

MagnaDrive

Market Progress Evaluation Report, No. 3

prepared by

Quantec, LLC

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NORTHWEST ENERGY EFFICIENCY ALLIANCE

www.nweaalliance.org

529 SW Third Avenue, Suite 600
Portland, Oregon 97204
telephone: 503.827.8416
fax: 503.827.8437

Final Report

Third Market Progress Evaluation Report for the MagnaDrive Adjustable Speed Drive, Phase 2

Prepared for:
The Northwest Energy Efficiency Alliance

Prepared by:
Quantec, LLC

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Executive Summary

Introduction

This Market Progress Evaluation Report (MPER) is the third of three progress reports prepared by Quantec over the course of this assignment. It covers research and analysis conducted between July and December 2002.¹

The Northwest Energy Efficiency Alliance (the Alliance) and the MagnaDrive Corporation (MagnaDrive) have formed a public/private partnership to help commercialize the MagnaDrive Adjustable Speed Drive (ASD). The MagnaDrive ASD is an innovative speed-control device that transmits torque through an air gap by using powerful permanent magnets. The MagnaDrive Corporation and the Alliance have been working together since May 1999.

Project Characterization

Quantec conducted comprehensive interviews with senior MagnaDrive management in the summer of 2002 to understand current product offerings, marketing efforts, and general company status. Quantec also reviewed the MagnaDrive marketing plan, monthly reports, sales reports and projected sales, and company presentations.

Capitalization, Funding, and Staffing

MagnaDrive completed a third round of funding in fall 2002, raising an additional \$9.3 million through a combination of equity stakes and convertible notes. The new funding is being used to expand sales channels and marketing infrastructure, cover general operating expenses, and develop additional research and development (R&D). As of the end of 2002 MagnaDrive had 37 employees, approximately than one-third of whom work in sales.

Product Offerings and Production

MagnaDrive introduced the Series S ASD in October 1999, targeting 25-250 horsepower (HP) motors. In 2001 MagnaDrive expanded the Series S line and introduced larger ASDs that serve motors up to 500 HP. There are now 33 configurations of the Series S ASD.

¹ The first MPER covered the period from August 15 through November 15, 2000. See "Market Progress Evaluation Report MagnaDrive, No.1," prepared by Quantec with Market Link Strategies, Schiller Associates, and XENERGY, report #E01-080, May 2001. The second MPER covered the period from November 2000 through October 2001. See "Second Market Progress Report for the MagnaDrive Adjustable Speed Drive, Phase II," prepared by Quantec with Schiller Associates, report #E01-099.

In 2001 MagnaDrive began offering couplings called the MGD and MGTL. These couplings, with 38 configurations for 20 HP-1,000 HP motors, are “stock items” with a low turnaround time; normally, they are available “off the shelf” for approximately \$6,000. The couplings do not offer speed control, but do offer a broad range of other nonenergy benefits.

MagnaDrive introduced the Series B ASD in May 2002. These ASDs are targeted for larger motors, 500 HP-1,500 HP. Future plans include ASDs over 1,500 HP, couplings over 1000 HP, and possibly even other applications, such as in vehicles (clutches, drive trains, transmissions, etc.), power generation, and wind turbines.

Marketing Efforts in 2002

MagnaDrive instituted a new sales approach, hiring six regional sales managers to cover distinct regions of the United States. All sales managers focus on water/wastewater and HVAC applications, in addition to specific applications that differ by region.

MagnaDrive is also strengthening its relationship with distributors, concentrating primarily on four categories: mechanical distributors, industrial distributors, HVAC specialists, and water/wastewater representatives. The company had nearly 100 dealers under contract nationwide as of the second quarter 2002, and one-third had already completed their first order.

MagnaDrive is actively pursuing Original Equipment Manufacturers (OEMs) to establish exclusive arrangements. In April 2002, SWACO announced in that they will exclusively use MagnaDrive ASDs and couplings in their products. SWACO is a leading provider of pressure control, rig instrumentation, solids control, and waste management services for the worldwide petroleum and production industry.

MagnaDrive continues to institute a number of other strategies aimed at increasing sales, including attending trade shows, maintaining an active public relations program, updating their Web page, using direct mail, earning approval as a General Services Administration (GSA) contractor, receiving American Bureau of Shipping (ABS) certification, and teaming with conservation program managers.

MagnaDrive Sales

More than half of MagnaDrive’s sales have been made to industrial customers, with the water/wastewater industry (51%) representing the largest single vertical market. Fifty-one percent of installations were for larger motors (100 HP and over), and 62% of the installations were associated with pump applications.

Sales through distributors and OEMs represented 44% of all sales for 2002, and this share is increasing every month. There is tremendous potential, however, in the OEM market, and MagnaDrive management estimates that OEMs could eventually represent 70% of all sales.

Sales in 2001 and 2002 were lower than anticipated by MagnaDrive, primarily due to the ongoing recession at that time. However, relative to the performance of the overall speed control market and the general state of the U.S. and Northwest economy, MagnaDrive's recent performance has been strong. In addition, the value (in dollars) of quotes continues to increase dramatically by quarter, sometimes by more than 100% from one quarter to the next.

Summary and Recommendations

MagnaDrive has implemented and moved beyond the earlier recommendations. They have also attempted to work with the utility industry to promote the Company's ASDs. However, the Company has had little success making inroads with Northwest utilities, and utility-sponsored incentives have been very limited.

The Alliance is in a unique position to capitalize on its expertise and relationships with the region's utilities to further promote MagnaDrive ASDs. Specific near-term action items the Alliance should consider implementing include:

- ← Placing promotion of MagnaDrive ASD on par with internal project administrative reporting
- ← Spending more time on-site at MagnaDrive's Seattle headquarters to work on joint marketing activities
- ← Intervening if the above activities result in the refusal of utility commercial and industrial program managers to include MagnaDrive ASDs in their programs

In technology diffusion parlance, the MagnaDrive ASD has moved beyond attracting pure innovators and early adopters. The Alliance's adoption of these recommendations will level the playing field by ensuring that the MagnaDrive ASD is not placed at a competitive disadvantage in terms of utility-sponsored incentives, a key component in the next stage of the MagnaDrive's market transformation process.

Market Actor Interviews

Quantec spoke with a total of ten purchasers and five non-purchasers of MagnaDrive.² Sample lists were prepared from the MagnaDrive sales and marketing database. An attempt was made to reach a diverse group of industries, one-time/repeat customers, and early/more recent customers. All interviews were conducted with respondents from the Northwest (Washington, Oregon, Idaho, or Montana). Quantec also spoke with all five Northwest distributors of MagnaDrive products.³

Perceptions about MagnaDrive

A number of the respondents reported that they were somewhat skeptical of the technology at first, but seeing a demonstration (either on-site with a demonstration unit or at an existing customer site) typically allayed their concerns. Some of the proponents of MagnaDrive, however, still encountered resistance from others within their organization that feared being an early adopter of what they perceived as a new technology.

Non-purchasers not only spoke positively about the company, but about the product. Of the five non-purchasers we spoke with, four are still hoping to secure funding to purchase a MagnaDrive ASD.

Many of the respondents reported an increasing awareness of MagnaDrive in their industries. Distributors felt that an increasing number of their customers are now aware of MagnaDrive (most estimated that at least 60%-70% of their customers were aware). Even more importantly, the distributors reported that some customers are now asking them for quotes that include a MagnaDrive.

Market Drivers

The MagnaDrive is still widely viewed as competitive technology to the VFD. Nonenergy benefits, therefore, were extremely important in the purchase decision, including lower maintenance costs, cushioned soft-start, and water savings.

Market Barriers

The initial cost of the MagnaDrive appears prohibitive to some potential customers because of the economic downturn and the longer payback periods resulting from lower energy costs in the Northwest.

² Non-purchasers refers to sites that received bids from MagnaDrive but have not yet purchased a MagnaDrive ASD.

³ There were only five Northwest distributors offering MagnaDrive at the time of this research. See Appendix C for the discussion guide.

Although respondents recognized the potential for lower maintenance costs, few would factor this into any decision to purchase the coupling as the risk of adopting a perceived new technology outweighed any potential maintenance savings.

Two distributors reported that they have seen cases where contractors have *inflated* the cost of the MagnaDrive to account for the unknown maintenance costs.

Aggravating the inability and unwillingness to quantify the maintenance savings was the fact that nearly all of the respondents only conducted a first cost analysis, not a life-cycle cost analysis.

Satisfaction with MagnaDrive

Every customer and distributor Quantec spoke with provided overwhelmingly positive reviews for MagnaDrive customer support and performance. Respondents were extremely satisfied with the competence, professionalism, and personal attention they received from MagnaDrive staff.

The high level of satisfaction can also be measured by the number of repeat customers: five of the customers we spoke with had followed their initial order with a repeat order for a MagnaDrive. In addition, four of the five “single purchase” customers said they hoped to order additional MagnaDrives.

The purchasers also reported that the MagnaDrive has required only routine maintenance, such as lubrication. Three respondents believed that their maintenance costs had decreased as a result of the MagnaDrive, but none of these had attempted to quantify the savings.

Market Potential

Based on the overwhelming satisfaction of MagnaDrive purchasers and the extraordinary level of interest from non-purchasers and distributors, the respondents we spoke with clearly think that MagnaDrive has a bright future.

The five distributors we spoke with were all making aggressive efforts to sell the MagnaDrive: most reported that they are introducing bids for MagnaDrive in 100% of the cases where they deem it is applicable, even if customers aren't aware of it.

Summary of Recommendations

- ⇐ Make the demonstration units – both the table-top and larger units – more affordable for distributors.
- ⇐ MagnaDrive could assist interested potential customers in calculating a life-cycle cost analysis, attempting to quantify

Operations and Maintenance (O&M) savings and other non-energy benefits.

- ⇐ MagnaDrive should educate potential customers to request itemized, not aggregated, project bids, with clear explanations of project costs.
- ⇐ Case studies should make a point of demonstrating and quantifying reduced maintenance costs resulting from MagnaDrive ASD installations. MagnaDrive sales force should also assist clients in calculating the potential reduction in maintenance costs. Even if they don't calculate life-cycle costs they, can at least consider it qualitatively.
- ⇐ MagnaDrive needs to continue to attempt to lower product costs, and should also assist customers in trying to work with utilities or other entities to locate third-party rebates and/or financing.
- ⇐ Continue setting up a cost-effective arrangement with distributors, as these "champions" of the product will lead to increased awareness, confidence, and sales in the coming years.
- ⇐ Continue "touching base" with current customers and potential customers on the appropriate level of interaction with MagnaDrive. This fosters continued confidence and respect of the company and technology, increasing the likelihood of future sales.
- ⇐ MagnaDrive should add more structure, or formalization, to their training. MagnaDrive also needs to make it clearer in the training what items they include with the coupling pricing and what items distributors need to price separately.

I. Introduction

The Northwest Energy Efficiency Alliance (the Alliance) and the MagnaDrive Corporation (MagnaDrive) have formed a public/private partnership to help commercialize the MagnaDrive adjustable speed drive (ASD). The ASD is an innovative speed-control device that transmits torque through an air gap by using powerful permanent magnets.

MagnaDrive Corporation, located in Seattle, Washington, is engaged in the development and commercialization of patented torque transfer technology with applications in industry, public works, transportation, and consumer products domestically and internationally. The Company's primary product is the MagnaDrive ASD.

The MagnaDrive Corporation and the Alliance have been working together since May 1999. Phase 1 of the project involved a number of tasks, including: the testing and comparison of the ASD to variable frequency drivers (VFDs), control valves, and dampers at Oregon State University's Motor Systems Resource Facility (MSRF)⁴, development of case studies of ASD installations at four industrial sites, and a confidential market assessment study.

The overall findings from Phase 1 led the Alliance to fund a second phase research effort designed to address market barriers. The primary goals of Phase 2 are as follows:

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

In January 2001, MagnaDrive received a grant from the Department of Energy as part of the National Industrial Competitiveness through Energy, Environment, and Economics (NICE³) program. The \$500,000 award is for installations of four high-horsepower (500 HP to 1500 HP) MagnaDrive ASDs in industrial applications and will augment Alliance Phase 2 resources.

The Alliance engaged Quantec to conduct an evaluation that tracks MagnaDrive Corporation's progress toward the Phase 2 goals. This Market Progress Evaluation Report (MPER) is the final of three progress reports prepared by the Quantec team to document the progress of the Phase 2 efforts.

⁴ 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 conducted a number of tasks, including:

- ⇐ ***Assess current practices, attitudes, and awareness of the MagnaDrive ASD and the speed drive market.*** The Quantec team conducted interviews with four participants at demonstration sites, six customers that purchased the ASD without Alliance co-funding, four non-purchasers who were familiar with the MagnaDrive, and seven non-purchasers who were not familiar with the MagnaDrive. We also conducted interviews with the two primary trade associations for the pulp and paper and wastewater treatment industries: the Northwest Biosolids Management Association (NBMA), and the Technical Association of the Pulp and Paper Industry (TAPPI).
- ⇐ ***Help 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.*** We 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) and is capable of comparing VFD and MagnaDrive to a base motor and to one another.
- ⇐ ***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).

This third and final Phase 2 MPER is focused on MagnaDrive’s performance over the last year, concentrating on why sales aren’t as high as originally forecasted. The findings from this report are divided into two additional sections:

- ⇐ **Chapter II: Project Characterization**. A review and update of MagnaDrive product offerings, marketing efforts, sales, and general company status, as well as market conditions facing MagnaDrive.
- ⇐ **Chapter III. 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.

II. Project Characterization

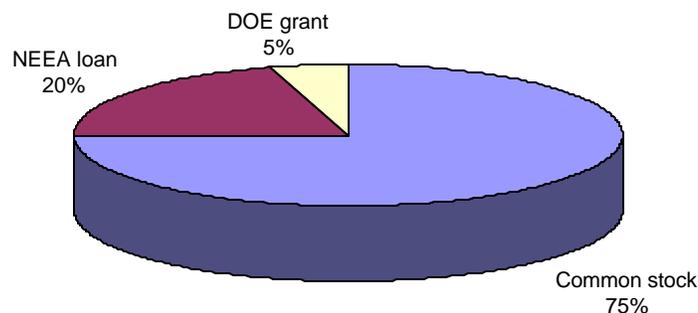
Quantec conducted comprehensive interviews with senior MagnaDrive management during the summer of 2002 to understand current product offerings, marketing efforts, general company status, and market conditions facing the company. Quantec also reviewed MagnaDrive's marketing plan, monthly reports, sales reports and projected sales, and company presentations.

Capitalization and Funding

In its first two rounds of funding (1999-2001) MagnaDrive raised \$10.3 million from private investors, the Alliance, and government energy-related funds (Figure II.1). MagnaDrive completed a third round of funding in fall 2003, raising an additional \$9.3 million through a combination of equity stakes and convertible notes. This round of funding was conducted during a very difficult fundraising climate, following the crash of the technology venture capital market and the uncertainty following the events of September 11, 2001. The third fundraising round took longer and required more effort than originally hoped. Despite the dearth of venture capital, however, MagnaDrive has been able to reach its fundraising goal.

The new funding is being used to expand sales channels and marketing infrastructure, cover general operating expenses, and develop additional research and development (R&D). At the end of 2002 MagnaDrive had 37 employees, with approximately one-third working in sales. MagnaDrive management estimates that approximately 40% of costs go to cover sales, 40% to engineering, and 20% to general and administrative, including patents/certifications.

Figure II.1
First Two Rounds of MagnaDrive Funding



Product Offerings and Production

Product Offerings

Series S Adjustable Speed Drive (ASD). MagnaDrive offered its first ASD in October 1999. The first ASD was called the Series S, and was targeted for 25 HP to 250 HP motors. In 2001 MagnaDrive expanded the Series S line and introduced larger ASDs that serve motors up to 500 HP. There are now 33 configurations of the Series S ASD. The larger models use a fan to cool the motor.

MagnaDrive Couplings. In 2001, MagnaDrive began offering couplings called the MGD and MGTL. These couplings, with 38 configurations for 20 HP to 1,000 HP motors, are “stock items” with a low turnaround time; normally, they are available “off the shelf” for approximately \$6,000.⁵ The couplings do not offer speed control, but do offer a broad range of benefits, including:

- ⇐ Cushioned soft-start, which allows companies to downsize motors and save energy and peak demand
- ⇐ Vibration control, reducing the maintenance and downtime on motors (including the need for laser alignment)
- ⇐ Overload torque protection, where the MagnaDrive Couplings automatically disengage, shutting down the system and preventing damage to the motor and driven equipment

MagnaDrive is working with the Sacramento Public Utility District to measure the energy savings from motor downsizing associated with MagnaDrive Couplings, and will make this information available to the Alliance when the analysis is completed.

Series B ASD. MagnaDrive introduced the Series B ASD in May 2002. These ASDs are targeted for larger motors, 500 HP to 1,500 HP. The first installation was for Swan Falls Irrigation, along the Snake River, and uses a water-cooled system to control the heat dissipation. Approximately 50% of the funding for this project came from the Alliance. A second installation, partially funded by the U.S. Department of Energy, will be placed in a phosphate mine. Future installations may occur in HVAC, mining, pulp and paper, and internationally.

⁵ Six special order 1800 HP/1800 RPM couplings were delivered to Hanover Compressor for use on natural gas pipelines.

Future Products. Future plans include ASDs over 1,500 HP, couplings over 1000 HP, and possibly even other applications, such as in vehicles (clutches, drive trains, transmissions, etc.), power generation, and wind turbines.

MagnaDrive management believes that they now offer a true “family” of products that meet a variety of customer needs and that MagnaDrive products are now a viable option for nearly all applications. They also believe that all products are complimentary, not “cannibalistic,” and that sales of less costly MGD couplings could eventually lead to sales of ASDs (i.e., by providing trust and confidence in the MagnaDrive product).

MagnaDrive Production

MagnaDrive has a new production partner – Precision Machine Works (PMW), based in Tacoma, Washington (www.pmwinc.com). PMW is a major machine supplier specializing in complex machine parts and assemblies. The company has been providing services to aerospace and other commercial markets since 1925. Its Tacoma headquarters has over 100,000 square feet of manufacturing space; the work area is capable of producing simple to highly complex assemblies.

PMW is responsible for manufacturing, assembly, testing, packaging, and shipping MagnaDrive ASDs and couplings. MagnaDrive Corporation will continue to manage all aspects of product design, application engineering, marketing, sales, and service.

PMW has constructed a special facility within the Tacoma plant for the assembly of MagnaDrive ASDs and couplings. Most significantly, PMW has been able to reduce both lead-time and production costs by 25%-40% relative to MagnaDrive’s previous production facilities in California and Washington. PMW has the capacity to produce 2,500 MagnaDrive units per month.

Marketing Efforts in 2002

MagnaDrive has continued to accelerate an aggressive “go to market” strategy in an effort to increase sales of its products.

Regional Sales System

MagnaDrive instituted a new sales approach, hiring six regional sales managers to cover distinct regions of the United States. All sales managers focus on water/wastewater and HVAC applications, in addition to specific applications that differ by region (Table II.1). The sales managers all have extensive experience with motor systems, and four of them came from the Rexnord Corporation, a competitor in the coupling market.

This approach has led to more focused, regional-specific sales applications. For example, there have been a number of high profile mining installations in the past year that could lead to greater sales in an application that had not previously been targeted.

**Table II.1
MagnaDrive Regional Sales Approach**

Region	Regional Industry Focus*
South	Process industries (power, chemicals, etc.) and refineries
Southeast	Pulp and paper, lumber and timber, mining
Southwest	Process and basic (manufacturing, steel) industries, mining, energy
Northwest	Pulp and paper, irrigation
Northeast	Process industries, mining
Midwest	Process and basic industries

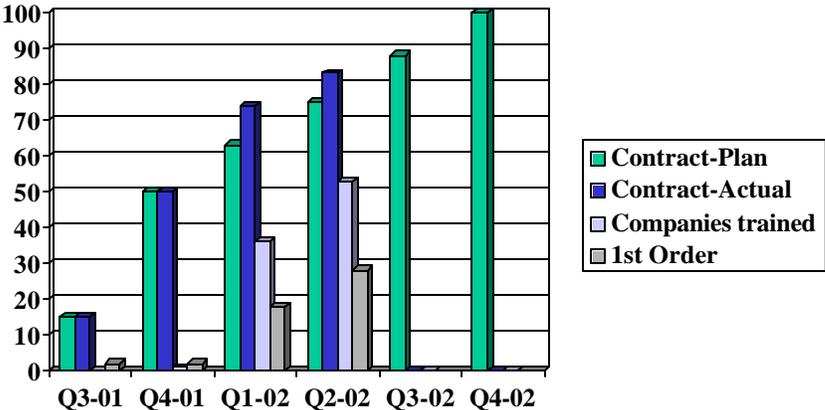
* All regions also focus on water/wastewater and HVAC applications

Distributor Focus

MagnaDrive is also strengthening its relationship with distributors, who also tend to be focused by region and industry. They are concentrating primarily on four categories of distributors: mechanical distributors, industrial distributors, HVAC specialists, and water/wastewater representatives.

Figure II.2 summarizes the growth of MagnaDrive’s distributor network over the last year. In each quarter, MagnaDrive has met or exceeded its sign-up (contract) goals. The company had 102 dealers under contract nationwide at the end of 2002. More importantly, 60% of these had completed training sessions, and over one-third had completed their first order.

**Figure II.2
Distributors Under Contract, Trained, and First Order**



Trained dealers are sent sales reports, updated price lists, and other information from MagnaDrive every month. MagnaDrive has also developed 100 suitcase-sized demonstration units that dealers can use in explaining the MagnaDrive to a potential customer. These units have proved extremely popular.

Original Equipment Manufacturers (OEMs)

In a further effort to increase sales, MagnaDrive began teaming with OEMs to include MagnaDrive equipment in their products. In a very important deal, SWACO announced in April 2002 that they will exclusively use MagnaDrive ASDs and couplings in their products. M-I L.L.C., SWACO's parent company, is owned 60% by Smith International, Inc. (NYSE: SII) and 40% by Schlumberger Limited (NYSE: SLB). SWACO is a leading provider of pressure control, rig instrumentation, solids control, and waste management services for the worldwide petroleum and production industry.

The introduction of MagnaDrive power transmission drives and over-torque protection couplings is a first for the oil and gas industry and signals a shift toward improving reliability, safety, and energy efficiency in critical systems. Oil and gas companies worldwide employ M-I/SWACO's machinery, opening a new market for MagnaDrive.

MagnaDrive expects to sell 300 ASD units over 30 months to SWACO, worth approximately \$3 million. According to SWACO Senior Vice President Larry Barker in an official press release dated April 4, 2002,

“SWACO's decision to use MagnaDrive's unique magnetic technology was based on our interest in improving the performance of our centrifuges in solids control applications. With the addition of MagnaDrive ASDs and couplings, we expect to be able to modify our centrifuges and easily operate them at variable speeds, which is currently achieved with either sophisticated hydraulic or variable frequency drives. The implementation of MagnaDrive technology will yield much simpler systems, resulting in a reduction in maintenance costs as well as an increase in reliability and safety. We also see an opportunity to apply these drives to pumps and a variety of other oilfield equipment.”

MagnaDrive is actively pursuing other OEMs to establish exclusive arrangements. For example, Hanover Compressor recently completed a successful initial installation and demonstration of the MagnaDrive product. Gardner Denver, the largest blower manufacturer, has been collaborating with MagnaDrive for more than six months. Other OEMs, including Autogard, TECO, Chung-Hsin, and Future Seafood Technologies, are all exploring the possibility of incorporating MagnaDrive equipment into their products.

MagnaDrive is also pursuing an alternative arrangement with some OEMs where they specify MagnaDrive equipment in a specific product or installation, even though it is not built directly into the product.

Other Marketing Efforts

MagnaDrive also continues to institute a number of strategies aimed at increasing sales, including:

- ⇐ **Trade shows.** MagnaDrive continued to attend trade shows in 2001-2002. Previous attendance at trade shows has proven extremely successful. MagnaDrive reports that the credibility of the company continues to improve each year as they attend more trade shows; repeated attendance helps dispel concerns about the financial health of the company or the applicability and reliability of their products.
- ⇐ **Public relations program.** MagnaDrive continues to target key trade and business media for familiarization with the company and products through the use of press releases, technical papers, and journal articles. MagnaDrive products have also won a number of accolades, including IndustryWeek technology of the year for 2001, the Control Engineering Progressive Innovations award, as well as feature stories in Compressor Tech Two, Engineered Systems, WaterWorld, Sales & Marketing Management and Pumps & Systems. Articles are pending in Water Environment & Technology, Plant Services, and Appliance Manufacturer. These press accolades are key to increasing the credibility of the MagnaDrive technology.
- ⇐ **Web presence.** MagnaDrive maintains an up-to-date, professional Web page that includes comprehensive company and product information. The Web page also utilizes advanced tools such as streaming video.
- ⇐ **Direct mail.** MagnaDrive has established a direct mail database for ongoing distribution of appropriate marketing material, including new print and electronic collateral.
- ⇐ **GSA Approval.** MagnaDrive was approved as a General Services Administration (GSA) contractor. This allows government facilities to place direct orders with MagnaDrive, including nuclear facilities. The first government order was received recently from the Savannah River Nuclear Reservation.
- ⇐ **ABS Certification.** MagnaDrive received American Bureau of Shipping (ABS) certification, which should increase applications in the shipping industry (from offshore platforms to large ships).
- ⇐ **Teaming with Conservation Program Managers.** MagnaDrive has been pursuing relationships with commercial and industrial conservation program managers at utilities in an effort to get them to educate their customers about the MagnaDrive products. The MagnaDrive management believes this is one area where the Alliance might provide further assistance; they feel the Alliance could promote the technology to utilities, provide utilities with

product information, and encourage the utilities to include MagnaDrive as part of rebate programs.

MagnaDrive Sales

Table II.2 provides a breakdown of sales by year, industry, application, location, horsepower, type, location, and sales channel mix.⁶ More than half of MagnaDrive's ASD sales have been made to industrial customers, with the water/wastewater industry (51%) representing the largest single vertical market. Slightly over half of the ASD installations (51%) were for larger motors (100 HP and over), and 62% of the ASD installations are associated with pump applications. Over half (51%) of the MagnaDrive sales have been to customers served by a Northwest utility, but this share is falling as MagnaDrive expands its presence outside the region.

Finally, and perhaps most significantly, ASD sales through distributors and OEMs were 44% in 2002 (24% overall), and this share is increasing every month. The current sales target mix is approximately 70% dealers, 15% OEM, and 15% direct. There is tremendous potential, however, in the OEM market, and MagnaDrive management estimates that OEMs could eventually represent 70% of all ASD sales.

Sales in 2001 and 2002 were somewhat lower than anticipated by MagnaDrive, primarily due to the ongoing recession in 2001 and 2002. However, relative to the performance of the overall speed control market and the general state of the U.S. economy, MagnaDrive's recent performance has been outstanding. According to revised data released by the Bureau of Economic Analysis on July 31, 2002, the 2001 recession was deeper and longer than originally estimated, with the manufacturing sector among the hardest hit.

⁶ Table II.2 focuses on ASD sales, but does demonstrate that MagnaDrive also had 49 MGD/MGTL coupling sales in 2002, compared to 141 sales of ASDs.

**Table II.2
MagnaDrive Sales, October 1999 through December 2002**

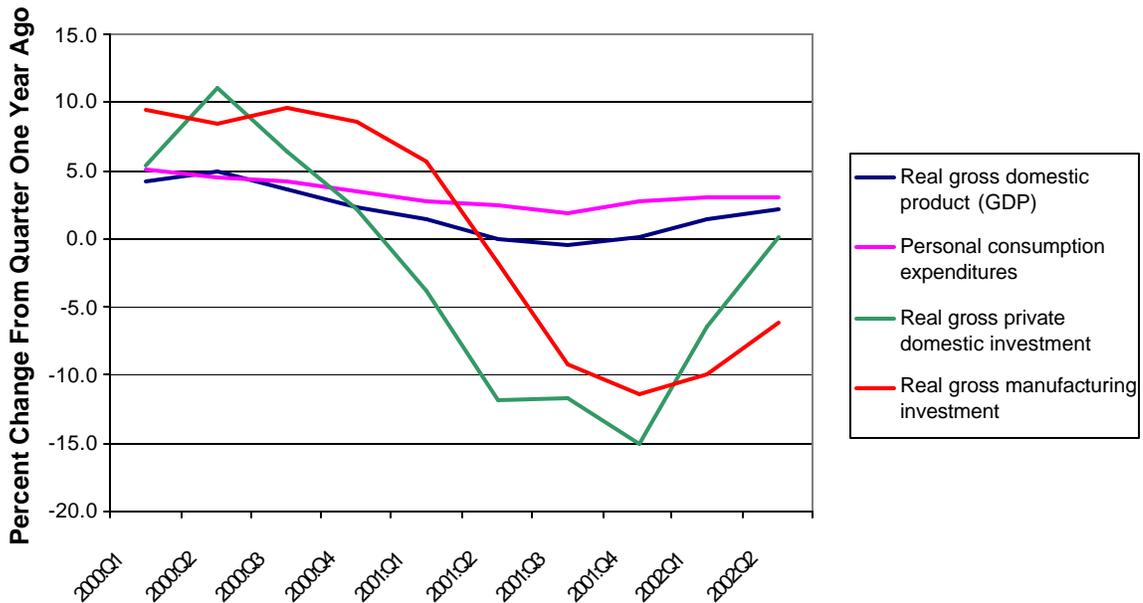
Year	Oct-Dec 1999	2000	2001	2002	Total	% of Total
Total ASDs Sold	5	25	50	61	141	
Industry*						
Water/Wastewater	1	12	31	28	72	51%
Pulp and Paper	1	2	1	2	6	4%
Irrigation	0	3	3	6	12	9%
Industrial	0	1	5	7	13	9%
HVAC	2	1	6	5	14	10%
Energy Generation	0	2	0	0	2	1%
Other	1	5	4	13	23	16%
Application						
Fans	1	3	6	4	14	10%
Pumps	4	17	37	30	88	62%
Other (compressor, blower)	0	5	7	27	39	28%
Horsepower						
Under 100 HP	2	11	24	35	72	51%
100 HP or more	3	14	26	26	69	49%
Utility Location						
Northwest	5	23	30	14	72	51%
Other location	0	2	20	47	69	49%
Sales Mix						
Distributors	0	0	4	22	26	18%
OEM	0	0	3	5	8	6%
Direct	5	25	43	34	107	76%
ASD vs. MGD/MGTL**						
ASD	5	25	50	61	141	74%
MGD/MGTL	0	0	14	35	49	26%

* Some applications span more than one industry

** The couplings (MGD and MGTL) were introduced in 2001

Figure II.3 depicts the economic situation faced by MagnaDrive. The graph shows that real GDP declined in the first three quarters of 2001, followed by a slow recovery. Personal consumption expenditures have increased throughout the period, while private and manufacturing investments have been very hard hit. Indeed, manufacturing investment fell for five consecutive quarters, with an average decline of 9% over the last year.

Figure II.3
Key Economic Indicators, 2000-2002



Source: U.S. Bureau of Economic Analysis, July 2002.

A press release by Drives Research Corporation (DRC)⁷ dated April 24, 2002 suggests that the adjusted speed market suffered heavily along with the general manufacturing sector, with a double-digit decline in 2001. In addition, the National Electrical Manufacturers Association (NEMA) reported that the Primary Industrial Control Index and the Primary Industrial Control and Adjustable Speed Drives Index fell 11 percent and 10.5 percent, respectively, in the fourth quarter of 2002.⁸

This market decline stands in stark contrast to recent projections – even those that take the recession into account – showing ASD sales growth in the 5%-10% range. According to the ARC Advisory Group, a consulting and research firm, the market for high power AC drives is projected to grow at a 7.4% annual rate through 2006. DRC is predicting a rebound for growth in 2002 and 2003 (4%-7% annual growth), and average growth of nearly 6% through 2006.^{9,10} While ASD sales may indeed resume robust growth, it is also possible that continued slow manufacturing investment may plague this

⁷ www.drivesresearch.com

⁸ National Electrical Manufacturers Association. *NEMA's Fourth Quarter 2002 Industrial Control Business Indices Dip to End the Year*. Rosslyn, VA. NEMA, 2003.

⁹ *High Power AC Drive Worldwide Outlook Market Analysis and Forecast Through 2006*, ARC Advisory Group, November 2001.

¹⁰ *AC Drives Outlook for North America 2002-2006*, Drives Research Corporation, March 2002.

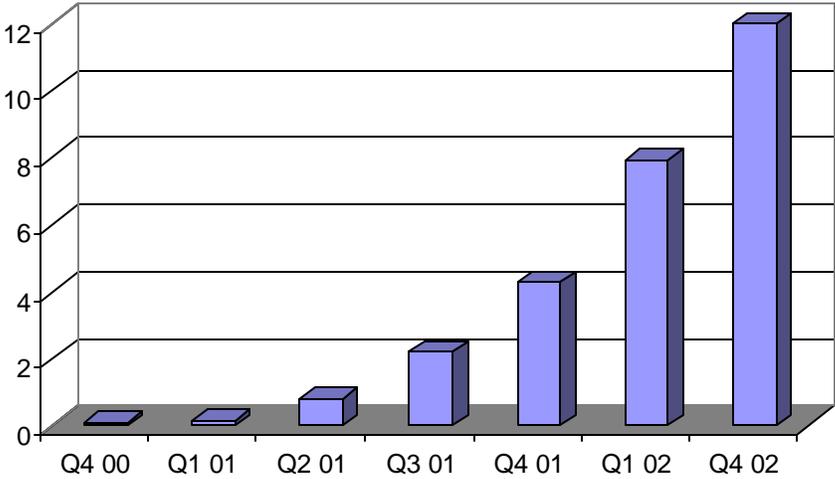
market. Indeed, macro-economists continue to debate whether a “double-dip recession” will occur, and the Federal Reserve has reduced interest rates further in its ongoing effort to stimulate an ailing economy. We therefore view the projected rebound of the ASD market as an optimistic scenario.

In the Pacific Northwest, the total number of pulp and paper facilities has fallen to about 30 from the 40-plant figure reported in the first MagnaDrive MPER. Two large mills shut down (Georgia Pacific in Bellingham, Washington, and Abitibi in Steilacoom, Washington) and several plants have curtailed production or have permanently shut down portions of their facilities.

Considering the state of the manufacturing sector both in and outside the Northwest, MagnaDrive’s sales performance has been strong. Year 2001 ASD sales more than doubled while the national ASD market experienced the aforementioned double-digit decline. MagnaDrive’s ASD sales increased at a 22% rate so far in 2002, despite the industry decline cited above. There are a number of other encouraging signs for the future despite the general state of the economy.

First, all of the 1999 and early 2000 Alliance-sponsored demonstration sites have placed additional orders with MagnaDrive, and most major customers are also now placing repeat orders. Second, as shown in Figure II.4, the value (in dollars) of quotes continues to increase dramatically by quarter, sometimes increasing by over 100% from one quarter to the next in 2001. The total value of quotations has increased dramatically in the last two years, rising from about \$0.7 million in the second quarter of 2001 to approximately \$12 million at the end of 2002.

Figure II.4
Quotes by Quarter (\$ millions)



MagnaDrive revenues have followed the sales pattern summarized in Table II.2. Company revenue totaled \$105,000 in 1999, \$552,000 in 2000, \$1,097,000 in 2001, and approximately \$2.3 million in 2002.

Perceived Market Barriers

MagnaDrive management identified a number of market barriers that continue to pose challenges, including:

- ⇐ ***Disruptive technology.*** MagnaDrive management felt that their product continued to be perceived as a “disruptive technology” – one that disrupts the status quo – thus lacking full acceptance by the market place. They felt many of their potential clients remained risk averse, with a fear of adopting what is still perceived as a new technology.
- ⇐ ***Common bidding practices.*** Some contractors have been reportedly inflating the true installation cost of the MagnaDrive ASD in comparison with VFDs. MagnaDrive management believes this problem is most likely a byproduct of the “disruptive technology” perception, reflecting the “buddy” network that has developed in the industry. They are actively working with distributors and contractors to alleviate this problem (one method is to itemize the installation cost so that the inflated cost can be more easily flagged and corrected).
- ⇐ ***Increasing staffing needs as the business grows.*** MagnaDrive management feels that the Company will need more staff to assist them with preparation of technical data for bids, particularly as the number of bids increases. Customers have expectations for a quick turnaround time for drawings/specs, yet MagnaDrive staff is often “stretched thin.”
- ⇐ ***Lead time.*** While the couplings will be a stock item (“off the shelf”), the ASDs are still custom built and require lead time. MagnaDrive has been successful in reducing the lead time to under a week in some cases, but, in a scenario where a potential customer has a current motor system fail and needs to replace the system immediately, a week may be too long.

Recommended Changes to the Alliance's Cost-Effectiveness Assumptions

Another objective of this third MPER is to review and comment on the assumptions used by the Alliance in its cost-effectiveness calculations.

Consistent with the second MPER, we recommend a number of changes to the Alliance cost-effectiveness calculations, including:

- ⇐ Average energy savings used by the Alliance are conservative at 18%. Our review of the Phase 1 research conducted by OSU suggests that the savings are approximately 23% for fans and 30% for pumps. An increase to 25% in the Alliance model would be consistent with the figures used in the LCC analysis reported here.
- ⇐ Non-energy benefits have not been included to date in the Alliance's cost effectiveness model. The LCC results show that non-energy benefits are sizeable, with a value of approximately 50% of the energy benefits in retrofit applications. We recommend that this figure be used in future calculations.
- ⇐ The Alliance is currently using a MagnaDrive lifetime estimate of ten years, while Quantec used a figure of 15 years. While both figures are within the possible range for this new technology, the Alliance may want to consider increasing its lifetime to 15 years to maintain consistency with the second MPER.
- ⇐ We recommend that the Alliance revisit market size, market share, and projected sales assumptions. The current projections are based on earlier Phase 1 research. The new projections should account for the impact of the current economic climate, and should adjust for actual sales from the past two years.

Summary and Recommendations

MagnaDrive has implemented and moved beyond the recommendations from the Alliance's *First Market Progress Evaluation Report for the MagnaDrive Coupling – Phase II*. Table II.3 summarizes our major recommendations from that report, and MagnaDrive's subsequent actions.

MagnaDrive has also attempted to work with the utility industry, both within and outside the Northwest, to promote the Company's ASDs through utility-sponsored incentive, facility audit, education, and marketing programs. It is interesting to note that, despite MagnaDrive's relationship with the Alliance, successful case studies with the Alliance and the U.S. Department of Energy, and the other efforts noted here, the Company has had little success making inroads with Northwest utilities, and utility-sponsored incentives have been very limited. Both Quantec and MagnaDrive have heard erroneous quotes from utility managers like "it is still an experimental technology" or "it isn't as good as a VFD." One Alliance Board Member utility apparently will not pay rebates for ASDs; in that program VFD technologies (but not ASDs) qualify for incentives.

**Table II.3
Disposition of Recommendations from First MPER, Phase II**

Alliance/Quantec Recommendations	MagnaDrive Corporation Actions
Additional investment in market promotion should be focused on lead generation, trade show participation, and providing selling tools to direct and channel marketing partners	Attendance at trade shows has expanded and proven extremely successful. MagnaDrive reports that the credibility of the company continues to improve each year as they attend more trade shows; repeated attendance helps dispel concerns about the financial health of the company or the applicability and reliability of their products. MagnaDrive's distributor focus and training (including sales tools), OEM contracts, and recent sales showing 75% from non-direct sales demonstrate the success of this sales diversification effort.
Educate prospects and the market through third-party endorsements (e.g., engineering firms, case studies, trade journal articles)	MagnaDrive was the <i>IndustryWeek</i> technology of the year for 2001 and was featured in <i>Compressor Tech</i> , <i>Compressor Tech Two</i> , <i>Engineered Systems</i> , <i>WaterWorld</i> , <i>Sales & Marketing Management and Pumps & Systems</i> . Articles are pending in <i>Water Environment & Technology</i> , <i>Plant Services</i> , and <i>Appliance Manufacturer</i> . MagnaDrive now has case studies and application reports spanning six markets (water/wastewater, pulp and paper, irrigation, HVAC, power generation, and mining) with two to five distinct studies in each market.
As identified in the company's business plan, develop a U.S. distribution system	MagnaDrive's regional sales system is now in place and is providing lead generation throughout the country.

The Alliance is in a unique position to capitalize on its expertise and relationships with the region's utilities to further promote MagnaDrive ASDs. Specific near-term action items the Alliance should consider implementing include:

- ⇐ ***Place promotion of MagnaDrive ASD on par with internal project administrative reporting.*** The MagnaDrive ASD is now a proven technology. Alliance-sponsored research has already shown that the savings and performance are real and that there are certain parts of the market where the MagnaDrive ASD is superior on a life-cycle cost basis against VFDs, especially retrofit motor applications. Specific promotional activities may include:

 - Presenting findings at Alliance Board meetings and obtaining member "buy-in" into including and promoting the MagnaDrive ASD within utility facility audit and incentive program offerings

- Working with the Regional Technical Forum to “deem” savings and demonstrate cost-effectiveness
 - Facilitating MagnaDrive contacts with other industry organizations such as the Electric Power Research Institute (EPRI)
 - Jointly presenting results with MagnaDrive at utility-industry/energy-efficiency industry conferences
- ⇐ ***Alliance implementation staff should spend more time on-site at MagnaDrive’s Seattle headquarters.*** In order to fully understand MagnaDrive’s needs and communicate opportunities in the utility industry, the Alliance’s project manager will require more direct interaction with MagnaDrive. We recommend spending a few days (up to a week) per month as a starting point, with an overall goal of moving forward with the items in the previous bullet.
- ⇐ ***Intervention of the Alliance Director and senior staff as needed.*** If the above activities result in the refusal of Northwest utility commercial and industrial program managers to include MagnaDrive ASDs in their programs, we would recommend that senior Alliance staff get involved, particularly for the region’s largest utilities and Alliance Board member utilities.

In technology diffusion parlance, the MagnaDrive ASD has moved beyond attracting pure innovators and early adopters. The Alliance’s adoption of these recommendations will ensure that the region’s utilities recognize the progress made to date. It will also level the playing field by ensuring that the MagnaDrive ASD is not placed at a competitive disadvantage in terms of utility-sponsored incentives, a key component of the next stage of MagnaDrive’s market transformation process.

III. 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.

Study Design

As shown in Table III.1, Quantec spoke with a total of ten purchasers and five non-purchasers of MagnaDrive.¹¹ Sample lists were prepared from the MagnaDrive sales and marketing database. An attempt was made to reach a diverse group of industries, one-time/repeat customers, and early/more recent customers. All interviews were conducted with respondents from the Northwest (Washington, Oregon, Idaho, or Montana).

The purchaser/non-purchaser interviews followed a discussion guide, included in Appendix B, and covered a number of topics, including:

- ← Perceptions about MagnaDrive and the speed control market
- ← Primary reasons for purchasing or not purchasing MagnaDrive (market drivers and market barriers)
- ← Satisfaction with MagnaDrive marketing, sales, installation, and performance
- ← Market potential for MagnaDrive

¹¹ Non-purchasers refers to sites that received bids from MagnaDrive but have not yet purchased a MagnaDrive ASD.

**Table III.1
Purchaser and Non-Purchaser Respondents**

	Purchasers	Non-Purchasers
Total	10	5
Industry*		
Water/wastewater	3	1
Pulp and Paper	1	2
Irrigation	4	0
Industrial	1	2
Mining	1	0
Repeat/One-Time		
Repeat customer	5	NA
One-time order	5	NA
Year of First Purchase		
1999-2000	4	NA
2001-2002	6	NA
Location		
Washington	7	3
Oregon	2	2
Idaho	1	0

Quantec also spoke with all five Northwest distributors of MagnaDrive products.¹² MagnaDrive began allowing distributors to carry the ASD in just the last 12 months, and all but one of the distributors had already sold one MagnaDrive ASD, and three of the five had already sold two or more ASDs (Table III.2). In addition, the distributors focused on a variety of industries, including agriculture, water/wastewater, and industrial applications.

**Table III.2
Distributor Respondents**

Distributor	Respondent State*	Number of ASDs Sold	Primary Industries
Distributor 1	Idaho	3	Agriculture
Distributor 2	Washington	6	Water/wastewater
Distributor 3	Montana	0	Water/wastewater
Distributor 4	Oregon	5	Water/wastewater
Distributor 5	Idaho	2	Industrial

* Distributors may have offices or operate in additional states.

¹² There were only five Northwest distributors offering MagnaDrive at the time of this research. See Appendix C for the discussion guide.

Findings

Perceptions about MagnaDrive

Both purchasers and non-purchasers learned of MagnaDrive from a variety of sources, including “cold calls” from MagnaDrive, word of mouth, trade shows/conferences, and brochures.

A number of the respondents reported that they were somewhat skeptical of the technology at first, but seeing a demonstration (either on-site with a demonstration unit or at an existing customer site) typically allayed their concerns. In fact, many of the respondents said that they were immediately impressed by the technology after seeing a demonstration. The truck unit, in particular, was cited as a quite convincing demonstration – an effective “hook” to heighten both their interest and trust in the technology. Seeing existing customer sites then solidified their interest in the MagnaDrive.

Some of the proponents of MagnaDrive, however, still encountered resistance from others within their organization that feared being an early adopter of what they perceived as a new technology.

Purchasers were all pleased that MagnaDrive continues to “check in” with them periodically to see how their product is performing. Non-purchasers stated that MagnaDrive sales and marketing staff were extremely helpful as they developed their bids and that they appreciated that MagnaDrive continues to provide them updates about the technology and new installations. None of the non-purchasers felt MagnaDrive staff was overly aggressive in its sales approach.

One interesting finding was that non-purchasers spoke positively not only about the company, but also about the product. Of the five non-purchasers we spoke with, four are still hoping to secure funding to purchase a MagnaDrive ASD. Only one non-purchaser had rejected the MagnaDrive in favor of a VFD, and even this respondent stated that he did so on the recommendation of a consultant who felt that MagnaDrive was too new a technology. Faced with the same choice today, he felt that his organization might have made a different decision, since MagnaDrive now has an established presence in the marketplace. Other non-purchaser comments worth noting include:

“I was tremendously impressed by the MagnaDrive and think it has tremendous potential.”

“MagnaDrive staff has been extremely helpful. They came to the plant site, made a presentation. I’ve had excellent dealings with them.”

“I’ve had a good experience with MagnaDrive; they’ve followed up but have not been overly aggressive.”

“The sales reps were courteous, very helpful.”

Many of the respondents reported an increasing awareness of MagnaDrive in their industries. Both purchasers and non-purchasers believed that MagnaDrive is developing a greater awareness among their co-workers and industry peers, including a greater presence at conferences and trade shows.

Distributors, in particular, felt that an increasing number of their customers are now aware of MagnaDrive (most estimated that at least 60%-70% of their customers were aware). Even more importantly, the distributors reported that some customers are now asking them for quotes that include a MagnaDrive. Two of the distributors, in fact, had clients that asked for MagnaDrive quotes on smaller motors – under 25 HP – knowing that the MagnaDrive would likely cost more than a VFD but might offer some nonenergy benefits they desired. For example, a gold mine thought the installation of a MagnaDrive could alleviate problems caused by poor power quality and a corrosive environment.

All five of the distributors had attended the mandatory MagnaDrive training session and generally found it informative and helpful. However, a few did offer suggestions for improvement, including:

“The training offered good content, but was not structured enough; it needs to be a more formal training program.”

“Generally well coordinated, but I would have liked it focused more by industry. We had people from Idaho doing agricultural/irrigation work which didn’t relate to me.”

“MD is primarily a company with engineers and still hasn’t completely made the transition to sales and marketing. They need to prepare better product specs/information.”

In addition, two of the distributors requested that MagnaDrive include more specifics about what items their quotations include and what items the distributors need to price separately. One distributor faced unexpected costs after assuming a part was included in the price and later “learning the hard way” that it was not.

Market Drivers

When asked about the advantages of MagnaDrive, nearly all of the purchasers, non-purchasers, and distributors we spoke with immediately compared the drive to a VFD. The MagnaDrive, therefore, is still widely viewed as competitive technology to the VFD. Most of the purchasers and non-purchasers, in fact, were conducting facility/equipment upgrades and requesting cost comparisons between MagnaDrive ASDs and VFDs.

With this paradigm in mind – comparing the two speed control technologies – energy consumption was not consistently cited as the main advantage of the MagnaDrive (although it was cited as a benefit by a number of respondents). Nonenergy benefits, therefore, were extremely important in the purchase decision. Respondents mentioned a variety of nonenergy benefits, including:

- ⇐ **Lower maintenance costs.** A number of respondents believed that MagnaDrive, as a simple, mechanical device, would have lower maintenance costs than VFDs (i.e., VFDs require more costly, skilled electrical technicians to work on them). In addition, the vibration control and overload torque protection could reduce the maintenance and downtime on motors (including the need for laser alignment). Plus, respondents felt MagnaDrive might perform better than a VFD in dusty/dirty applications.
- ⇐ **Cushioned soft-start.** Allows users to downsize motors and save energy and peak demand.
- ⇐ **Water savings.** MagnaDrive provides vastly improved flow control for irrigation applications compared to open discharge systems.
- ⇐ **Lower initial cost.** The initial cost of the MagnaDrive tends to be less than VFDs for applications over 75 HP-100 HP, or for medium-voltage applications.

Market Barriers

Despite these market drivers, the interviews with the purchasers, non-purchasers, and distributors revealed a number of market barriers that are impeding sales of the MagnaDrive. At least four of these – low-cost energy, the economic downturn, the perception of MagnaDrive as a nascent technology, and the hegemony of first cost – counter two of the market drivers (energy savings and lower maintenance costs).

Low-cost energy is an obvious deterrent to installing a MagnaDrive or any adjustable speed control device. Decreased cost savings means a longer payback period or return on investment, discouraging some potential customers from purchasing a MagnaDrive ASD. For example, many respondents reported that the energy savings couldn't justify the cost of installing a MagnaDrive in their retrofit applications:

“The cost of the MagnaDrive is too high, we can't make a two-year payback, our cut-off for considering projects”

“We only pay three cents/kWh, so energy savings is not important, and certainly not enough to justify installing the MagnaDrive”

“Energy savings is really just a fringe benefit, as our energy costs are so low.”

“We’d like to install additional MagnaDrives, but the cost is too high and our budget is too tight”

The low energy costs in the Northwest, therefore, magnify the perceived initial cost of the MagnaDrive and reduce the energy savings component to a secondary (fringe) benefit for many current and potential customers.

The cost of the MagnaDrive also appears prohibitive because of the economic downturn. As discussed in the market characterization section, many Northwest companies are facing severe budget shortfalls – particularly in the paper products industry – and cannot currently afford to purchase a MagnaDrive ASD.

MagnaDrive is also still perceived as a nascent technology by many of the respondents. Because this is a new technology, there was a real sense that maintenance costs are unknown. Although most respondents believed (and reported) that the MagnaDrive *should* have lower maintenance costs, few would factor this into any decision to purchase the coupling. So one of the major market drivers is rarely included in any purchase decision, as the risk of adopting a perceived new technology seems to outweigh any potential maintenance savings.

Not only are most market actors not calculating the potential maintenance savings, but two distributors reported that they have seen cases where contractors have *inflated* the cost of the MagnaDrive to account for the unknown maintenance costs. In one case, a contractor prepared a bid for a MagnaDrive and a VFD, yet – for fear of unknown expenses – did not reduce the electrician costs for the MagnaDrive even though it would have required far less electrical work. In another case, a distributor discovered that a contractor had inflated a \$12,000 bid for a MagnaDrive to \$20,000, the same as the competing VFD, to account for other costs they feared they might encounter.

In response to the question of maintenance costs and unknown expenses, respondents reported:

“MagnaDrive is a newer technology; we are approaching it with caution”

“We still question how MagnaDrive would perform in our plant, which is very dusty”

“We still need to learn more about the true O&M costs, ask other operators about their experience, as it’s a newer technology”

“I have seen contractors inflate the cost of the MagnaDrive. They don’t trust it, are worried, and have a fear of the unknown”

“We can’t build reduced maintenance into our costs and benefits since it’s not something we can go the bank on, so we don’t count it or expect it. Farmers, for example, don’t feel they can get a loan for a MagnaDrive based on reduced maintenance costs.”

Aggravating the inability and unwillingness to quantify the maintenance savings was the fact that nearly all of the respondents only conducted a first cost analysis, not a life-cycle cost (LCC) analysis. In fact, of the 15 customers and non-customers we spoke with, only one reported to have prepared a full LCC analysis.

While the apparent lack of maintenance data is one likely reason companies may not have conducted a LCC analysis, many also reported that the funds for purchasing a MagnaDrive are considered a capital expenditure, whereas the O&M budgets are calculated separately. So, even if maintenance savings could be quantified and validated, some potential customers may still not include these savings in any analysis.

Satisfaction with MagnaDrive

Every customer and distributor Quantec spoke with provided overwhelmingly positive reviews for MagnaDrive customer support and performance. Respondents were extremely satisfied with the competence, professionalism, and personal attention they received from MagnaDrive staff, and three respondents even stated that they were “tickled to death” with the product.

A number of the interviews were conducted with “beta” sites (some of MagnaDrive’s first customers), a few of whom required additional customization of the drive for proper performance. Even these customers offered only positive remarks about the responsiveness of MagnaDrive sales, installation, and support staff.

The high level of satisfaction can also be measured by the number of repeat customers: five of the customers we spoke with had followed their initial order with a repeat order for a MagnaDrive. In addition, four of the five “single purchase” customers said they hoped to order additional MagnaDrives (one customer came within a day of placing a second order but canceled the order because of economic concerns; others also cited budgeting concerns).

All the purchasers of MagnaDrive – including the beta sites that required additional customization – reported that the MagnaDrive was working as expected and had no unexpected or hidden costs (MagnaDrive performed all the customization work for the beta sites).

In terms of unexpected advantages, two irrigation customers reported that the ditch riders are now much happier, as all they need to do is check on the

MagnaDrive, where previously they had to manually adjust the pumps to achieve proper pumping levels.¹³

The purchasers also reported that the MagnaDrive has required only routine maintenance, such as lubrication. Three respondents believed that their maintenance costs had decreased as a result of the MagnaDrive, but none of these had attempted to quantify the savings.

Some of the purchaser comments included:

“Everything went extremely well. Customer satisfaction is extremely important to us, and MagnaDrive demonstrated this right ‘out of the shoot.’ We expect good service and get it from MagnaDrive.”

“MagnaDrive staff provided great training, I have nothing but good things to say.”

“All excellent. MagnaDrive staff have good communications, they are responsive, less than 24-hour response time. One of my staff members even left to join MagnaDrive. I’ve received such excellent service from MagnaDrive...in return I gives tours of our facility and speak about MagnaDrive when potential clients have questions.”

“MagnaDrive stands by their product; they want to make sure we are a happy customer. They will stick with it and keep us happy.”

“MagnaDrive even brought up performance issues with us – we weren’t concerned – and made adjustments to the drive. If I wasn’t working here I’d probably be working for MagnaDrive.”

“MagnaDrive has been extremely cooperative, handled the entire installation process from start to finish.”

“The company has a great work ethic and talented staff. The caliber of people is excellent.”

[FROM A DISTRIBUTOR] “Our client is ‘tickled to death’ with the product. With VFDs they had problems [because of a corrosive environment], but the MagnaDrive is great. People are flabbergasted at what it can do.”

¹³ The respondent mentioned that, with only one MagnaDrive, they don’t see a sizable impact on reduced staff time.

A number of other, more minor disadvantages to the MagnaDrive were mentioned, including:

- ⇐ **Noise.** The cooling fans can be quite loud. MagnaDrive is developing a shroud to help alleviate this problem.
- ⇐ **Motor alignment.** One purchaser reported that lining up the motors can be difficult. Apparently MagnaDrive is working on a flange to help solve this problem.
- ⇐ **Range of speed control lower than expected.** Two customers expected a greater range of speed control, and felt the MagnaDrive ASD didn't offer as broad a range as a VFD.

Market Potential

Based on the overwhelming satisfaction of MagnaDrive purchasers and the extraordinary level of interest from non-purchasers and distributors, the respondents we spoke with clearly think that MagnaDrive has a bright future.

The five distributors we spoke with were all making aggressive efforts to sell the MagnaDrive: most reported that they are introducing bids for MagnaDrive in 100% of the cases where they deem it is applicable, even if customers aren't aware of it. Having these additional "champions" of the product speaking with potential customers should lead to increased awareness, confidence, and sales of the product in the coming years. MagnaDrive has effectively multiplied the size of its sales force by teaming with these distributors, who reported:

"MagnaDrive will likely be a Fortune 500 company in five years"

"Sales in the next five years will be great, as ASD sales continue to increase from 3% five years ago, 15% now, and 25% in five years"

"Sales will continue to grow at an incredible rate, I may overwhelm them! We are filling the 'quote barrel' now, which will lead to many more sales. We have more sales people in the Northwest than all MagnaDrive sales force. They'll get more exposure now. We will keep 'hammering away.' You cannot refute the technology, it is a matter of time before it catches on."

"Sales will continue growing as people are asking for it now. A lot more people are selling MagnaDrive now, we're even competing with other distributors now for business. Sales will go up as it's more proven, more people will get on bandwagon. No one wants to be first to use it. In one recent sale an electrical engineer recommended it, which meant he wouldn't be involved in the project, but he saw what it could do and likes it."

In terms of strategies for increasing sales, most respondents stated that MagnaDrive should continue to move forward with their current “go to market” approach, which includes attending trade shows, cold calls, OEM partnerships, etc. All respondents felt that they generally had the MagnaDrive materials – case studies, product materials, etc. – they needed to make an informed decision, and they believed these materials were professional in content and appearance.

A number of customers, however, stated that Alliance or utility funding was critical in their purchase decision, and non-purchasers continued to look for funding assistance. One non-purchaser even asked if the Alliance or MagnaDrive could assist them with identifying utility or other funding sources.

One distributor also requested that MagnaDrive make the demonstration units more affordable for the distributors/sales people. This distributor believed that each sales person should carry a table-top demonstration unit in their car with them, and that larger demonstration units, currently selling at \$6,000-\$8,000, should either be more reasonably priced, offer extended terms, or be available as rentals.

Summary of Findings and Recommendations

⇐ **Finding.** Customers are learning about MagnaDrive from multiple resources, including word of mouth, conferences/trade shows, cold calls, and brochures. No one source stood out as the primary method.

Recommendation. MagnaDrive should continue to cost-effectively balance marketing resources and institute an array of marketing approaches, as multiple strategies appear to be effective. It may be too early to heavily favor one marketing approach, and is better to continue to balance marketing resources.

⇐ **Finding.** Many of the respondents reported that seeing a demonstration of the product was an influential turning point in their acceptance of the product. Distributors also stated that they could use the demonstration to heighten interest in the product.

Recommendation. Make the demonstration units – both the table-top and larger units – more affordable for distributors.

⇐ **Finding.** Nearly all of the respondents only conducted a first cost analysis, not a LCC analysis.

Recommendation. MagnaDrive could assist interested potential customers in calculating a LCC analysis, attempting to quantify O&M savings and other non-energy benefits.

- ⇐ **Finding.** Some contractors may be inflating the cost of the MagnaDrive because of the fear of unknown expenses.
Recommendation. MagnaDrive should educate potential customers to request itemized, not aggregated, project bids, with clear explanations of project costs.
- ⇐ **Finding.** Although most respondents believed (and reported) that the MagnaDrive *should* have lower maintenance costs, few respondents would factor this into any decision to purchase the coupling; the risk of adopting a perceived new technology seems to outweigh any potential maintenance savings.
Recommendation. Case studies should make a point of demonstrating and quantifying reduced maintenance costs resulting from MagnaDrive ASD installations. MagnaDrive sales force should also assist clients in calculating the potential reduction in maintenance costs. Even if they don't calculate life-cycle costs they can at least consider it qualitatively.
- ⇐ **Finding.** Cost tends to be the number one reason that companies are not placing initial or repeat orders. The low cost of energy (increasing payback periods), and the slow economy accentuate this market barrier.
Recommendation. MagnaDrive needs to continue to attempt to lower product costs, and should also assist customers in trying to work with utilities or other entities to locate third-party rebates and/or financing.
- ⇐ **Finding.** Distributors are making aggressive efforts to sell the MagnaDrive, preparing many bids and effectively multiplying the size of its sales force.
Recommendation. Continue setting up a cost-effective arrangement with distributors, as these “champions” of the product will lead to increased awareness, confidence, and sales of the product in the coming years.
- ⇐ **Finding.** The MagnaDrive sales and support staff receive strong accolades from distributors, purchasers and non-purchasers alike.
Recommendation. Continue “touching base” with current customers and potential customers on the appropriate level of interaction with MagnaDrive. It fosters continued confidence and respect of the company and technology, increasing the likelihood of future sales.

← ***Finding.*** Distributors generally found the training session informative and helpful but felt that it could be improved.

Recommendation. MagnaDrive should add more structure, or formalization to their training. MagnaDrive also needs to make it clearer in the training what items they include with the coupling pricing and what items distributors need to price separately.

Appendix A. MagnaDrive Staff Interview Instrument

1. How has MagnaDrive been doing over the past year and what have been major changes and highlights?
2. Capitalization and funding? Has it been secured? How much? How long will it cover MD for?
3. How is the manufacturing process working out? Challenges? Highlights?
4. How is the new sales and distribution organization working out? Challenges? Highlights? (Compare to Shareholder Meeting Report)
5. Excluding the high HP ASD how have the ASD product offerings changed (e.g., a year ago the range of 1800 RPM motors covered was 25-300 – what is it now)?
6. Have there been any major changes in the product design in the lower HP ranges? What has driven these changes (e.g., cost reduction, customer demands, etc.)?
7. How has work on the High HP ASD (the B Drive) been progressing and what have been the major challenges? Are savings rates similar to the lower HP ranges?
8. Do you view the MGD/MGTL coupling as a competing product, sales neutral, or will it help foster sales of the ASD?
9. In ASD sales what have been the major highlights in the past year (e.g. M-I Swaco sales agreement of 300 units, two sales to Gardner Denver, Micron Technology promise that “all fans will be outfitted with MD,” etc.)?
10. What have been major challenges over the past year?

Probe for impacts of...

- General economy vs. specific industry downturns
- Price competition from VFDs
- Customer bias towards VFDs (especially in medium- voltage applications)
- Perceived risk of adopting new technology
- Misperception of what MD ASD is (e.g., an eddy drive)
- Perceived payback (insufficient models to show savings)

- Insufficient distribution/support network
 - Limitations to MD (e.g., no software to hook into plant automation software)
 - Long sales cycle for industrial customers
 - Any other factors influencing sales of MD
11. What are MagnaDrive's strategies for increasing sales?
 - Focus has been on Water and Waste Water – any new markets or applications?
 - Role of high HP models?
 - Marketing plans? What are the plans and what industries and channels are the primary focus?
 - Is the recognition that MD is garnering in the press working to its advantage?
 - Any new partnerships, purchases, or merger plans?
 - Do you have any revised, specific sales goals?
 - What is MDs pricing strategy and what type of discount is it offering wholesalers and bulk buyers?
 - Where do you see MD in five years? Ten years?
 12. How are potential customers perceiving the MagnaDrive ASD?
 13. Do you believe your current customers are satisfied with MD?
 - What improvements could be made to increase customer satisfaction?
 - Why do you feel some customers (e.g., Ponderay) have not placed new orders (e.g., Sales cycle slow, view MD as niche application, still testing the MD, payback insufficient, etc.)?
 - How long does it usually take for a second sale?
 14. OEMs: How does MD perceive the growth potential in the OEM market?
 15. Does MD see any major changes in costs to support reduced prices? What sources (e.g. lower input costs, economies of scale in production, simplified design and resulting lower parts count)?
 16. Were you able to use the Quantec LCC model?
 17. What are the greatest challenges facing MagnaDrive?
 18. What are your perceptions about the Alliance's role in MD?
 19. How has your interaction with the Alliance been? Areas for improvement or change?

Appendix B. Customer and Non-Customer Interview Instrument

Name: _____ Date: _____

Company: _____ Phone: _____

Position: _____ Interviewer _____

Type(s) of MD Purchased/Date(s) of Purchase: _____

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 market research for MagnaDrive, and are working closely with MagnaDrive staff. We are not selling anything; we are only conducting research.

[ASK ALL RESPONDENTS; if this is a past respondent thank them for previous participation and ask if anything has changed in the past year and a half.]

- How did you first learn of MD?
- What do you see as the primary advantages of MD? (probe for shock and vibration control, simplicity, no additional space requirements, etc.)
- What do you see as the primary disadvantages of the MD?

[ASK OF ALL PURCHASERS ONLY]

Factors in the decision to purchase a MagnaDrive:

- What was the main reason you decided to purchase the MD (e.g., speed control, process control, reliability, reduction in O&M, energy savings)?
- (If not mentioned) Was the MD purchased to resolve a specific motor system problem or as part of a facility upgrade?
- Did the MD have features that were needed for a specific application?
- What MD features were the most compelling?
- What role did economics (both energy and non-energy benefits/costs) play in the decision?
- What role did marketing materials (e.g., case studies), or presentations (truck, in-person, at an existing site), or testimonials play in the decision?

- [FOR CUSTOMERS WITH ALLIANCE FUNDING] How influential was Alliance funding or support in the decision?
- [FOR CUSTOMERS THAT ONLY MADE ONE PURCHASE] Why have you not purchased a second MD coupling? Do you have plans to purchase a second?
- [FOR CUSTOMERS THAT MADE TWO OR MORE PURCHASES] What were the primary reasons for purchasing more than one MD? Do you have plans to purchase additional MDs?

Satisfaction with MagnaDrive:

- How satisfied are you with the ordering process? What could be improved?
- How satisfied are you with the installation process? What could be improved?
- Have you contacted customer support? [IF YES] What for? How satisfied are you with customer support? What could be improved?
- Have there been any unexpected or hidden costs with the MD?
- How satisfied are you with the MD performance?
- Is MD working as expected?
- Have there been any unexpected advantages or disadvantages to using the MagnaDrive?
- Has the MagnaDrive required much maintenance?
- Have you seen a change in maintenance costs as a result of installing the MD? Can you quantify these savings? [GET AS DETAILED AN ESTIMATE AS POSSIBLE FOR THESE COSTS, BOTH PRE- AND POST-MD INSTALLATION]

[ASK ALL NON-PURCHASERS AWARE OF MAGNADRIVE; IF CUSTOMER IS NOT AWARE OF MAGNADRIVE ASK FOR DIFFERENT CONTACT AT COMPANY THAT WOULD BE AWARE OR TERMINATE INTERVIEW]

- Why did you not purchase the MagnaDrive (e.g., no applications, too expensive, no current funds, risk aversion, product features that MD did not have, or features not meeting purchasing criteria)?
- What product solution, if any, was selected?
- What product information would be helpful in your decision (e.g. appropriate applications, more information, a longer product track record, testimonials)?
- What economic and non-economic information would be helpful in your decision (e.g., life cycle cost comparisons, simple paybacks, energy saving benefits, non-energy benefits)?
- How has your experience been with the MD sales/marketing staff?

[ASK ALL RESPONDENTS]

Use of motors in the facility:

- How many motors used (over 100hp), horsepower distribution, types, age, etc.
- Voltages used in the plant for motor drive
- How many motors over 250 hp use medium voltage?
- Motor O&M
- Do you have any recurring problems with your motors?
- Can you estimate your O&M costs for your motors? [TRY TO GET ANNUAL ESTIMATES WITH AS MUCH DETAIL AS POSSIBLE]

Use of speed control in the facility:

- What percentage of your motors would benefit from speed control?
- What percentage of your motor systems are throttled using valves, dampers, or bypass systems?
- Have you considered installing speed control devices on these systems? Why or why not? [PROBE]
- What percentage of motors have speed control devices like VFDs, Eddie Current Drives or DC type drives?
- Are you satisfied with your current speed control devices?
- How would you compare the MD against the conventional VFD? Any particular advantages or disadvantages of the MD vs. a VFD?
- What percentage of your variable loads would see as applicable to MD?

Factors in the decision to purchase a motor or speed control device:

- Review of the factors considered in purchase – price, energy savings, process improvement – and which ones are the most important by various use situations.
- Role of energy efficiency and use of decision criteria such as payback period, life cycle costs, etc.
- Staff who make the final decision and influence it – process engineering, facilities engineering, purchasing, headquarters engineering, etc.
- Field support needed with drive products – field tech support, parts supply, etc.

[ASK ALL RESPONDENTS]

Background on the customer:

- Type of role the respondent has in his/her company
- General background – engineering, production, etc.?

Type of business and the specifics of the operation:

- Products produced or service provided
- Scope of the business – size of the plant, production levels, number of plants, FTEs, etc.
- Structure of plant within the total corporate organization
- Ties to headquarters, particularly in the technical area (i.e. technical support available)
- Do you have a staff person responsible for energy and energy efficiency?
- What do you feel are the best ways to reach other members of the industry with information about the MD?
- [IF NOT MENTIONED] Are there any trade associations or publications that you find most useful?

Thank respondent for taking the time for the interview.

Appendix C. Distributor Interview Instrument

Discussion Guide for Distributors

Name: _____ Date: _____

Company: _____ Phone: _____

Position: _____ Interviewer: _____

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 market research for MagnaDrive, and are working closely with MagnaDrive staff. We are not selling anything; we are only conducting research.

General Background Information

- What primary industries does your company sell to?
- How would you define your business? (Products/services provided)

Awareness and Perceptions of MD

- How long have you been selling MD?
- [If MD cannot provide sales then ask] How many MD's have you sold? How many MGD's?
- How did you first learn of MD?
- When did you do the training?
- Did you find the training informative?
- Any recommendations for improving the training program?
- What do you see as the primary advantages of MD? (probe for shock and vibration control, simplicity, no additional space requirements, etc.)
- What do you see as the primary disadvantages of the MD?
- How would you compare the MD against the conventional VFD? Any particular advantages or disadvantages of the MD vs. a VFD? (Compare on: installation costs, O&M costs, longevity, reliability, etc.)
- Approximately what percentage of your customers are aware of MD? (if necessary clarify: "before being told about it")
- How do these customers typically learn about MD?

- Have any customers specifically asked for quotes for MD products?
- To what percentage of your customers have you actively tried to sell the MD?
- What methods have you used to sell and market the MD? (Probe for presentations/sales calls, marketing materials, etc.)
- Have you attempted to sell MD to those that were previously unaware of the product? (If No ask, “why not?”)
- How do customers perceive the MD? Are they interested in MD? Why or why not?
- Are there any differences in perceptions regarding MD for those that were previously aware of MD and those that were not?

Market for MD

- What percentage of your customers’ variable loads would see as applicable for a MD?
- Where do you see the greatest potential for MD (existing motors without speed control, existing motors with old ASD technology, new motors, motor over/under 100 HP, etc)

Sales of MD

- Do you normally prepare bids – and make sales – directly to the customer or through a contractor?
- Approximately how many bids do you make a year? Approximately how many of these include an option for speed control?
- Approximately what percentage of all your bids involving speed control include an option for a MD product? Why is that?
- What have been the main reasons your customers have decided to purchase the MD (e.g., speed control, process control, reliability, reduction in O&M, energy savings)?
- (If not mentioned) Was the MD purchased to resolve a specific motor system problem or as part of a facility upgrade?
- Did the MD have features that were needed for a specific application?
- What were the primary reasons that some of your customers did not purchase the MagnaDrive (e.g., no applications, too expensive, no current funds, risk aversion, product features that MD did not have, or features not meeting purchasing criteria)?
- What might have helped the sale of the MD (more product information, a longer product track record, testimonials, lower price)?
- What is the greatest challenge to selling MD?
- What would you project unit sales to be in the next 12 months? Five years?

- Do you provide all-inclusive pricing (including installation), or do you itemize pricing so customers can see the costs of MD vs. other project costs?
- [If respondent does not itemize pricing] Why do you not itemize your pricing?

Satisfaction with MagnaDrive

- How satisfied are you with MD marketing support? (including the marketing materials)
- How satisfied are you with the ordering process? What could be improved?
- How satisfied are you with the installation process? What could be improved?
- How satisfied are you with the technical support? What could be improved?
- How satisfied are your customers with the MD performance?
- Are there any unexpected or hidden costs with the MD?
- Have there been any unexpected advantages or disadvantages to using the MagnaDrive?
- Has the MagnaDrive required much maintenance?
- Have your customers seen a change in maintenance costs as a result of installing the MD? Can you quantify these savings? [GET AS DETAILED AN ESTIMATE AS POSSIBLE FOR THESE COSTS, BOTH PRE- AND POST-MD INSTALLATION]

Additional Background Information

- Type of role the respondent has in his/her company
- Scope of the business – FTEs, number of bids/year, number of sales/year, etc.
- How long has your company been in industrial sales? How long selling speed control?
- What percentage of your revenues are from VFDs and other speed control devices?

Marketing

- What do you feel are the best ways to reach other members of the industry with information about the MD?
- [IF NOT MENTIONED] Are there any trade associations or publications that you find most useful?

Thank respondent for taking the time to speak with me today.