Bellevue, Washington,² and develops and commercializes patented torque transfer technology with applications in industry, public works, transportation, and consumer products domestically and internationally. The Northwest Energy Efficiency Alliance (the Alliance) and the MagnaDrive Corporation (MagnaDrive) formed a public/private partnership to help commercialize the MagnaDrive adjustable speed drive (ASD). The Company's primary product is the MagnaDrive ASD, an innovative speed-control device that transmits torque through an air gap by using powerful permanent magnets.

The MagnaDrive Corporation and the Alliance began working together in 1999. During Phase 1 of the project, several activities occurred:

- Offering of first MagnaDrive ASD in October 1999
- Testing and comparison of MagnaDrive's ASD to variable frequency drives (VFDs), control valves, and dampers at Oregon State University's Motor Systems Resource Facility (MSRF)³
- Development of case studies of ASD installations at four industrial sites
- A confidential market assessment study

The overall findings from Phase 1 led the Alliance to fund Phase 2, designed to address market barriers. The primary goals of Phase 2 were as follows:

1. Increase sales in the markets pursued in Phase 1 (pumps, fans, and blowers; pulp and paper; water/wastewater treatment; and HVAC)
2. Expand the ASD into the larger motor market (500 to 1000+ horsepower, medium- and high-voltage equipment)
3. Expand the ASD into the irrigation market

The Alliance engaged Quantec to conduct an evaluation that tracked MagnaDrive Corporation's progress toward the Phase 2 goals. As part of this effort, Quantec prepared three Market Progress Evaluation Reports (MPERs) to document the progress of the Phase 2 efforts.

² MagnaDrive relocated its headquarters from Seattle in 2004.

³ Product Testing: Magna Drive, Report No.1, Motor Systems Resource Facility, Oregon State University, March 2000 (Alliance Report #00-048).

The first MPER examined the period from August 15 – November 15, 2000, and included a number of tasks:

- **Assess current practices, attitudes, and awareness of the MagnaDrive ASD and the speed drive market.** The Quantec team conducted interviews with purchasers of MagnaDrive, non-purchasers of MagnaDrive, industry experts, and trade associations.
- **Estimate the Northwest market size.** Quantec conducted “bottom-up” market-potential estimates for the wastewater treatment and pulp and paper segments, along with a database of potential Northwest purchasers.
- **Assist MagnaDrive marketing staff.** Quantec conducted a review of MagnaDrive’s marketing approach that included facilitating a brainstorming/strategy session to help the company better focus its target markets, delivery channels, products, pricing, and promotions.

The second MPER covered the period from November 2000 to October 2001 and consisted of:

- **Interviews with Consulting Engineers.** In an effort to better understand how engineering consultants view MagnaDrive in relation to other speed-control devices, Quantec interviewed consultants that attended a MagnaDrive demonstration.
- **Development of Life-Cycle Cost (LCC) Model.** The Quantec team developed an Excel spreadsheet-based tool that provides life-cycle cost, simple payback, and internal rate of return (IRR) for MagnaDrive ASDs, VFDs, and base motor options.
- **LCC Findings.** Twelve iterations of the model were run to compare different combinations of horsepower (50 HP, 250 HP, and 500 HP), application (fans vs. pumps), and age of motor (new vs. retrofit).

The third and final Phase 2 MPER focused on MagnaDrive’s performance during 2002, and included:

- **Project Characterization.** A review and update of MagnaDrive product offerings, marketing efforts, sales, and general company status, as well as market conditions facing MagnaDrive.
- **Market Actor Interviews.** To assess current practices, attitudes, and awareness of the MagnaDrive, the Quantec team conducted 20 interviews with a number of purchasers, non-purchasers, and distributors of MagnaDrive.

MagnaDrive's accomplishments since 2002 included:

- Implementation of a new distributor plan in December 2003, targeting Original Equipment Manufacturers (OEMs) and licensing arrangements as a strategic growth opportunity
- A common stock equity offering in September 2003
- A financing round completed in February 2004 that raised \$4.7 million
- Citation as 2001 "Technology of the Year" in *Industry Week* and receipt of the "Editor's Choice Award" in *Controls Engineering*
- Installation of a new management team

The primary goal of this report is to provide an update on MagnaDrive's status and progress from 2003 through early 2005.⁴ Specifically, this report examines current product offerings, changes in production, marketing strategies, sales, market barriers, and customer satisfaction.

The next section summarizes our data collection approach and scope. The following section presents an update on MagnaDrive's corporate operations, structure, marketing, and sales. Section IV discusses market barriers, how MagnaDrive has been addressing them, and current perceptions about the barriers. Section V presents findings from interviews with MagnaDrive distributors in the Northwest, and Section VI summarizes feedback from Northwest customers on MagnaDrive products and the company. The final section presents our key findings and conclusions. Interview guides are provided in the appendix.

⁴ The Alliance's support ended at the end of 2004.

II. Data Collection

Data Collection Overview

The information presented in this report was compiled through interviews with MagnaDrive's management team, Northwest distributors, a sample of Northwest end-use customers that purchased MagnaDrives, OEMs, and a review of technology and market information.

There were two factors that limited the quality of the information collected through interviews for this study. First, the scope of the study did not permit conducting a large number of interviews. Second, MagnaDrive provided the samples of interviewees so they were not selected independently and randomly from the populations. Based on information gathered through the interviews, we believe the samples were unbiased. However, as discussed below the respondents did not always have the extent of knowledge desired about the MagnaDrive ASD, which limited the value of the information gathered. Given these caveats and the small sample sizes, the findings should be viewed more as indicative of the situations examined than statistically valid.

To analyze the information from the interviews, we created data entry forms that corresponded to the questions asked. Due to the small number of interviews conducted, our reporting references the raw numbers rather than percentages.

MagnaDrive Interviews. A group interview was conducted with key MagnaDrive management personnel. Due to their knowledge and familiarity with all MagnaDrive products, both ASDs and couplings, many of the issues that were discussed crossed product lines. However, this report, and the other interviews that were conducted, focus on the ASD alone. In addition, while the other interviews concentrate on activities within the Northwest region, the staff at MagnaDrive have a broader knowledge of the company's activities and markets, and thus provided information that was less region specific.

Distributor Interviews. Of the six Northwest distributor contacts provided by MagnaDrive, five were available for interviews. The interviews ranged between 30 and 45 minutes and were tailored to address the ASDs only. One distributor was generally negative about MagnaDrive and was hesitant to provide information; that interview was approximately 20 minutes and did not cover all of the interview questions.

Customer Interviews. We had intended to interview ten Northwest customers who had purchased MagnaDrive ASDs, however MagnaDrive provided contact information for only seven. All seven were available for interviews.

Though we had preferred to interview recent purchasers of MagnaDrive ASDs, the customer contacts provided by MagnaDrive had purchased their units at different times ranging back to when MagnaDrive first entered the market. These interviews also lasted between 30 and 45 minutes and were tailored to address the ASDs only.

The generalizability of findings for customers is more limited than for other market actors because we are uncertain how MagnaDrive selected the sample. Nevertheless, since the customers were very diverse in terms of organization type and MagnaDrive applications, the findings are unlikely to be biased. Unfortunately, the customers were not selected from recent purchasers of the ASD, so they could not be used to identify longitudinal trends by comparing their responses with those from prior studies.

OEM Interviews. While two OEM contacts were provided, it was discovered during the interviews that neither of them had any experience with MagnaDrive ASDs. Instead, each used couplings only. The findings from these interviews, therefore, are not included in this report, as the interview instruments were designed to primarily address the ASDs because of their energy savings potential.

III. MagnaDrive Corporate Update

This section summarizes corporate information about MagnaDrive, with an emphasis on the changes since the last MPER. Specifically, this section provides an update regarding MagnaDrive distribution, staffing, marketing, product offerings, sales, and general company status.

This information was obtained primarily through an in-depth group interview with MagnaDrive management staff. We note that most of the information provided by these managers reflected overall corporate operations and not just the Northwest or ASD market.

Distribution

Perhaps the most significant change to occur at MagnaDrive in the last two years is a strategic repositioning of the company in terms of the role of distributors.

Previously, MagnaDrive had relied on direct contacts from in-house staff to promote, sell, design the application, install, and support the MagnaDrive. In 2001 and 2002, however, MagnaDrive began to utilize the services of distributors as “champions” of the product to help promote and sell the MagnaDrive. In the last two years, the company has taken this strategy a step further, relying primarily on distributors for all sales, system design, installation, and support activities.

Reflecting the increased importance placed upon distributors, MagnaDrive implemented a more rigorous process of selecting distribution companies, trimming the multitude of companies to only those who demonstrate a strong commitment to promoting the products and are not just “order takers.” This strategy has led to a *decrease* in the number of distributors from more than 100 in 2002 to 36.

MagnaDrive has set the bar high for its distributors. They must make a substantial financial commitment and participate in a comprehensive training program, onsite at the MagnaDrive offices, covering sales, order taking, and application engineering. The company’s objective is to have a team of dealers who can play a consultative role and the sales network can be “scalable” to accommodate changes in the market. MagnaDrive management noted, “We’re growing very rapidly, and we want to put a system in that would allow it to be ten times bigger than we are now without having ten times the number of employees.”

Distributors are organized geographically, with sales responsibility for specific areas. MagnaDrive's distributors typically sell other, complementary products and are not required to be exclusive to MagnaDrive.

Because of their tighter requirements for distributors, MagnaDrive now has some gaps in their geographic market coverage. According to MagnaDrive management, "Ultimately, we want champions in every local market that are experts on how to get a MagnaDrive application to work properly." But MagnaDrive is carefully selecting the distributors that can best represent their product, so they are moving carefully in terms of filling these gaps. According to MagnaDrive management, "We purposefully make it difficult for distributors to sign up to be our distributor. We put a big hurdle there. It's a hurdle of money, and it's a hurdle of resources that they have to dedicate to us. And that's done as a qualification that the distributors will give us the time and attention it requires to sell a MagnaDrive."

One strategy MagnaDrive is employing is a "train-the-trainer" approach using their existing distributors to train sub-distributors who would cover specific geographic areas.

Staffing

Increasing the role of the distributors has allowed MagnaDrive to reduce internal staff by approximately 50%, from a high of about 40 staff in 2002 to a current staff of about 20 full-time equivalents (FTEs).

The sales staff consists of four people, whereas it had been as large as about 12 in 2003. While direct sales constituted over half the sales in 2002, distributors now provide about 80% of the sales and almost all the remaining sales are to OEMs.

The company has also made several key changes at the management level during recent years. The President/CEO joined MagnaDrive about two years ago and other key management staff have joined the company within the past year. They have taken several strategic and tactical steps to improve the company's profitability.

Marketing

Total Cost of Ownership Focus

In addition to placing a significant emphasis of the marketing responsibility on distributors, MagnaDrive has also strategically redefined the marketing message.

During the first few years of MagnaDrive, the company was marketing their products based on energy savings, promoting their association with such groups as the Alliance and the Department of Energy.

According to the MagnaDrive CEO, however, to compete with the myriad of VFDs now available, MagnaDrive has had to shift away from promoting energy savings to presenting a “total cost of ownership” message to potential customers.

The “total cost of ownership” concept is the cornerstone of MagnaDrive’s current sales training and strategy. This is driven primarily by the fact that MagnaDrive ASD units’ economic benefits, compared to other speed control technologies, are primarily in future cost savings. As a consequence, it is essential to get customers to understand the implications of other future cost components in their speed control decisions.

The MagnaDrive products offer potentially significant operation and maintenance (O&M) benefits, as well as energy cost savings.⁵ The O&M benefits, particularly in terms of avoided downtime and equipment replacement costs, have the potential for significant life cycle cost reductions relative to their main competition, electronic VFDs. As a result of embracing the “total cost of ownership” concept and an interest in displaying the benefits to customers, MagnaDrive has developed its own life cycle cost analysis tool that is used to illustrate the potential financial benefits to customers.⁶

Targeting

Along with the geographic focus of MagnaDrive’s distributors, the company has a customer-type and application market-targeting approach. Marketing staff have developed a matrix of near- and longer-term target markets based on the end user and application. The current emphasis is on identifying installations where the MagnaDrive is far superior to other alternatives due to the cost of downtime that can be minimized by the installation of the MagnaDrive. Management noted that they have trained distributors to identify and key in on these “mission critical applications.”

MagnaDrive has also attempted to focus on installations with a good “fit” with the product in terms of the application and installation, avoiding installations that may be more problematic. The CEO noted, “We just stopped going after all this stuff on the periphery and just focused on the core stuff . . . the ‘sweet spots’ We’ve got hundreds of these working So we’re passing up

⁵ Another advantage is that it can be used in conjunction with an existing motor irrespective of whether the motor is a low- or medium-voltage unit.

⁶ As part of its original agreement with the Alliance, Quantec developed and provided a life cycle cost model to MagnaDrive, but MagnaDrive is currently using their own model developed in house.

the opportunity to go out after everything, to focus on the things we know we're really successful at.”

MagnaDrive is finding that their “success rate” of accepted bids is approximately 30% on average, but upwards of 50% when they identify “mission critical” applications with a good product fit.

Marketing Channels

MagnaDrive has used multiple venues and materials to reach potential customers. MagnaDrive feels that trade shows have been especially effective, providing an opportunity to team with their local distributors. The Web site, especially the training feature, has also been an important marketing tool. One manager believed that the sales training was the most important aspect of marketing, providing the best “return” for the investment. Company brochures and materials, including reprints of articles from *Inc. Magazine* and Deloitte Technology that highlight the company’s growth, have provided MagnaDrive more credibility and exposure.

Perceptions Regarding Customer Response

MagnaDrive’s CEO noted that purchasers usually have a positive experience with their unit and “when they use it in one plant or application, they then want it in another.”⁷

When asked what negative feedback they have had from customers, MagnaDrive’s CEO mentioned problems fitting the units into a specific mounting configuration, higher first cost than alternatives, and that they didn’t always have a product that fit the customers’ specific need.

Manufacturing

Another significant change since the last MPER has been the move to in-house manufacturing. In December 2004, MagnaDrive shifted the bulk of their production from Precision Machine Works to a new 17,000 sq.ft. assembly facility. The main motivation for this change was the need to have a more responsive production process that could satisfy near-term orders immediately. Another factor was the desire to have better control over the assembly process and the ability to identify ways to reduce production cost.

⁷ Five of the seven customers we interviewed for this study had already purchased more than one MagnaDrive ASD.

Alliance's Role

The corporate managers were very pleased with the assistance the Alliance had provided in the past. Most, if not all, installations in the Northwest had been done under MagnaDrive's partnership with the Alliance. Management was very appreciative of the project leads that the Alliance had provided. Managers noted that sales training has been a very useful component of the company's sales efforts and the Alliance provided initial funding for this training. Contacts with the Alliance have been coordinated primarily through MagnaDrive's lead sales person.

One limitation to the Alliance's assistance has been its need to avoid recommending specific technologies. However, MagnaDrive believes the Alliance support has been helpful in making potential customers aware of the technology and providing leads, noting that awareness of MagnaDrive is far higher in the Northwest than in other parts of the country because of the Alliance's efforts.

MagnaDrive management has been frustrated that utilities in the region have not incorporated the company's ASD in efficiency programs on a large scale. This is one area the Alliance and its member organizations – particularly those utilities with seats on the Alliance Board – should examine. The key question is what steps or processes need to be conducted to bridge the gap between Alliance product/market development efforts, and later inclusion of “available cost-effective measures” in utility DSM programs? In addition, MagnaDrive would appreciate assistance from the Alliance in making utilities outside the region aware of their technology.

Since the company's inception, its market has expanded considerably, with sales extending around the U.S. and internationally. In the beginning, almost all sales were in the Northwest, but the region now provides only about 10% of total sales (partially because of the downturn in the pulp and paper industry). MagnaDrive has found that the Alliance's assistance has been very helpful in making sales in the Northwest market, but lack of knowledge of the organization has meant that the Alliance's support has not been a sales advantage outside the region. To provide further assistance on behalf of the Alliance, Quantec provided MagnaDrive management information on efficiency programs and organizations similar to the Alliance that they might contact in other parts of the country.

MagnaDrive has discussed with Alliance staff the possibility of providing a facility (probably a utility plant) in which to test a very large ASD unit. No progress has occurred so far, largely because MagnaDrive has not developed a unit for testing yet. This is an area in which further assistance by the Alliance could be helpful.

Product Lines

There are two major product categories – couplings and ASDs. Sales are about evenly split between the two. Within the ASD line, units are either water- or air-cooled, with the water-cooled ones typically being those for 500 HP and larger motors. Couplings are produced for motors ranging in size from about 10 HP to 2,600 HP. ASDs are being delivered for motors in the 10 HP to 1,500 HP range. Customers have requested products that are available for motors up to 5,000 HP, and MagnaDrive is currently developing these larger HP units.

Since the last MPER was published, progress in design and development has been incremental, with no major changes. The raw materials continue to be imported from China. The range of products has expanded to include both larger and smaller units (the sizes reported previously ranged from 25 to 500 HP). Advancements in magnet strength and materials could improve the efficiency of the units and possibly lower costs. MagnaDrive has invested in a finite-element modeling tool that is allowing the company to optimize the design of existing and future products. MagnaDrive now has a 6,000 sq.ft. test center at its new manufacturing site that will permit extensive testing of new products. As noted earlier, in-house manufacturing will permit MagnaDrive to identify more opportunities to refine designs and reduce costs.

Sales

Since its founding, MagnaDrive's sales have experienced steady and significant growth. During the first five years, sales increased an average of 94% per year and more than 2,000 units of this technology are now in the field. In 2004, *Inc.* magazine recognized MagnaDrive as the 392nd fastest growing company in the U.S. and MagnaDrive was recognized in the *Deloitte Technology Fast 500* as the 98th fastest growing technology company in the U.S. and fourth fastest growing in Washington. The company forecasts growth of 20% per year for the next few years, including many repeat sales.

Sales are currently split equally between the coupling and the ASD. A greater percentage of sales is going to the larger horsepower applications, where the competing medium voltage VFDs are relatively expensive and purchasers take the time to examine the total cost of ownership model and invest in the MagnaDrive.

MagnaDrive is targeting nine specific industries, although sales have been strongest in for water/wastewater treatment plants (approximately 20% of sales), power generation facilities (approximately 20% of sales, which include some of the largest units), and mining (approximately 10% of sales). MagnaDrive has been quite successful selling units to smaller municipal treatment plants and is making efforts to expand their sales to the larger

facilities. In the Northwest, sales have also been strong to the pulp and paper industry.

For nearly all the targeted industries, the primary application has been for pumps. Fans, blowers, centrifuges, and bulk handling have been other common applications.

Another potentially large application is on ships. One Navy ship has conducted radar signature simulations and the MagnaDrive units have met the Navy's requirements. According to the CEO, "the Navy sees very significant benefits from isolation of vibration and reduced seal wear." Initial Navy applications are for the couplings, but if these experiences are positive, the Navy might order ASDs as well; one aircraft carrier could have as many as 5,000 applications including couplings and ASDs. Because space on existing ships is constrained, these applications would be on new ships designed to accommodate the MagnaDrives. The planning and construction cycle for new ships is likely to be as long as 10 or 15 years.

Although the majority of MagnaDrive sales are in the United States, about 30% go to overseas customers. Sales have been strongest in Korea and Japan, and the company is also beginning to make inroads in China, Europe, and South America.

The last MPER indicated that MagnaDrive was pursuing significant inroads into the OEM market and had initiated an arrangement with SWACO, a provider of products for the petroleum industry. Due to corporate changes at SWACO, however, this arrangement has not been as productive as MagnaDrive had hoped. MagnaDrive is still pursuing the OEM market channel for coupling and ASD sales, though, because of the opportunities for repeat sales and large sales volumes of similar units (and thus the ability to decrease manufacturing costs). The company has identified about 300 potential OEMs to work with and has signed them up in "the double digits" so far. MagnaDrive hopes to eventually have at least 50% of sales come from OEMs. MagnaDrive currently allows its distributors to market and sell to OEMs.

With MagnaDrive's evolving marketing strategies and developing markets, the share of total sales that occur in the Northwest is declining. Initially, 100% of their sales were in the Northwest and now the share is estimated to be about 10%.

Financial

When the last MPER was prepared, MagnaDrive had just raised \$9.3M through issuance of equity stakes and convertible notes. The company's strategy now is to limit additional partners and external funding and thus avoid diluting current shareholder value.

MagnaDrive has outstanding debt through bank loans, but doesn't anticipate any additional bank debt in the near future. The company's goal is to be a self-sustaining, profitable business within one year.

IV. Market Barriers

This section presents background on market barriers faced by MagnaDrive, the views of MagnaDrive management and key market actors on market barriers, and steps MagnaDrive has taken to overcome historical barriers and their progress.

Past Market Barriers

In its previous studies, Quantec identified several barriers that were expected to limit sales and growth of MagnaDrive products in the market. The most prominent barriers reported by the company's management in the third MPER follow:

- Customers' concerns that the technology was "disruptive," reflecting perceptions of risk and newness
- Inflated contractor installation prices
- MagnaDrive staff constraints
- Production lead times that were too long to meet immediate customer needs

From the perspective of other market actors interviewed for the last MPER, the main barriers to increased demand for MagnaDrive units were:

- Inadequate simple payback as a result of low electricity prices and relatively high costs of MagnaDrive units
- An economic downturn and lack of capital
- Risk of a new technology
- Lack of focus on or belief in the credibility of life cycle cost comparisons

It is important to note that two of the barriers identified by these other market actors were exogenous market factors (low electricity prices and an economic downturn) that were likely to affect products other than MagnaDrive's ASDs.

Specific Barriers and Steps to Minimize Them

Our interview with MagnaDrive's management team indicated that, although they believed some of the barriers cited in prior MPERs had been addressed, significant ones still remained. Feedback from distributors and customers confirmed this view. Specific barriers and steps that have been taken to overcome them are discussed below.

Awareness

When asked what the main barrier was that faced MagnaDrive, the CEO stated emphatically, “Our biggest challenge is awareness Nine out of ten [industrial sites] will have an application for a MagnaDrive. And nine out of ten will never have heard of MagnaDrive. The end user makes the final selection, and we need to be written into their specs. But that won’t happen without their awareness.”

However, when we probed about awareness, it appeared that the CEO’s concerns were mostly outside the region:

Quantec: How does awareness in the Northwest compare to the rest of the country?

CEO: It’s much higher, much higher, much, much higher. I think that’s through [the Alliance].

This suggested that the Alliance’s support had helped MagnaDrive overcome in the Northwest what they now perceived to be the major barrier in other markets: lack of customer awareness.

First Cost

First cost was cited in prior MPERs as a significant barrier, and it continues to be one. MagnaDrive is well aware of this and has taken several steps to address this barrier.

MagnaDrive management stated, “A VFD is always lower on front-end price. It would be cheaper than MagnaDrive because they make them overseas, they make millions of them, and the overhead is very low.” As noted later, MagnaDrive distributors and customers also expressed dissatisfaction with the price of MagnaDrive when compared to VFDs, and many mentioned that they simply weren’t competitive, especially within the lower horsepower range.

MagnaDrive has responded, in part, with their emphasis on total cost of ownership. The company’s focus and training of sales staff and distributors on total cost of ownership is a recognition that first cost is still a concern but that it can be mitigated if customers understand full ownership costs.

MagnaDrive’s life cycle cost model is used extensively to present the economic case, and its inputs clearly present a significant difference between the operating life, maintenance costs, and downtime costs of a standard VFD and MagnaDrive unit. Management noted, “We don’t deal with first cost. People ask us a lot, but we don’t give them an answer. We tell them, we’ll look at your system, and give a total cost of ownership. We don’t give price, we give total cost of ownership, and then work on that with the customer.”

This strategy appears to be paying off, at least among certain customers. MagnaDrive’s CEO noted that, “the Navy has calculated that 29 person-days

per year of maintenance are required on each shipboard pump due to vibration and wear. For every 12 pumps, this is equivalent to one sailor. If MagnaDrive can significantly reduce the maintenance labor required, this will help the Navy in a time of manpower constraints.”

But the total cost of ownership model does require more attention and commitment on the part of the customer, making it more of a challenge for MagnaDrive to overcome the first cost “hurdle.” The distributors that were interviewed, for example, indicated that customers are hesitant, for competitive reasons, to provide the level of detailed data needed to perform an accurate analysis. Even MagnaDrive management noted that, “Total cost of ownership is hard to sell. It takes a lot of time. It’s a consultant sale.” In addition, there is a level of skepticism toward the model among customers, as it is seen as a MagnaDrive tool, designed to sell MagnaDrive.

In addition to the total cost of ownership approach, MagnaDrive is taking other steps to overcome the potential barrier of higher initial costs. As noted earlier, the company anticipates that taking over the product assembly process will permit MagnaDrive to identify opportunities to reduce production costs. Costs also are expected to decline as sales volume increases and overhead costs are spread over more units. Marketing costs are expected to decline as the number of repeat sales increases. Increasing sales through OEMs are also expected to reduce unit costs due to scale economies, as large volumes of the same units will be produced for individual OEMs.

Distributors are also being better informed and equipped to relay to customers information about the relative reliability of VFDs and MagnaDrives, including recent findings about deterioration mechanisms such as fluting in bearings when VFDs are used.

Technology Risk

Risk associated with new and unproven technologies was identified as a market barrier in prior MPEs, and it remains an important one.

MagnaDrive staff readily acknowledge that there have been failures of their units in some applications. However, they have researched those cases and found that many occurred when “the MagnaDrive unit was being tried to solve a problem that the customer had never been able to solve in the past, and they were very challenging situations.” As noted earlier, MagnaDrive’s management has developed a strategy to minimize these situations, and thus reduce risk, by targeting first installations for a customer to the “sweet spot” where the advantages of the MagnaDrive unit will shine and chances for success are good. As MagnaDrive’s CEO stated, “We don’t want our first sale to a customer to be a problem.”

Management's current responses, in a way, are an indicator of the extent to which MagnaDrive has addressed and overcome these barriers after they were identified in the past. Perceptions of risk and newness are difficult to overcome; however, MagnaDrive now has a track record of several years of experience and more than 2,000 installed units to draw upon to challenge such concerns.

Other Market Barriers

Although production lead times had been a concern in the past, MagnaDrive does not view their typical ASD three-week lead-time as a sales limitation now.⁸ A shorter lead-time is critical when a unit is being ordered in an emergency situation to replace an existing speed control that has failed, but most of MagnaDrive's sales are made through longer sales cycles requiring capital budgeting. For example, the purchase planning cycle for the wastewater treatment market is about one year. This strategy and perspective on lead times also appear to reflect MagnaDrive's decision to carefully target applications rather than take advantage of every sales opportunity that arises, even if the application is a risky one, as they were likely to do in the early years.

MagnaDrive management believes that some VFD distributors have been lowering the first cost of VFDs in order to keep MagnaDrive out of the market, stating that "[VFD distributors] were trying to keep us out of this customer, because once we get in, customers want us back in. And so they have the ability to selectively lower prices against us."⁹ Although there is little MagnaDrive can do to respond to these situations, they are an indication that their products are being perceived as a serious competitor to other technologies.

Other market barriers that were mentioned are a result of the general market and beyond the control of MagnaDrive. One example is the prevalence of cuts in capital expenditures during the past few years. For example, one of the distributors working in the agricultural sector mentioned the difficulty of reaching his market: "The fact that we're an agricultural distributor, it's much different; it's a depressed industry. People are struggling and trying to survive." The economic downturn most likely had also exacerbated the first cost differential. MagnaDrive management, however, noted that expenditures are beginning to increase with the improving economy, and many more

⁸ When outsourcing the manufacturing process, MagnaDrive experienced lead times as long as 12 weeks on occasions when huge orders came in, but now the typical lead-time for fairly standard products is less than three weeks. Many of the couplings can be ordered off-the-shelf.

⁹ The significance of differences in first cost was highlighted by anecdotal evidence provided by MagnaDrive management that VFD sales people have dropped quoted prices by as much as 70% when they have had to compete with MagnaDrive for a sale.

customers are moving along the purchasing “pipeline” as additional funds are available.

As MagnaDrive’s market approach has evolved, some new marketing barriers have emerged. For example, in the water/wastewater treatment plant market sales have been limited by the long budget cycle (one to two years) and limitations on the ability of municipal governments to sole source procurements. In the potentially large Navy market, the military has extensive research and testing requirements that may take more than a decade to complete.

V. *Distributor Interviews*

Quantec conducted interviews with five distributors working within the Northwest region. Of these, four responded freely to the interview questions, while one distributor was hesitant to provide information and refused to answer a number of questions, especially those specific to the distributorship. As this distributor provided some informative and relevant information, the interview is included in this discussion.

Respondent Characteristics

Of the five people interviewed, three were involved in sales (two sales managers, one in sales and marketing), one was a branch manager, and one was an engineer. The average length of time in their current position was almost six years. Most distributors began selling MagnaDrives in 2001. The total number of MagnaDrives sold by individual distributorships ranged from 4 to 24; the average number sold per year per distributorship was about 3.

The types of products and services provided by the distributorships included pumps, deep well turbines, full service repair, rebuilding, fabrication, and speed control devices. On average, the distributorships have been operating in industrial sales for about 22 years, selling speed controls for about 11 years, and are working in Oregon, Idaho, and Washington, Nevada, and other parts of North America. All distributorships sell VFDs in addition to MagnaDrives; the average percentage of sales from speed control devices was about 10%.

Awareness and Perceptions of MagnaDrive

Two of the distributors had become aware of MagnaDrive through colleagues at their distributorships directly, while the others either heard about it from another associate, a trade show, or just couldn't remember.

When asked what they thought the primary advantages of the MagnaDrive ASD were, two of the respondents mentioned shock/vibration control and two mentioned O&M savings. Other advantages cited included:

- Simplicity
- Durability of the product
- Low cost of ownership
- Diminished need for alignment procedures

When asked about the disadvantages of the MagnaDrive, all of the respondents listed first cost. Compatibility was also mentioned, as one respondent stated that the need for application-specific configurations was

sometimes a disadvantage. Additional disadvantages that were mentioned included:

- “Over-engineered” units
- Inability to “over-speed”
- Lack of application and installation support

Compared to a conventional VFD, some of the MagnaDrive benefits that distributors thought customers liked were:

- No harmonic distortion
- Simplicity
- Reliability/long life
- Smaller footprint
- No need for electronic filters, heating, or cooling
- Maintenance savings
- User-friendliness
- Fully mechanical

MagnaDrive Sales and Marketing

When asked about the annual growth rate in MagnaDrive sales, most respondents were unable to give an accurate estimate. Two said there had been little or no year-to-year growth. A third said that there had been a big increase this year, but that it was “hard to say [what the average rate was];” one distributor claimed sales had grown by about 200% per year.

Three of the five distributors stated that they discuss MagnaDrive with the majority of their customers. Reasons given for not discussing MagnaDrive included the higher first cost and compatibility issues.

On average, it was thought that about 44% of the customers had already known about the MagnaDrive before the distributor mentioned it. However, the range of responses was notable: two people said 75%, while others claimed that 50%, 19%, and 5% of their customers were already aware of the MagnaDrive.

Each of the distributors had tried various techniques to reach customers. Of the five interviewed, all had used presentations, while two had used sales calls, two had used marketing materials, and two mentioned the Web site.

As part of the bidding process, distributors indicated that about 22% of customers requested that bids include both MagnaDrive and VFD options. Of

the bids that included both, about 29% of these customers went with the MagnaDrive.

Distributors were asked what factors influenced whether or not a customer would buy the MagnaDrive ASD. The following were given as reasons for purchasing the MagnaDrive:

- Lack of harmonic interference
- To solve a specific problem
- Simplicity
- Long life
- Vibration control
- Small footprint
- Limited contact with other machinery
- To replace problem equipment
- User friendly
- Distributor technical support

Reasons why customers have decided not to purchase MagnaDrive were less diverse: all of the distributors claimed that the main reason the MagnaDrive was not purchased was because it was too expensive. Additionally, three respondents stated that a lack of current funding (i.e., budget constraints) were also responsible for the customer's decision. One distributor also mentioned that the devices weren't applicable in certain situations.

When asked to identify strategies that might help to sell the MagnaDrive, four of the distributors claimed that lowering the price would have improved sales. Two also identified the need for a longer track record in the industry. Other suggestions included having a "need for [MagnaDrive,]" and Total Cost Analysis, though it was stated that this method was inappropriate for smaller applications.

A variety of challenges that the distributors faced in selling the MagnaDrive were identified. These were very similar to the disadvantages of MagnaDrives and factors that impeded sales:

- Cost
- Timing and availability: "How quickly can we get it?"
- Competition from low-end pricing of VFDs
- Inability to compete financially with VFDs at lower horsepower ranges
- Verifying that MagnaDrive is the solution

- Overpriced and over-engineered

Four of the five distributors offered customers all-inclusive pricing that included installation. All but one of the distributors provides information to potential customers on the total cost of ownership; that distributor claimed that he hadn't had a chance to attend the training program, which he described as "time consuming."

Two of the four distributors who said they provided total cost of ownership information identified materials they used to present this information. These materials included the models provided by MagnaDrive and the quote itself. Both of these respondents mentioned the difficulty involved in getting the information needed from the customer in order to run the models, and one claimed that it was simply "too much to ask for."

The distributors had mixed feelings regarding using total cost of ownership information as a way to inform customers about MagnaDrive. Several respondents mentioned that some customers felt the information was biased towards MagnaDrive and that they questioned the accuracy of the information. This was driven by the perception that the model itself was a tool designed by MagnaDrive to sell MagnaDrive. It was also mentioned that the ability for total cost of ownership to be effective was highly dependent on the customer; one customer may be able to understand it easily, while another may not respond well to it.

The most promising horsepower for MagnaDrive was identified at about 150-200hp or higher. This was generally due to the perception that the MagnaDrive was not cost effective at the lower horsepower ranges, and that it couldn't compete with VFDs in that size range.

Suggestions for Improving Marketing

When asked how MagnaDrive marketing could be improved, most suggestions addressed ways to reduce costs. Some believed that mass production would bring the cost down, which would be necessary in order to really penetrate the depressed agricultural market. One mentioned that utility incentives targeted specifically towards the agricultural market would be helpful.

Distributors also provided the following suggestions:

- Personal demonstrations
- Attendance at general and agricultural trade shows
- Local advertisements
- Marketing through electrical, pumping, fluid coupling, conveyor bulk handling, and agricultural publications

Satisfaction with MagnaDrive Services and ASDs

Of the four distributors who had attended MagnaDrive's training, two claimed the training was "good," and two said it was "fair," but none of the four respondents described the training as "excellent" or "poor." A few of the distributors felt that the training program had already changed quite a bit since they attended it and assumed that MagnaDrive had made a lot of improvements, taking into account suggestions given by the distributors. Additional suggestions for improving the training included:

- Improving the organization and structure of the training
- Additional software to back-up the calculations
- Additional post-training support

One distributor took issue with the fact that MagnaDrive charges the distributors to take the installation and application training, commenting that doing so "is inappropriate and egotistical."

Most of the distributors were somewhat satisfied with the marketing support provided by MagnaDrive, including marketing materials. Three of the respondents mentioned the cost of the materials as a reason for being less than "very satisfied." They resented having to pay for the materials they needed to sell MagnaDrive, and noted that this was an unusual practice in the industry. Additional suggestions to improve marketing included providing more materials printed in relevant publications, making MagnaDrive demonstration units available for use, and producing more brochures.

When asked about the order-filling process, the distributors were generally only somewhat satisfied. Suggestions for improvement included bringing the lead-time down (though it was mentioned that this had already improved), streamlining the process to make it simple and quick, and improved communications within MagnaDrive. One distributor stated that he was frustrated that the information provided by MagnaDrive differed depending on who was being questioned – engineers give a different answer than the regional manager.

The distributors were "somewhat" to "very" satisfied with the technical support provided by MagnaDrive. A perception that most of the distributors voiced was that MagnaDrive wasn't always responsive when the distributor needed them, and that firm answers were difficult to come by. For instance, they said that they would be told "that *should* work" as opposed to "that *will* work." In addition, it was suggested that support be provided free of charge. One distributor said that MagnaDrive appeared to be less focused and provide less support than they used to.

When asked about their customers' satisfaction levels, they said most customers were very satisfied. Though the distributors said that some

unexpected disadvantages were identified (vibration issues, beat frequencies, an unclear U.L. rating), most thought that the problems had been addressed and didn't impact the customers' overall impression of the MagnaDrive. Additionally, it was felt that the issues were not necessarily caused by the MagnaDrive, as much as the application itself and lack of planning. MagnaDrive's strategy of better targeting applications appeared to be alleviating some of these problems.

When asked about maintenance required by MagnaDrive ASDs, the distributors generally said that maintenance requirements had not been a problem. One respondent did mention that a bearing had gone out with one unit. Another distributor mentioned that, while there was no real maintenance involved, training needed to be provided regarding the importance of routine maintenance, specifically the need for regular lubrication.

VI. Customer Interviews

Quantec interviewed a total of seven customers about their experience with and impression of MagnaDrive. As noted earlier, the list of customers we interviewed was provided by MagnaDrive so they were not an independently selected random sample. Consequently, it was not possible to assert that the responses were representative of the population of MagnaDrive customers. Nevertheless, the group represented a broad cross-section of user types and provided diverse responses.

In addition, the interviewed customers had purchased MagnaDrives at different times during the past four or five years, so the information gathered on how current conditions compare to conditions in the past was limited.

Respondent Characteristics

Customer respondents represented a variety of positions including engineers, managers, and supervisors from diverse organization types, including municipalities, semi-conductor plants, paper/pulp product plants, universities, and private developers. The interviewed customers had spent an average of about ten years in their current position.

All of the customers had purchased at least one MagnaDrive ASD, though most had made multiple purchases, with the average number for all the interviewed customers 3.7 units. The greatest number of MagnaDrives purchased by a single customer was seven. Two customers had also purchased a MagnaDrive coupling in addition to the ASD.

Equipment Purchase Decision-making

When asked about the decision-making process involved in purchasing energy-efficient equipment, the respondents reported that they relied on a mix of internal and external resources. Three said they hired outside help (engineering or consulting firms) to perform the energy analysis or the design work. One customer said they had an “energy-efficiency team” on staff, while another said their operations and maintenance staff had the primary responsibility.

We did not ask specifically about economic criteria used in equipment decision-making, but two customers offered that they conducted a payback analysis and projects were expected to fall within a one to three year range to be acted upon.

One customer said they worked with their utility to determine efficiency and to aid in the assessment of whether equipment upgrades were justified.

MagnaDrive Awareness and Perceptions

Marketing and Awareness

Customers were asked how they had first become aware of MagnaDrive. Although the most common source was either in-person or phone contact from MagnaDrive, the other responses were very diverse and included the following:

- MagnaDrive in-person or phone call (3)
- Word of mouth
- Utility representative
- Trade journals
- Staff engineering department

Two of the customers couldn't recall receiving any marketing materials from their distributor or MagnaDrive. Of the five who recalled marketing materials, three mentioned brochures one each mentioned the following: the Web site, conferences materials, and refrigerator magnets.

We also asked customers to rate various marketing techniques based on their importance when considering whether or not to purchase MagnaDrive. Presentations were rated "very important" overall and marketing materials were regarded as "somewhat" to "very important." Testimonials were rated as only "somewhat unimportant," and information from industry colleagues was considered to be only slightly more important on the average.

All of the respondents had talked to a distributor about MagnaDrive. Overall, the materials and services provided by the distributors received favorable ratings. On a 5-point scale (5 is "excellent"), written materials, presentations, responses to questions, and installation of MagnaDrive provided by distributors were all rated as a 4 or 5.

Perceived Advantages and Disadvantages

Customers saw MagnaDrive as having many advantages. Simplicity was the most recognized benefit and was cited by half of the respondents. Shock and vibration control, operation and maintenance savings, and space saving capabilities were identified each by two customers. Advantages mentioned only once included:

- Energy savings
- Speed control
- No harmonics
- All mechanical/no electronic parts

- Cleaner application
- Ease of training
- Smaller footprint

When asked to identify disadvantages of MagnaDrive, two respondents mentioned having issues with the space/sizing that complicated the installation, and two mentioned the need for ventilation in some situations. Other disadvantages mentioned included:

- Logic control/sequencing issues
- Inability to program
- Requires additional equipment (actuator)
- Lack of flexibility

Two of the respondents couldn't think of any disadvantages.

Suggestions for Improving Marketing

A variety of ideas were related by the customers regarding how to reach other members of the industry with information about MagnaDrive. These included:

- Product demonstrations
- Inventor's circuits
- Mail-out cards
- Flyers and inserts in target industry publications
- Additional case studies

Advertising in trade journals and with associations was also mentioned. Specific publications and associations included American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), National Fluid Processor Association (NFPA), and the Building Owners and Management Association (BOMA.) General recommendations included pulp and paper, plumbing, and engineering publications.

Factors in MagnaDrive Purchase Decision

When asked, customers identified a wide range of reasons for purchasing MagnaDrive ASD, with only one citing each of the following reasons:

- Energy savings
- To increase capacity
- The sales representative pushed it

- To test the technology
- Northwest Energy Efficiency Alliance financial participation
- Utility incentive
- Reliable/non-electronic backup

When asked specifically about the role that total cost of ownership and first cost analysis played in the decision to purchase the MagnaDrive, the responses indicated that most of these purchasers took life cycle cost into account. One suggested that the life cycle cost analysis made the decision to purchase MagnaDrive easier. Another commented that, while the initial cost was comparable to a VFD, the life cycle cost analysis showed a payback of three years. One customer stated that first cost is always important, but that life-cycle cost was as well; additionally, this customer stated that, “We’ll spend more if we’ll get more in the end.” Two customers were unable to answer this question.

Customer Applications and Market for MagnaDrive

When asked what percentage of motors without speed control devices (in the facility) would benefit from a MagnaDrive, the average response was about 20%. The most important factors for the facility, when making decisions about motor and speed controls, were identified as:

- Cost
- Reliability
- Standardization of equipment
- Simplicity
- Flexibility
- Training costs
- Robustness
- Life cycle cost analysis

When asked to identify particularly good applications for the MagnaDrive, all of the customers mentioned pumping. Other applications included “soft start” situations, back-up systems, large motors, vibration control, and fans.

Of the five customers that had purchased more than one MagnaDrive, only one stated that he probably would not purchase another one, stating simply that they did not have the need. The other four would either consider the MagnaDrive in the future or had already included MagnaDrive in their active specs. Reasons given for purchasing more than one MagnaDrive included:

- Existence of twin or multiple pumps
- Standardization of equipment
- Good experience with original purchases

Of the two respondents who had purchased only one MagnaDrive, neither had plans to purchase additional units. Both stated that they had no need for an additional speed control device. One of the customers went on to say that he felt there was no compelling reason to purchase a MagnaDrive over a standard VSD unless there were vibration issues.

Customer Satisfaction

All four of the customers interviewed who were familiar with the MagnaDrive ordering process were “very” or “somewhat” satisfied with the process. One of the customers that was only “somewhat” satisfied stated that they preferred to work with MagnaDrive directly rather than through the distributor.

Five out of the seven customers stated that they were “very” or “somewhat” satisfied with the installation process. Only one suggestion for an improvement to the installation process was made: this customer thought that MagnaDrive should have taken care of the installation instead of using his own staff engineers.¹⁰

Three respondents said they had contacted MagnaDrive customer support for various reasons, including energy calculations to justify cost, a bearing failure, an actuator that wouldn’t stabilize, and a controls issue. It was determined that the bearing failure and controls issues were not the fault of MagnaDrive, though MagnaDrive helped to remedy the problems. Overall, customers were very satisfied with customer support, and had only two suggestions for improvement: greater technical expertise and more hands-on installation training for customers.

All of the customers interviewed were either “very” (6) or “somewhat” (1) satisfied with the performance of the MagnaDrive. Only one respondent had experienced an unexpected cost – they had to build a safety shield to mitigate a noise problem. All of the respondents said that the MagnaDrive was working as expected, and none were able to identify any unexpected disadvantages.

Some unexpected *advantages* were uncovered, however, including the ability to reduce flows to even lower levels than expected, continued operation

¹⁰ This customer had ordered and installed the MagnaDrive before distributors had taken on an increased role in sales and installation.

during power failures (while electronic ASDs failed), and even more noise and vibration reduction than had been expected.

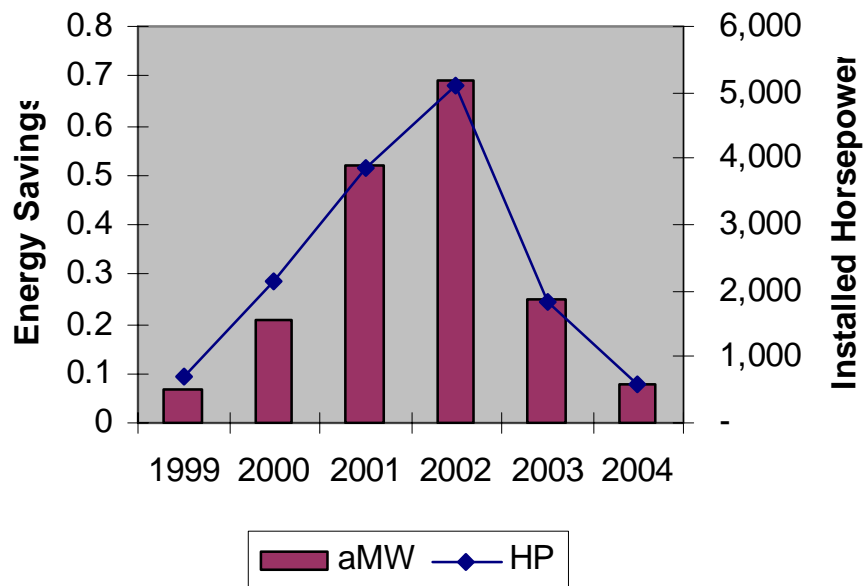
Only two customers were able to comment on maintenance costs; it was too early for most respondents to gauge whether there had been any reduction in motor, pump, or other maintenance costs as a result of installing the MagnaDrive. Of the two customers who'd noticed a reduction, only one was able to quantify the savings, claiming a reduction of about 60 labor hours, and about \$6,000 in parts and labor per year.

VII. Review of Alliance's Cost-Effectiveness Calculations

Another activity conducted as part of this update was a review of the assumptions used by the Alliance in its cost-effectiveness (ACE) calculations. The MagnaDrive MPEs, produced by Quantec, recommended a number of changes to the ACE model. The Alliance adopted the majority of these recommendations and recalculated the cost-effectiveness for MagnaDrive in November 2004.

The Alliance also provided Quantec estimated regional sales and energy savings data for MagnaDrive ASDs sold from 1999 through 2004.¹¹ These estimates are based on data provided to the Alliance by the company and are shown in Figure VII.1. As discussed earlier, MagnaDrive reported that their global sales have increased substantially, but the data assessed by the Alliance show that regional sales peaked in 2002 and have declined significantly since.

Figure VII.1: Estimated Regional Annual Sales and Additional Energy Savings



The updated ACE inputs, along with Quantec's assessment of them, are discussed below and summarized in Table VII.1.

¹¹ Personal communication, Roch Nalway, Northwest Energy Efficiency Alliance, July 18, 2005.

- First cost is based on the cost of a 500 HP MagnaDrive ASD in 2004. MagnaDrive did not share cost information for this report, but indicated costs were dropping. The Alliance should consider verifying the current cost and showing potentially slowly decreasing costs due to economies of scale and other steps that the company is taking to reduce costs.
- Energy savings – approximately 25% of standard motor consumption – are based on research conducted by both Easton Associates and Oregon State University as part of the earlier Alliance MagnaDrive studies. This is reasonable as MagnaDrive is still focusing on installations that are most-likely not suitable for VFDs (i.e., the unit of comparison remains a motor without speed control).
- Weighted life of 15 years is reasonable given Quantec’s earlier research and supporting information from the company.
- Non-energy benefits have not been included to date in the Alliance’s cost effectiveness model. Our earlier research, corroborated by the findings from this report, show that non-energy benefits are likely to be sizeable, particularly the reduced maintenance costs of associated equipment and downtime. In fact, MagnaDrive emphasizes this fact in the total cost of ownership model. Consistent with our earlier research, we recommend including non-energy benefits. Our earlier estimate was approximately 50% of the energy benefits. A sample total cost of ownership analysis provided by MagnaDrive suggested these savings were on the order of 20% of the energy savings compared to a standard control valve. To be conservative, we recommend including non-energy benefits equivalent to 20% of the energy savings.
- Annual O&M costs are minor with a MagnaDrive, but most likely they are positive. We recommend that the Alliance seek to obtain an estimate of the cost per HP based on field experience.
- MagnaDrive’s early sales grew at a rate of 94% per year, but the growth rate has not been as large recently. MagnaDrive is forecasting 20% per year growth in global sales for the next several years. Northwest sales fell in both 2003 and 2004, and in 2003 were about 15% less than the level forecast by the Alliance. Consequently, the Alliance’s estimate of 25% annual growth after 2003 is probably too high. The Alliance should work with MagnaDrive to get revised estimates of the expected sales growth rates in the Northwest. Until then, the Alliance should use a rate that takes into account estimated Northwest sales for 2005.

Table VII.1 Review of Alliance Cost Effectiveness Assumptions

Input (Unit Assumptions)	Current Value	Discussion
First Cost (\$/HP)	\$94.38	Based on assumed cost of 500 HP motor in 2004. MagnaDrive did not share current cost info, but indicated prices are likely dropping
Energy Savings (kWh/year-HP)	1,185.9	Based on assumed savings of 24.6%, consistent with the Phase 1 research and Quantec's previous recommendation
Weighted Life (years)	15	Consistent with Quantec's earlier recommendation
Non-Energy Benefits (\$/Unit-year)	\$ 0	Conservative, as O&M benefits are the primary driver in MagnaDrive sales (i.e., cost of ownership model). A value of 20% of energy savings value is recommended.
Annual O&M Cost (\$/Unit-year)	\$0	Costs are reported to be minimal, but likely to be some positive amount.
Market Size and Market Acceptance	25% growth rate for 2003-2010	MagnaDrive estimates global sales will increase by 20% per year for the next few years; recent Northwest sales growth rates declined from historical levels in 2003 and 2004. The Alliance should work with MagnaDrive to develop a revised growth rate estimate for the Northwest .

VIII. Summary Findings and Conclusions

The key findings and conclusions from this update on the progress of MagnaDrive are presented here. It is important to recognize that, given the small number of respondents, findings must be treated as indicative, rather than statistically reliable.

Overall, MagnaDrive has made significant changes internally and externally to respond to market barriers and concerns that were identified in the past. MagnaDrive's collaboration with the Alliance has helped establish the company's viability and customer awareness in the Northwest is far higher than anywhere else. Nevertheless, untapped market potential still remains in certain markets in the Northwest. MagnaDrive management believes that the company is poised to become profitable within one year.

Program Goals and General Findings

The Alliance began working with the MagnaDrive company in May 1999 and started providing funding support in 2000. The market transformation strategy of this project was

. . . to expand the adjustable speed control market, rather than replace variable frequency drives (VFDs), by introducing the MagnaDrive coupling in applications where VFDs have not penetrated or are not applicable. It was believed that this product introduction would stimulate the development of a new generation of Adjustable Speed Couplings (ASCs), which would provide improved energy efficiency and non-energy benefits. The project strategy includes: accelerating the commercialization and market penetration of the MagnaDrive Coupling in targeted market segments – pulp and paper, HVAC and wastewater – and confirming the performance of the MagnaDrive Coupling in the high horsepower and irrigation markets.¹²

Although progress may be slower than the Alliance's original expectations, the basic strategy of accelerating the commercialization and market penetration of the MagnaDrive ASD is working. The technology has clearly been commercialized and is being delivered through an established distributor network. Distributor comments indicated that customer awareness of MagnaDrive has grown considerably in the past four years. Nevertheless, market penetration is still relatively small. It is possible that it could be

¹² Northwest Energy Efficiency Alliance. February 2004. *Alliance Accomplishments—Alliance Accomplishments towards its Strategic Mission-1997 to 2002*. Portland, Oregon.

increased by focusing more directly on the end uses that can benefit from speed control rather than using a targeting approach based on customer types.

It is more difficult to assess how well the objective of expanding the overall adjustable speed control market is being accomplished. There is evidence that MagnaDrive is entering some markets where VFDs have made little headway in the past; the potentially large Navy ship market is one interesting example. On the other hand, MagnaDrive's focus on the "total cost of ownership" as a marketing message and the company's software tool comparing MagnaDrive to VFDs suggest that the company is prepared to compete directly with VFDs in existing markets, as well as increase the overall speed control market.

The primary goals of the Alliance's support of MagnaDrive in Phase 2 were to

1. Increase sales in the markets pursued in Phase 1 (pumps, fans, and blowers; pulp and paper; water/wastewater treatment; and HVAC)
2. Expand the ASD into the larger motor market (500 to 1000+ horsepower, medium- and high-voltage equipment)
3. Expand the ASD into the irrigation market

Progress has been made in accomplishing the first two goals. MagnaDrive's marketing strategy has targeted pumps, fans, and blower applications, while sales to the pulp and paper industry and water/wastewater treatment plants have grown. Sales to the Northwest pulp and paper industry grew considerably when the industry was doing well. Inroads have been made in the Northwest water/wastewater treatment market as well, with sales to at least five smaller cities and plans to tackle the larger cities. MagnaDrive did not indicate, however, that they have made significant sales for HVAC applications.

MagnaDrive has expanded its product line to include both larger (up to 2,600 HP) motors and smaller (down to 10 HP motors). Products that would apply to motors up to 5,000 HP are under development. MagnaDrive has made steady progress developing products for the large motor market. This is an example of a market where VFDs have not had significant market penetration and MagnaDrive's products are expanding the market for energy-efficient speed control.

Sales for irrigation applications, however, have not grown very much. Nevertheless, MagnaDrive still considers this a viable target market although the Alliance's review has shown only a fairly limited market potential.

The Alliance's involvement with the company revolved around the ASD because of its energy savings potential. Consequently, from the Alliance's perspective, success will hinge on the ultimate market penetration of the ASD. It appears, however, that MagnaDrive is able to use sales of its magnetic couplings to make inroads into markets that lead to ASD sales as well. Based

on MagnaDrive's expectations about possible sales to the Navy, one likely scenario may be market entry via couplings because of the benefits they offer, followed by sales of ASDs once customers gain awareness and knowledge of the technology and confidence in its performance.

Overall, this project has demonstrated that market transformation with relatively new products, particularly in the industrial sector, is unpredictable and can take a considerable amount of time – perhaps 10 years or more. In addition, the course of market adoption is difficult to predict. The Alliance's support has helped the company develop and market its adjustable speed product to a growing market, but at the same time the company has placed an emphasis on sales of its non-adjustable coupling. While product sales outside of the Northwest have grown dramatically, they fell significantly in the Northwest in 2003 and 2004. Much of this decline appears to be attributable to regional market conditions.

The length of time required to transform a market like this and the unpredictability of market conditions and the behavior of market actors are important lessons for the Alliance to take into account in its project planning, expectations, and forecasts.

The remainder of this section summarizes specific findings and conclusions from this update.

Increased Role of Distributors

To reduce costs, leverage distributors as “champions,” and be more in line with industry practices, MagnaDrive has continued to increase the role played by distributors. The increased role (distributors now conduct the majority of the sales, installation, and support activities) has allowed MagnaDrive to successfully decrease staffing and internal costs.

MagnaDrive has set the bar high for distributors to participate, in part to ensure that they are highly committed marketing partners. The change, however, has led to a number of issues and concerns:

- There are some geographic “gaps” in distributors
- A number of distributors resent having to pay for the distribution and installation training and materials
- At least one Northwest distributor has not attended the training yet
- Some customers may prefer to work directly with MagnaDrive

To offset the distributor cost of the distribution and installation training, MagnaDrive provides a distributor discount on the products they sell that helps offset the out of pocket training costs that they incur.

Total Cost of Ownership Model

To address the persistent first-cost issue, reduce the dependence on energy savings as a marketing advantage (particularly because VFDs can deliver equivalent or larger savings), and emphasize the other cost advantages of MagnaDrive, management has strategically redefined the marketing message, downplaying the energy savings and focusing on total cost of ownership. MagnaDrive has developed their own total cost of ownership model used to estimate and display the life cycle cost benefits of MagnaDrive ASDs.

The model is meant to help customers analyze cost components in addition to first cost and understand the true operations and maintenance savings that can be realized with a MagnaDrive. A number of distributors, however, stated that the model is complex and requires quite a lot of information from the customers that can be difficult to obtain or customers may not be willing to provide.

Some of the responding distributors and customers also expressed a concern that the model was simply a sales tool for MagnaDrive, questioning the accuracy of some of the information it included. In addition, even current customers have a difficult time quantifying O&M savings that have been achieved by purchasing a MagnaDrive.

Nevertheless, both ASD purchasers and distributors gave generally favorable reviews of the total cost of ownership model and information it provides. Some exogenous factors, such as market downturns and low electricity prices, could be changing in directions that will make MagnaDrive ASDs more economically attractive. At least among the customers we interviewed, there appeared to be a good understanding of the benefits of taking a life cycle cost perspective, and this was frequently a key factor in the decision to purchase a MagnaDrive.

First Cost of the MagnaDrive

Although management has moved away from discussing first cost by presenting the total cost of ownership model, all of the responding distributors stated that first cost is still the primary reason that customers would not purchase a MagnaDrive. In the lower horsepower ranges (less than 150 HP) MagnaDrive continues to be perceived as less attractive than a VFD.

By relying more on distributors and by implementing production and material cost saving measures, MagnaDrive is taking steps to reduce unit costs. To a large extent, however, significant cost reductions will probably be possible only when production levels can be increased enough to capture significant economies of scale.

The first-cost concern has been aggravated in certain industries, such as agriculture and pulp and paper, whose markets were especially depressed and the industries are facing severe budget limitations that made the first cost differential even more conspicuous.

A number of respondents mentioned that utility or other third-party incentives could help reduce the first cost disparity and promote MagnaDrive sales. As recommended in our previous report, the Alliance is in a unique position to capitalize on its expertise and relationships with the region's utilities to further promote MagnaDrive ASDs. Specifically, the Alliance should ensure that utilities include MagnaDrive in existing programs and in the design of new programs, particularly for applications where VFDs may not be well-suited. Utility promotion and incentives can be instrumental in reducing the awareness and first-cost barriers that limit the market potential of MagnaDrive.

Awareness of MagnaDrive

Although management currently believes that lack of awareness is the primary market barrier, a number of the Northwest distributors believe that more than half of their customers had already heard about a MagnaDrive before the distributor even mentioned it. This difference of perspective is probably a result of the relatively high level of product awareness in the Northwest that resulted, at least in part, from the Alliance's support.

In the Northwest, at least, the distributors and customers continued to indicate that first cost is, by far, a much more important market barrier to overcome than awareness.

Satisfaction with MagnaDrive

The customers we spoke with are generally quite satisfied with the installation and performance of their MagnaDrive and the support provided by the company or its distributors. One strong piece of evidence is that five of the seven customers had purchased more than one drive, and many of the customers were planning on purchases in the future.

Risk of unproven or unfamiliar technology has been a market barrier faced by MagnaDrive since the company was started. MagnaDrive is addressing this, in part, by developing and implementing a marketing strategy designed to reduce the likelihood that MagnaDrives are applied in situations where they are unsuited or risks are unknown. As installations continue to grow and the number of success stories increases, MagnaDrive should be able to leverage this experience to ameliorate concerns about technology risk with potential buyers in the future.

Appendix A. Interview Guides

This appendix contains the interview guides we used to interview the following groups:

- MagnaDrive management staff
- MagnaDrive distributors
- Original equipment manufacturers (OEMs)
- MagnaDrive customers

Final MagnaDrive Customers Interview Guide

Name: _____
Company: _____
Position: _____
Phone: _____
Date: _____
Interviewer: _____

Introduction

Hello, my name is ___ and I am calling from Quantec, an energy consulting firm, performing research on behalf of the Northwest Energy Efficiency Alliance and in partnership with the MagnaDrive Corporation. We are assisting the Alliance in assessing MagnaDrive's market. We are not selling anything; we are only conducting research.

Personal/Organization Background

1. Interviewee's role _____
2. Length of time in position _____
3. Type of company _____
4. Products produced or services provided _____

5. What is your process for selecting energy-efficient equipment (who's involved, how are decisions made, criteria, etc.)? _____

6. How many MagnaDrive adjustable speed drives has your company purchased? _____
7. How many MagnaDrive couplings has your company purchased? _____

[If respondent confirms they have purchased MagnaDrive ASDs GO TO 12.]

8. a. Are there any particular reasons for why your firm has not purchased any MagnaDrive adjustable speed drives (ASDs)? _____

8. b. What type of information would you need to support a decision to acquire a MagnaDrive ASD? _____

9. Do you have plans to purchase MagnaDrive ASDs in the future?

a. Yes

b. No

THANK AND TERMINATE

10. When do you think you will purchase a MagnaDrive ASD? _____

11. a. For what application(s)? _____

11. b. What features of the MagnaDrive are of most interest to you? _____

THANK AND TERMINATE

Product Awareness

[If this is a past respondent, thank them for previous participation.]

12. How did you first learn of MagnaDrive?

a. Vendor

b. Customer

c. Brochure/Flyer

d. Trade Journal

e. Other, Describe _____

13. Did you hear first about the MagnaDrive coupling or adjustable speed drive (ASD)?

a. Coupling

b. ASD

c. Both at the same time

d. Don't know/don't remember

14. We are primarily interested in your feedback on the MagnaDrive ASD so the following questions refer to the ASD. What do you see as the primary advantages of the MagnaDrive ASD? [DON'T READ])

a. Shock and vibration control

b. Simplicity

c. Space saving capability

d. Energy savings

e. O&M savings

f. Other, Describe _____

15. a. What do you see as the primary disadvantages of the MagnaDrive?
- a. Cost (purchase price)
 - b. Maintenance, Explain: _____
 - c. Compatibility, Explain: _____
 - d. Limited information on technology, Explain: _____
 - e. Other, Describe _____

15.b. In your view what are particularly good MD applications? _____

MagnaDrive Purchasing Factors

16. What was the main reason you decided to purchase the MagnaDrive ASD?
- a. Speed control
 - b. Process control
 - c. Reliability
 - d. Reduction in O&M
 - e. Energy savings
 - f. Other, Describe _____

17. What MagnaDrive features were the most compelling?
- a. Shock and vibration control
 - b. Simplicity
 - c. Space saving capability
 - d. Energy Savings
 - e. O&M Savings
 - f. Other, Describe _____

18. Please describe what role first cost and total cost of ownership, or life cycle cost (including both energy and non-energy benefits/costs) played in the decision?

19. What MagnaDrive marketing materials do you recall? _____

20. How important were these MagnaDrive marketing materials in your decision to purchase MagnaDrive?
- a. Very important
 - b. Somewhat important
 - c. Somewhat unimportant
 - d. Unimportant
 - e. Don't remember/Didn't receive marketing materials
21. How important were presentations (truck, in-person, at existing site, at trade shows) in your decision to purchase MagnaDrive?
- a. Very important
 - b. Somewhat important
 - c. Somewhat unimportant
 - d. Unimportant
 - e. Don't remember/Didn't view presentation
22. How important were testimonials in your decision to purchase MagnaDrive?
- a. Very important
 - b. Somewhat important
 - c. Somewhat unimportant
 - d. Unimportant
 - e. Don't remember/Didn't receive testimonials
23. Did you hear about MagnaDrive ASDs from colleagues or others in your industry?
- a. Yes
 - b. No
- GO TO 25**
24. How important was information from colleagues or others in your industry in your decision to purchase a MagnaDrive?
- a. Very important
 - b. Somewhat important
 - c. Somewhat unimportant
 - d. Unimportant
 - e. Don't remember
25. Did a MagnaDrive distributor inform you about the ASD?

- a. Yes
- b. No
- c. Don't remember

GO TO 27
GO TO 27

26. Please rate the following services or materials provided by the distributor on a scale from 1 to 5 where 1 is "poor" and 5 is "excellent." *[Enter 98 if respondent doesn't remember and 99 if not applicable.]*
- a. ___ Written informational materials
 - b. ___ Presentations
 - c. ___ Responses to questions
 - d. ___ Installation of MagnaDrive
 - e. ___ Other, specify _____

Customers Who Made Only One Purchase

27. Why have you not purchased a second MagnaDrive ASD? _____

28. Do you have plans to purchase additional MagnaDrive ASDs?

- a. Yes
- b. No

GO TO 30

29. For what type(s) of applications? _____
_____ **GO TO 33**

30. Why not? _____
_____ **GO TO 33**

Customers Who Made Two or More Purchases

31. What were the primary reasons for purchasing more than one MagnaDrive?

32. Do you have plans to purchase additional MagnaDrive's?

Satisfaction with MagnaDrive

33. How satisfied are you with the MagnaDrive ordering process?
- a. Very satisfied
 - b. Somewhat satisfied
 - c. Somewhat unsatisfied
 - d. Unsatisfied
34. What could be improved in the ordering process? _____

35. How satisfied are you with the installation process?
- a. Very satisfied
 - b. Somewhat satisfied
 - c. Somewhat unsatisfied
 - d. Unsatisfied
36. What could be improved in the installation process? _____

37. Have you contacted customer support?
- a. Yes
 - b. No
- GO TO 41**
38. Why did you contact customer support? _____

39. How satisfied were you with customer support?
- a. Very satisfied
 - b. Somewhat satisfied
 - c. Somewhat unsatisfied
 - d. Unsatisfied
40. What about customer support could be improved? _____

41. Have there been any unexpected or hidden costs with the MagnaDrive?
- a. Yes, Describe _____
 - b. No

42. How satisfied are you with the MagnaDrive performance?
- a. Very satisfied
 - b. Somewhat satisfied
 - c. Somewhat unsatisfied, Explain _____
 - d. Unsatisfied, Explain _____
43. Is the MagnaDrive working as expected?
- a. Yes
 - b. No, Describe _____
44. Have there been any unexpected advantages or disadvantages to using the MagnaDrive?
- a. Yes, Describe _____
 - b. No
45. Has the MagnaDrive required much maintenance?
- a. Yes, Describe _____
 - b. No
46. Have you seen a reduction in motor, pump, or other maintenance costs as a result of installing the MagnaDrive?
- a. Yes
 - b. No
- GO TO 48**
47. Please quantify these savings in average dollars per year: _____

Speed Control in the Facility

48. What % of your motors without speed control devices would benefit from them?
 _____%
49. What are the most important factors when your facility is making decisions about motor and speed control device purchases? _____

Marketing

50. What do you feel are the best ways to reach other members of the industry with information about the MagnaDrive? Describe. _____

51. Are there any trade associations or publications that you find most useful? Describe.

52. Finally, what other comments would you like to provide about your experience purchasing and using the MagnaDrive ASD?

THANK YOU FOR YOUR TIME AND THE INFORMATION YOU HAVE PROVIDED

Draft MagnaDrive Distributors Interview Guide

Name: _____
Company: _____
Position: _____
Phone: _____
Date: _____
Interviewer: _____

Introduction

Hello, my name is ___ and I am calling from Quantec, an energy consulting firm, performing research on behalf of the Northwest Energy Efficiency Alliance and in partnership with the MagnaDrive Corporation. We are assisting the Alliance in assessing MagnaDrive's market, and are working closely with MagnaDrive staff. We are not selling anything; we are only conducting research.

Personal/Organization Background

1. Interviewee's role _____
2. Length of time in position _____
3. Products provided _____
4. Scope of business
 - a. FTEs _____
 - b. Territory covered _____
5. How long has your company been in industrial sales? _____
6. How long has your company sold speed controls? _____
7. What types of speed control devices do you sell besides MagnaDrives? _____

8. What % of your revenues are from VFDs and other speed control devices? _____%
We are primarily interested in MagnaDrive's ASDs so for the following questions please respond only for the ASDs unless I ask specifically for information on couplings
9. When did you start selling MagnaDrive ASDs? _____(YYYY)
10. How many total MagnaDrive's has your distributorship sold? _____

11. Since your distributorship started selling MagnaDrives, what has been the average annual growth rate in MagnaDrive sales? _____%/Year

Awareness and Perceptions of MagnaDrive

12. How did you first learn about MagnaDrive?

- a. Vendor
- b. Customer
- c. Brochure/Flier
- d. Trade Journal
- e. Other, Describe _____

13. How did you become a MagnaDrive distributor? _____

14. What do you see as the primary advantages of the MagnaDrive? (DON'T READ)

- a. Shock and vibration control
- b. Simplicity
- c. Space saving capability
- d. Energy Savings
- e. O&M Savings
- f. Other; Describe _____
- g. Other; Describe _____

15. What do you see as the primary disadvantages of the MagnaDrive? (DON'T READ)

- a. Cost (purchase price)
- b. Maintenance, Explain: _____
- c. Compatibility, Explain: _____
- d. Limited information, Explain: _____
- e. Other; Describe _____
- f. Other; Describe _____

16. Compared to a conventional VFD, what are the things customers like about the MagnaDrive?

Sales of MagnaDrive

17. What percent of your customers do you discuss speed control with? _____%

18. What percent of these do you discuss the MagnaDrive with? _____%

19. In those cases where you don't discuss MagnaDrive, why don't you? _____

-
-
20. For those customers with whom you discuss MagnaDrive, what percent were already aware of MagnaDrive? _____%
21. How do these customers typically learn about MagnaDrive?
- a. Vendor
 - b. Other customer
 - c. Brochure/Flyer
 - d. Trade Journal
 - e. Other, Describe _____
22. Which methods have you used to sell and market the MagnaDrive?
- a. Presentations
 - b. Sales calls
 - c. Marketing materials
 - d. Other, Describe _____
23. What percent of the time are you asked to provide a bid that includes both an option for a MagnaDrive and one for a conventional VFD? _____%
24. When your bids include both options, what percent of the time do customers select the MagnaDrive? _____%
25. What have been the main reasons your customers have decided to purchase the MagnaDrive?
(DON'T READ)
- a. Speed control
 - b. Process control
 - c. Reliability
 - d. Reduction in O&M
 - e. Energy savings
26. What are the primary reasons your customers decide not to purchase the MagnaDrive?
(DON'T READ)
- a. No application
 - b. Too expensive
 - c. No current funds
 - d. Risk aversion
 - e. Unavailable product features; Describe _____
 - f. Other, Describe _____

27. What might have helped the sale of the MagnaDrive when customers chose not to buy it?
- a. Product information
 - b. Longer product track record
 - c. Testimonials
 - d. Lower price
 - e. Other, Describe _____
 - f. Other; Describe _____

28. What is the greatest challenge to selling MagnaDrive? _____

29. How do you provide pricing?
- a. All-inclusive pricing, including installation
 - b. Itemized pricing
 - c. Comparison pricing (MagnaDrive vs. other project costs)
 - d. Other, Describe _____

30. Do you present information on the total cost of ownership?
- a. Yes GO TO 31
 - b. No

Why not? _____ **GO TO 33**

31. Please describe the types of material and information you present on total cost of ownership.

32. Please indicate your level of agreement with the following statements about using total cost of ownership information as a way to inform customers about MagnaDrive? Use a scale from 1 to 5 where 1 means you “disagree totally” and 5 means you “agree totally.”
- a. __Customers’ are able to understand it
 - b. __Customers find the information credible
 - c. __It is relevant to customer decision making
 - d. __It is a good tool for educating customers about real costs
 - e. __It is easy to explain

Market for MagnaDrive

33. Which of the following applications do you feel has the greatest potential for the MagnaDrive ASD?
- a. Existing motors without speed control
 - b. Existing motors with old ASD technology
 - c. New motors

34. What horsepower size range do you think is the most promising market for the MagnaDrive? _____
35. What do you see as the opportunities for MagnaDrive in the OEM market? _____

Satisfaction with MagnaDrive Company

36. Did you take the training provided by MagnaDrive?
a. Yes GO TO 38
b. No
37. Why not? _____ GO TO 40
38. How would you rate the training overall?
a. Excellent
b. Good
c. Average
d. Fair
e. Poor
39. How could the training be improved? _____

40. How satisfied are you with MagnaDrive marketing support, including the marketing materials?
a. Very satisfied
b. Somewhat satisfied
c. Somewhat unsatisfied
d. Unsatisfied
41. What about marketing support could be improved? Describe

42. How satisfied are you with the process of filling orders?
a. Very satisfied
b. Somewhat satisfied
c. Somewhat unsatisfied
d. Unsatisfied
43. What about the process could be improved? Describe

44. How satisfied are you with the technical support provided by MagnaDrive?

- a. Very satisfied
- b. Somewhat satisfied
- c. Somewhat unsatisfied
- d. Unsatisfied

45. What about technical support could be improved? Describe _____

46. Overall, how satisfied are your customers with the MagnaDrive performance?

- a. Very satisfied
- b. Somewhat satisfied
- c. Somewhat unsatisfied
- d. Unsatisfied

47. Have there been any unexpected advantages or disadvantages to using the MagnaDrive?

- a. Yes, Describe _____
- b. No

48. Has the MagnaDrive required much maintenance?

- a. Yes, Describe _____
- b. No

Marketing for MagnaDrive

49. What do you feel are the best ways to reach other members of the industry with information about the MagnaDrive? Describe _____

50. What other comments or feedback would you like to provide about MagnaDrive on any of the areas we've covered or others you would like to comment on? _____

Thank and terminate.

Draft MagnaDrive OEM Interview Guide

Name: _____
Company: _____
Position: _____
Phone: _____
Date: _____
Interviewer: _____

Introduction

Hello, my name is ___ and I am calling from Quantec, an energy consulting firm, performing research on behalf of the Northwest Energy Efficiency Alliance and in partnership with the MagnaDrive Corporation. We are assisting the Alliance in assessing MagnaDrive's market, and are working closely with MagnaDrive staff. We are not selling anything; we are only conducting research.

Personal/Organization Background

1. Interviewee's role _____
2. Length of time in position _____
3. Products manufactured/sold _____
4. Scope of business
 - a. Annual sales, \$ _____
 - b. Areas where products are sold _____
5. How long has your company been in manufacturing? _____
6. What types of equipment do you sell with OEM speed controls?

7. What types of speed control devices other than MagnaDrives do you include as OEM equipment? _____

Sales of MagnaDrive

8. When did you start selling MagnaDrive ASDs with your products? _____(YYYY)
9. To what industry(ies) are you primarily selling the equipment with MagnaDrives?

10. What types of equipment are the MagnaDrive ASDs going into? Why?

11. For what types of equipment or applications is MagnaDrive a good choice?

12. Are there any plans to include the MagnaDrive in any additional equipment in the future?

13. Are customers made aware that the MagnaDrive is in the equipment?

14. For the products that you offer with MagnaDrives, what percent are sold with MagnaDrives and what percent have another type of speed control?
_____ % MagnaDrive _____ % Other speed control
15. What criteria determine which products you offer with MagnaDrive ASDs?

16. In what cases would you not recommend MagnaDrive with your products and why wouldn't you?

[IF CUSTOMERS ARE NOT GIVEN A CHOICE BETWEEN MAGNADRIIVE AND OTHER SPEED CONTROL DEVICES SKIP TO 19]
17. When offered a choice of speed control devices, what have been the main reasons your customers have decided to purchase the MagnaDrive?

18. What have been main reasons they have decided not to purchase the MagnaDrive?

19. What are the greatest challenges to selling MagnaDrives as OEM equipment?

20. What types of issues or problems has the MagnaDrive addressed or solved for customers?

21. What type of feedback have you had from customers?

22. What might help you to sell customers on the MagnaDrive?
- a. Product information
 - b. Longer product track record
 - c. Testimonials
 - d. Lower price
 - e. Other, Describe _____
 - f. Other; Describe _____

Awareness and Perceptions of MagnaDrive

23. How did you first learn about MagnaDrive?
- a. Vendor
 - b. Customer
 - c. Brochure/Flier
 - d. Trade Journal
 - e. Other, Describe _____
24. What do you see as the primary advantages of the MagnaDrive? (DON'T READ)
- a. Shock and vibration control
 - b. Simplicity
 - c. Space saving capability
 - d. Energy Savings
 - e. O&M Savings
 - f. Other; Describe _____
 - g. Other; Describe _____
25. What do you see as the primary disadvantages of the MagnaDrive? (DON'T READ)
- a. Cost (purchase price)
 - b. Maintenance, Explain: _____
 - c. Compatibility, Explain: _____
 - d. Limited information, Explain: _____
 - e. Other; Describe _____
 - f. Other; Describe _____
26. Which methods have you used to sell and market the MagnaDrive as OEM equipment?
- a. Presentations
 - b. Sales calls
 - c. Marketing materials
 - d. Other, Describe _____
27. Do you present information on the total cost of ownership?
- a. Yes GO TO 31
 - b. No
28. Why not? _____ GO TO 30
29. Please describe the types of material and information you present on total cost of ownership.

Market for MagnaDrive

30. What horsepower size range do you think is the most promising market for the MagnaDrive? _____
31. What do you see as the main opportunities for MagnaDrive in the OEM market?

Satisfaction with MagnaDrive Company

32. Did you take any training provided by MagnaDrive?
a. Yes GO TO 38
b. No
33. Why not? _____ GO TO 40
34. How would you rate the training overall?
a. Excellent
b. Good
c. Average
d. Fair
e. Poor
35. How could the training be improved? _____
36. How satisfied are you with MagnaDrive marketing support, including the marketing materials?
a. Very satisfied
b. Somewhat satisfied
c. Somewhat unsatisfied
d. Unsatisfied
37. What about MagnaDrive's marketing support could be improved?

38. How satisfied are you with the process of filling the orders you submit to MagnaDrive?
a. Very satisfied
b. Somewhat satisfied
c. Somewhat unsatisfied
d. Unsatisfied
39. What about the process could be improved?

40. How satisfied are you with the technical support provided by MagnaDrive?

- a. Very satisfied
- b. Somewhat satisfied
- c. Somewhat unsatisfied
- d. Unsatisfied

41. What about technical support could be improved? _____

42. Have you had any warranty or call-back issues with the MagnaDrives?

- a. Yes, Describe _____
- b. No

43. Overall, how satisfied are your customers with the MagnaDrive performance?

- a. Very satisfied
- b. Somewhat satisfied
- c. Somewhat unsatisfied
- d. Unsatisfied

44. Have there been any unexpected advantages or disadvantages to using the MagnaDrive?

- a. Yes, Describe _____
- b. No

45. Has the MagnaDrive required much maintenance?

- a. Yes, Describe _____
- b. No

Marketing for MagnaDrive

46. What do you feel are the best ways to reach other members of the industry with information about the MagnaDrive? Describe _____

47. What other comments or feedback would you like to provide about MagnaDrive on any of the areas we've covered or others you would like to comment on? _____

Thank and terminate.

MagnaDrive Staff Interview Guide

Name:

Position:

- (1) _____
- (2) _____
- (3) _____
- (4) _____
- (5) _____
- (6) _____

- _____
- _____
- _____
- _____
- _____
- _____

Date: _____

Interviewer: _____

Personal/Organization Background

- 1. Staff person's role _____
- 2. Length of time in position _____
- 3. Number of employees on staff _____
- 4. Positions on staff _____

Alliance Assistance

- 5. What are your perceptions about the Alliance's role in MagnaDrive's progress?

- 6. How has the Alliance's assistance helped?

- 7. In what ways, if any, has its assistance had negative effects?

- 8. Was the Quantec life cycle cost model used? _____
 - 8.a. If not, why? What model, if any, is being used? _____
 - 8.b. If yes, what has been MagnaDrive's experience with it? _____

9. Have you had any additional interaction with the Alliance? If so, how have these interactions been? What areas are there for improvement or change?

Products and Manufacturing

10. What products does MagnaDrive currently offer? _____

11. How have your product offerings changed in the last two years? _____

12. What percent of dollar sales are by product type? _____

13. What types of customers and applications are typical for each product? _____

14. What, if any, new products are in development? _____

15. If new products are being developed, which markets and applications do they target?

16. Have there been any major changes in the product design in the different size ranges?

17. What has driven these changes (e.g., cost reduction, customer demands, etc.)?

18. Have there been any new developments in the manufacturing of your ASDs? What effects have these changes had?

19. What design or manufacturing changes are you expecting in the next three years?

Markets, Sales, and Marketing

20. What is your current total annual sales volume in dollars and units per year? _____

21. What are your sales forecasts in 3 years? 10 years?

22. What are the shares of total sales by market (e.g., water treatment, wastewater treatment, etc.)?

23. How are the shares distributed geographically and domestic v. foreign?

24. What approaches have you used to promote and sell your ASD?

25. What markets are you targeting now?

26. What markets will you target over the next three years?

27. What have you done about the OEM market? What are your plans for this market?

28. What types of products are your major competitors in each market?

29. What are the major product-specific challenges you have to address in selling your ASD including:

Price _____

Inadequate payback or rate of return _____

Perceived technical or performance shortcomings (e.g., lack of ability to connect to automation controls) _____

Lack of in-field application information _____

Bias toward electronic ASDs _____

Risk aversion toward new technologies _____

Lack of familiarity with your technology _____

Lack of brand recognition _____

Lack of distributors or distribution channels _____

Customer concerns about product support _____

Others _____

30. Why are specific products being purchased?

Price _____

Application (e.g. rough duty) _____

Energy efficiency _____

Maintenance _____

Other _____

31. What general challenges do you face selling to your markets (e.g., long sales cycle for customers, general market or specific industry downturns, etc.)?

32. How do you address these challenges and what are your major selling points in each market?

33. What strategies do you have for increasing sales in your markets (including selling points, distribution channels, promotions, pricing, discounts to wholesalers and bulk buyers, etc.)?

34. Have you implemented any new partnerships, purchases, or mergers? Do you have plans to expand any of these during the next three years? Why? _____

35. What role has MagnaDrive's recognition in the press had on your marketing and sales?

36. What general trends do you expect will have significant effects on your markets in the future?

Distribution

37. What are your major sales/distribution channels (direct sales, distributors, wholesalers, OEM, other)? What share of your products is sold through each channel?

38. What challenges do you face with the existing distribution network?

39. What changes are planned in the sales/distribution network and process? Why?

40. What feedback have you heard from your distributors?

Feedback from Customers

41. What types of positive feedback have you had from MagnaDrive ASD purchasers?

42. What types of negative feedback have you had?

43. What could be done to increase customer satisfaction?

44. What factors, if any, have limited repeat sales?

45. What recommendations have buyers made for product changes?

Finances

46. Has sufficient external funding been secured?

47. What kinds of sources are providing the funding? How much?

48. Is it anticipated that additional funding will be needed? If so, when?

49. What is your current profitability situation?

50. If you are not currently profitable, when are you forecasting you will be?

51. What level of sales is required for profitability?

52. What are the major things you are doing to achieve your financial goals?

Other

53. What do you see as the greatest challenges facing MagnaDrive?

54. What do you see as the greatest opportunities?

What other information or observations would you like to share?
