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Attocube Systems (Germany)

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This case has been prepared as a basis for class discussion rather than to illustrate either the effective or ineffective handing of a business / administrative situation.

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ATTOCUBE SYSTEMS

Introduction

"And the winner is …", Dr. Dirk Haft, CEO of the Munich company Attocube Systems AG, was on the edge of his seat as the announcement was made *"...Cytonet GmbH & Co. KG in Weinheim!" "Oh well, too bad"*, Dirk thought to himself, especially as the ostentatiously decorated orange-colored reception hall of the Frankfurt Opera House would have matched the company's logo colours so well. Attocube Systems from Munich was a candidate for the German Economics Innovation Award 2006, the world's first Innovation Award®, in the category of 'Start-up'. Hundreds of groundbreaking innovations that were new to the market, or on the brink of being introduced, were being premiered in the categories of Large Corporation, SME, and Start-up to the 2,600 guests in attendance .

"Come on", said Dirk to his business partner, and the CTO of Attocube Systems AG, Dr. Khaled Karrai, *"We're gonna celebrate tonight anyway, we've definitely earned it"*. The two disappeared into the crowds of the ballroom where well-known people from business, politics, academia, culture and society gathered, all guests of the Rhein-Main Business Club and Wirtschaftswoche (Business Week) magazine. What the two entrepreneurs had not noticed was that they were being watched by some merger and acquisition partners who were also in attendance. As Dirk and Khaled made their way to the front entrance, they were approached and just a few words were spoken: "*Our clients at Wittenstein AG would like to talk to you about your company"*, they said. A short conversation, an exchange of business cards, and then these mystery men moved back to the party. This 'coincidental' exchange of pleasantries was long forgotten after about four months. Then the telephone rang…

Introducing Attocube Systems AG

Atocube Systems was founded as a spinoff of the CeNS (Center for NanoScience) at the Ludwig Maximilian University of Munich. In seven years, it became a world renowned partner for top scientific laboratories. Their breakthrough innovation was a patented actuator for precise positioning in the nano realm, it 'pushes-the-envelope' with regard to what is physically and technologically possible at temperatures of minus 270 degrees celsius, in an absolute vacuum among powerful magnetic fields. These actuators and microscopic systems provide a precision and stability that is achieved by no other existing technology today, and are accumulating a market leadership in the fields of semiconductors, biotech, life sciences, telecommunications, and air and space travel. A number of innovative industries are applying this 'enabling technology' to expand their own opportunities in, for example, sensory and microscopic technologies. Such interdisciplinary technology is opening, and taking over, markets that will begin to see growth in the coming years. By 2007, the company had 25 employees and a turnover of around €4.5 million. It won the Bavarian Innovation Award in 2006, was a finalist for the German Economy Innovation Award in 2007, and won the German Start-up Award in 2008.

Dr. Dirk Haft, president and founder of Attocube Systems, remembers how it all got started, and still has a smirk on his face when thinking back.

> *"This company started off very small. Back then, I was writing my diploma thesis for my physics degree, and was mentored by Dr. Khaled Karrai (now the company's CTO). He's one of the sharpest researchers out there, and has fantastic ideas when it comes to creating devices that are simple to use. I was working on one of these kinds of devices back then. There was a guest lecturer from the USA at our institution who at some point came to me and asked if he could buy it. I built a new device for the dissertation, twice for that matter, because of the interest coming from the USA to buy it. Our intention was to pay back to the university in Munich the $50,000 we earned as a way to finance and secure my dissertation. But back then at the end of the 1990's, combining science with business was*

looked down upon. As a result, the administration put all kinds of stumbling blocks in our way, but I stuck with the plan, and after three months of not giving up, I finally had what I wanted. Parallel to my dissertation, I was able to establish Attocube."

Attocube Systems AG was officially entered into the commercial registry in November of 2001. Dirk has since then filled the position of CEO, while Dr. Stefan Reineck has served as a business angel for the company, as well as chairman of the board. Dr. Khaled Karrai serves as a deputy member of the board, while the third board position is occupied by Dr. Hans-Jörg Kutschera, with whom Dirk had studied (see reference Appendix One).

Looking back on the early days, Dirk smiled as he recalled how they managed to get funding for the business:

"In 2000/2001 we submitted our idea at the Munich Business Plan Competition, and won from a field of 160 entries. This competition was a big step in helping to bring our business idea into focus. During the lead-up to the competition, we conducted a little market research. We looked to see what kind of products our competition was offering. We asked customers what kind of solutions their businesses required, etc. The €25,000 in prize money went back into the company. But we were still looking for funding. We had a (theoretical) monetary gap of €600,000. Those were the internet-bubble days and it was pretty easy to get venture capital. There were several instances where we were offered two million Euro with the idea of turning us into a publicly traded company in the not-too-distant future. There was no doubt that such a prospect was enticing, but this is not what makes your technology better. This offer was made to us over and over, and at some point we agreed. The contracts were all drawn up and ready to be signed. But at the last second there was a change of mind. That was in the middle of 2001 when the first signs of the stock market boom were coming to an end. We ultimately never received venture capital or a loan from the bank."

During this time, the team of founders met the business angel Dr. Stefan Reineck, who had very good contacts in the industry. According to Dirk:

> *"It was in this difficult phase that Stefan got involved with us as an investor. He's still with us as a coach.* U*ltimately,we had a total of €200,000 available as start-up capital. €50,000 of this was from us founders, another €50,000 from Reineck. Another €100,000 was provided in the summer of 2002 in the form of a loan Reineck had acquired. We used this for the cash flow we needed for the contracts we were finishing. This loan was already paid back at the end of 2003."*

The founders decided to form the company as an AG (Aktiengesellschaft, the German equivalent of the American Inc.) because it has the advantage of being able to flexibly provide for an increased capital requirement when further expansions occur. It also provides the opportunity for the employees to participate in a company stock option program.

After many years of hard work by everyone involved in the company, Attocube Systems is now active in a number of areas.

1. <u>Innovative Nanotechnology</u>

The rapid progress of modern technology means capitalising on the latest trends and intelligently meeting the demands of new markets with innovative product systems. A key factor to meeting the challenge of this development was having 'top-notch' personnel in the developmental department. It was also decided to take advantage of, and actively pursue, the synergy effects of close cooperation with universities. Khaled Karrai's professorship at the Center for NanoScience (CeNS) in Munich was seen as a key for the training and continued development of those university students studying in the field of nanotechnology. Cooperative projects with institutes of technology, the mentoring of those writing diploma theses, and the financial support of doctoral candidates were seen as an effective, cost-efficient ways to obtain further know-how for the company. In the first years, Attocube Systems opened their office close to the university and Center for NanoScience in order to maximize the synergy effects coming from them.

2. Production

a. Coordinating the external component manufacturing suppliers:

At the start, Dirk and Tobias Lindenberg were responsible for the organisation of, and cooperation with, external suppliers. The flexible management of production to deliver on existing orders was essential, while also achieving maximum cost savings via quantities of scale. Manufacturing costs were agreed upon with the suppliers from the precision mechanics and electronics industries depending on how full the order books were. Complicated processes such as the manufacturing of metal parts (for example, titanium) or the production of electronic switches were contracted out to both domestic and international firms. No great threat of a dependency arose from this; even though the suppliers were required to guarantee predetermined specifications and norms, these were all able to be provided by a multitude of modern enterprises. With all suppliers, the focus is on the flexibility to operate both close to the market and with the customer's best interests in mind. There are very productive cooperation agreements with companies such as Elatec/Epiko (Haar/Ljubljana, electronic control systems), Laux (Munich, precision components), Ertl Precision Engineering (Munich, precision components), and others. Current suppliers are capable of producing, storing and delivering larger quantities when needed as a way to capitalise on economies of scale. This strategy was used in 2005 to reduce purchase prices by as much as 35 percent. Material costs of nano positioners comprise an average of under 35 percent of the sale price. A further decrease of manufacturing costs is expected in the coming years. When asked whether future suppliers will come from places like China or India, Dirk simply shakes his head:

> *"No, I don't think so, at least not for the foreseeable future. Our quantities are way too small for that, and our products have a lot about them that needs to be explained.The search for professional suppliers was a big learning curve for us, especially because we dealt with this internationally right from the start. For example, we used to work together with a shop in Latvia, among other places. This was simply a catastrophe, but we've also established successful cooperations with special suppliers in the international realm, for example specialised technical ceramics shops in*

Switzerland and France, titanium suppliers in Lithuania, piezo suppliers in Denmark and Japan, or electronics developers in Slovenia. We purchase highly specialised components in Switzerland, and large machinery is usually bought on the dollar market. Not too long ago, we set up a company in Berkley (USA) in order to have someone there to not only direct purchasing, but also to promote what we stand for and to communicate our quality concept".

b. Product finishing, testing, and quality control:

The formation of a stable development and production environment was accomplished, among others, by Dr. Christoph Bödefeld, physicist Tobias Lindenberg and economist Florian Hackinger. By their fifth year, the company already had 20 technical and manufacturing engineers working in their production, building and testing their positioners. When things got busy, interns and apprentices helped out by taking care of the simpler tasks. The final product assembly requires the greatest amount of the company's technical know-how, and is therefore preformed by their own employees. The system tests and quality controls help the experiences obtained from them to be quickly and clearly turned into further innovations. Function tests are carried out with only a minimum time investment. Nevertheless, the company must be able to perform low temperature and vacuum tests. To accomplish this, an in-house cooling device (closed cycle cryostat) and a special vacuum facility were acquired at a cost of €200,000. In the early days, monthly laboratory expenses (electricity, coolants, chemicals etc.) were less than €1,000 per month.

As a result of these collective developments, Attocube Systems was now positioned as follows: the company's added value is a result of the creation and design of actuators that are able to perform nano positioning, their component manufacture is contracted, after which the company assembles them into systems, then tests them under extreme conditions, and finally markets them.

Market and Competition – Opportunity and Risk Analysis

When the idea for Attocube Systems was first being developed in 2000, it was estimated that the total market for micro and nano positioning systems was over €300 million. Since that time, there has been substantial growth in the technology of precision positioning (reference Appendix Two) and Dirk had estimated that a variety of opportunities and risks now awaited the company in this market.

1. Opportunities:

As the era of nanotechnology continues to dawn, the ability to position with atomic-level precision will not just be decisive for high-tech research, but for all kinds of industries. The semiconductor industry, for instance, will be able to do even 'finer' work. Smaller, faster processors in all realms that work together with computer-based technology will allow a performance several times faster than former technology could achieve. Biotechnical processes that work to improve and expand the diagnostics and manipulation of biology, medicine, pharmaceuticals, and ecology (environmental monitoring) represent another growth industry. Evidence from the R&D sector of this industry is that ultra-precise, automated positioning at very low temperatures is already possible. The doorway to successful marketing has therefore been thrown wide open. If the competition is not able to bring products to the market that are capable of low temperature applications, Attocube Systems will remain the sole provider in this field. On the other hand, if the competition can achieve this, Attocube Systems will still achieve a leading position and secure an important foundation on the market through its edge in technology.

The company sees a strategic advantage in its proximity to the local university and the current research being done there, which offers a competitive time advantage when it comes to new product development and innovation. Along with its patents, the know-how that Attocube Systems achieves also provides it with unique opportunities. If the company's products can achieve a reputation for reliability, flexibility, and high quality, this could allow the company to emerge as

a business that offers a wide portfolio of positioning, laser, microscopic, analytical and manipulation systems. Space travel and satellite technology would be possible as a new generation of micro satellites will be needed 'en masse' in the future (e.g for data communication) and will have to be equipped with the smallest possible, highly robust, extremely efficient actuators for their mirrors and antenna. As the systems developed by Attocube Systems were also constructed particularly for the extreme conditions that are found in outer space (very low temperatures, vacuum, magnetic fields etc.), they are more than suited to be further developed for extraterrestrial applications. Assuming that Attocube Systems can successfully produce reliable products that meet these requirements, much higher sales prices can be achieved than those shown in Table One (see below), offering the company a further opportunity for rapid expansion.

Table 1: Product Prices with the Planned Price Increases Scheduled for the Second Year

Produktpreisentwicklung (€)		
	Rabattpreis	Preis ab 2. Jahr
Nanopositionierer für Tieftemperatur	9.500	13.000
Nanopositionierer für Raumtemperatur	8.000	10.000
Rastersondenmikroskop für Tieftemperatur	125.000	150.000

2. Risks:

Attocube Systems operates in the markets of micro and nano positioning systems as well as microscopics for modern high-tech industries. Some of the company's current competitors such as TG (Germany), Kingstown (USA) and Kinsley (USA) have access to far greater financial resources, have a comparable depth of competence, and enjoy a much higher level of recognisability than Attocube Systems. The competition has, for the most part, placed its focus on standard solutions. However, Attocube Systems can set itself apart as being a company that provides faster, more flexible product solutions to meet the specific needs of

customers. There is, without question, the chance that one of the large microscope manufacturers will attempt to develop a low temperature technology product. Standing in the way of this are the years of research experience that Attocube Systems already has in this area. However, if this situation should emerge, it is imaginable that Attocube Systems' existing patents can be licensed to the larger competition, or that Attocube Systems could even provide this company with low temperature positioners as an OEM supplier. The devices and components for industrial production are required to pass longer, more intensive load and performance tests than those found in R&D. This industry also has requests and requirements for the products and components within their orders that need to be met. If these types of load and performance tests turn out negative, even amidst continued company development, Attocube Systems will then shift its primary concentration back to its tried-and-tested market of research and development (positioners and microscopics).

Dirk was concerned that the products developed by Attocube Systems could contain hidden defects, causing them to be only minimally accepted on the market. If these products are applied within complex technical systems, their failure can cause economic losses on the part of the client or his final consumer. In turn, this could lead to a decrease in trust in Attocube Systems, and may even require them to pay compensation or provide a rebate. This would have a disadvantageous long-term effect on Attocube Systems' business and reputation. To prevent these risks to the largest extent possible, Attocube Systems aims to conduct increased testing from the product development stage right through to market introduction. Furthermore, increased importance is being placed upon quality control during the manufacturing process of its products. Also, the feedback coming from customers in the university realm also plays an important role in helping to increase knowledge in development and production.

Having analysed the opportunities and threats, Dirk believed that a worst case scenario would see Attocube Systems providing the research and development measurement equipment market with positioning systems and microscopes. This

market entry would not be preferable due to the market entry barriers that are quite high to overcome. Given that the company has approximately 20 employees with an annual turnover of €5 million and a moderate rate of growth, Dirk believed that a trade sale would be a foreseeable exit for any venture capitalists involved up to this point. The best case scenario would see the company growing rapidly into the new industrial mass market, with locations being opened in five years that operate on the global high-tech markets of the most important industrial nations. Annual turnover in the tens of millions would secure for the company a leading position in the most important semi-conductor, biotechnology, nanotechnology, and medical engineering market segments.

Marketing Strategy

Attocube Systems had initially established itself as a business supplying the research and development (R&D) market. At that time, no competition existed for products specialising in the low temperature realm. The main goals of Attocube Systems in the R&D segment were:

1. To lead the market in low temperature research with a potential customer base of (at the time) 2,000 laboratories. By 2005, the company had been able to acquire 110 customers from this market.
2. To lead the market in the field of vacuum positioning technology and microscopics.
3. To establish its presence in the general market of research and development.

In the industrial market, the aim was to market nano positioners particularly in the sought-after OEM market for microscopics and telecommunications. The core nano positioner product is now sold as a standard item in the industry of research and development. According to Dirk:

> *"We had the vision of providing a simple, affordable system for research and industry that could still function under extreme conditions such as low temperatures, powerful vacuums, and strong magnetic fields. The first test series which consisted of seven positioning systems and a low temperature*

microscope was completed and sold in 1999/2000. This experience gave me the confidence I needed to believe in our vision."

But a certain amount of work was still needed between this first test series and the delivery of the modified and improved version of the positioning systems sold in February 2002, as Dirk explained:

"We had to find shops where we could have our actuators made. We didn't have any technical drawings, and so we didn't have the option of a university-internal production. Back then, six weeks were estimated for the delivery of our products. Assembly, tests and quality controls were done inside of two weeks. Looking back, this was a pretty tight schedule, and before we knew it, mistakes were popping up."

Christoph Bödefeld, who came to Attocube Systems in May 2002 as the company's first technician, remembers:

"In the beginning, our motors were very susceptible to breakage. Some of them were damaged during delivery. It was during this beginning phase that our product portfolio provided customers with either (1) a complete system (microscope systems) or (2) individual components (e.g. positioners for the low temperature realm – see Figure One). The former was a lot harder to sell than the individual components. We sold maybe one or two complete systems every year. The reasons for this were a lack of reliability and trust in a company that nobody really knew at that time."

For the industrial market, it was planned to tailor nano positioners to the specific needs of the customers, or to the general standards of the particular industries. The intention was for this to be profitable via the high quantities sold to each of the individual customers.

Figure One: Core Products – Titanium and Ceramic Nano Positioners

The prices that were set from the R&D department were the result of the experiences the company had in the test market phase. The budgets within research institutions are done in such a way that investments below €10,000 (small devices) are more flexible, that is the decision to buy can be made directly by the research group itself. Thus, these decisions can occur more rapidly than the so-called 'large investments' over €10,000, where several committees might have to agree on the decision to purchase. In Attocube Systems' first year in this sector, a penetration strategy for nano positioners was pursued for the price range below this €10,000 mark. The goal was to enter this market as quickly as possible as a way to 'spread the word' about the company. The higher price for low temperature nano positioners (when compared to devices that operate at room temperature) was able to be explained and legitimised by the expensive, time-consuming tests needed during the quality control. This technology nevertheless remained below the important €10,000 level. A high pricing strategy was planned for the industrial sector. The advantages of Attocube Systems' products, compared to their competitors producing nano technology, are their compact form, flexibility, and large range of adjustment. Better product equipping (for example, with system software) allowed the prices to be raised in the second year of sales.

The customers in the R&D market included research labs such as CalTech, Stanford University and MIT. Brochures, product catalogues, and e-mail advertising were sent to these institutions to inform them of the products and to encourage them to purchase. Scientific publications, the professional look of the company's internet site, advertisements in industrial journals such as Physik Journal and Physics Today, along with personal networking by the employees, all helped to market and publicise Attocube Systems. The presentation of the products at large international physics conventions helped deepen networks and generate new interest. To get a foothold in the industrial market, negotiations with the directors in the technical departments of companies were planned with the aim of gathering insight into how the products could be adapted to the needs of respective industrial sectors. As with the R&D department, the company, along with its other marketing activities, will continue to present at international trade shows as a pathway to reach industrial customers.

One of the company's strongest commitments to customer care was through its customer trust guarantees, which Dirk hoped would encourage customers to regularly purchase their products. As Dirk noted:

> *"Trust isn't built overnight. It needs to be proven over and over. It's not always easy, especially when you're a start-up. Our maxim is, and always was, 'No is not an option.' This means that we do everything to deliver the best possible solution to each customer. But keeping this promise wasn't always simple. We had a few kinks to work out of our products, especially at the beginning. If a researcher called us up because he wasn't happy about something, we sent out a replacement product, or went to see him right away. The most important thing was for him to never have the feeling that he was left out in the cold. This can lead to really bad word-of-mouth. If a customer thinks 'They're doing something to take care of my problem,' then they're (at least in our line of work) a lot more patient, and will recommend your company to other people, even if your product isn't working exactly the way it's supposed to."*

Dirk believed that injecting this kind of 'flesh and bones' element into their business relationships has brought a lot of new customers to Attocube Systems. Karin Höfling, an employee who hass been with the company from the beginning, was originally responsible for sales and marketing, as well as being an 'all-rounder', described the situation in the early days as follows:

> *"We did everything to make our customers happy. In spite of this, our first customers were still 'test buyers,' that is small research institutions that already assume that something's going to go wrong anyway."*

The sales and distribution for the company was done directly in the R&D market. Due to its very manageable quantities and complex systems, the low temperature microscopics product group was sold and distributed directly to research laboratories. Feedback loops between research-oriented users and the developmental department of Attocube Systems were able to be generated with clear precision as a result of this form of direct sales, allowing important information to be taken advantage of quickly. For applications and distribution realms with special requirements, standard products such as the nano positioner was handled by well-known distributors. In the middle of 2002, a new distributor took over the sales territory of Japan while other distributors were similarly active now in Korea and Taiwan. The company Hama in Vorarlberg, Austria was acquired for worldwide sales and distributions for clients requiring applications in ultra-high vacuums. To have a section of the essential markets in the USA and Canada, and to further strengthen direct sales, there is now an objective to establish a sales location in the USA. Doing this should greatly improve US institutions' access to these European products. A respective acclimation of sales and customer service infrastructure is planned for entry into the industrial market. In this market, it is planned for a sales partner to accompany the customer from the initial offer phase all the way to order (and even project) fulfillment. Furthermore, this person will be available beyond this time period for any other general or maintenance questions. Doing this allows someone from Attocube Systems to be an ongoing contact person during the entirety of a customer's project.

The total marketing budget in the first five years was approximately €200,000. Around 50 percent of this was intended for customer acquisition and the ensuing customer care. About 10 percent of the budget was earmarked for the direct marketing activities described above (direct mailings, advertising brochures), another 10 percent was spent on newspaper advertising, while the final 30 percent was invested in trade show appearances.

Development of Internal Structures and Processes

The search for fellow students interested in 'getting into' the company as partners was more difficult than Dirk had expected. However, he was able to find two people with whom he believed he could enjoy a successful cooperation. As Dirk explained:

> *"I now know that it's not enough to be friends with one another. What matters is that each partner thinks entrepreneurially and is prepared to take personal risks. That was unfortunately not the case in this instance. We've parted ways with some initial partners – fortunately on peaceful terms. However, during the first three or four years, many new companies have difficulties finding qualified employees who are willing to work for a 'no name' company. Interestingly, Attocube Systems had fewer difficulties because our customers were also potential employees. They had already known us pretty well for a while from the different trade shows, the way we deal with customers, our passion, etc. What I really had to rack my brain over was bringing the first employees from abroad to our company, complete with their families. I was already worried that, if the company goes down the tubes, we're going to ruin this person's resume. My employees needed to be clear about the fact that we weren't sitting on millions and millions of Euros of funding."*

What Attocube did have to offer was that it was a young enterprise with an innovative product that had realistic opportunities for growth, while working directly with company founders who were living out their passion. This is what drew employees to Attocube Systems, who in return have shown a deep commitment to the company. While there was a large amount of work to do at the

beginning to get the business started, Attocube Systems' employees were willing to pay this price. Tobias Lindenberg sees this a bit more pragmatically and explains:

> *"For me, the idea of working for a start-up that was founded as a spin-off from a university was very exciting. I figured that I'll give it a shot. After all, my dissertation was still lingering in the air, which of course I never got around to finishing. There were no real difficult moments for me personally. I always got my paycheck at the end of the month, and we worked with what we had. For example, we got hold of some laboratory equipment at a bankruptcy sale for next to nothing and we just started from there."*

Dirk had always tried to avoid questions from visitors about how long they had been in existence. To create a clear identity, high-quality became a central factor for all decisions made by the company from the beginning. This was not only reflected in the product development, but also in how the company presented itself (for example, through the creation of a professional-looking presentation video, the right company logo, and high-quality letterhead and business cards), in the selection of their office location, good employee salaries, etc. As Dirk explained:

> *"This may seem a little superficial at first glance, but for potential customers, future employees, and financers, this level of quality is a very important signal you can send when the first impression is being made. It was a learning process for me because I had to ensure that the identity was understood and followed by everyone in the company. And not only did I grow because of it, my surroundings did too. I'm not a 'My way or the highway' kind of guy. I don't really like to say 'Hey, we're doing it like this.' I was always willing to trust others and delegate responsibility to my employees. I like to work according to the motto 'It's OK to make a mistake, but only once' – and this includes me too. I was helped in some way by the fact that my father was a freelance patent attorney, and I always wanted to own some kind of company. I always liked being able to sell something. Fortunately, I had the right people around me who*

supported my ideas. This includes my former professor Khaled Karrai, who's now my CTO."

The values of high quality, having fun, trust, and being down-to-earth continue to form the pillars of the Attocube Systems company culture. Dirk believes that these have all played an important role in bringing success and a positive reputation to the company. Additionally, since the company was founded, the turnover nearly doubled annually in its early years, reaching €1.5 million in 2004 with seven employees. During the first full business year in 2002 the company broke-even. This was the consequence of a streamlined organisation and decisive market orientation, which has meant that the company has always been running in the black and any investments have been financed solely from free cash flows.

Product Portfolio

The future of nanotechnology is very promising. Many industries today are in a stage of transition. It will be increasingly important for them in the future to be able to position their processes down to the nanometer. Many potential markets do not even exist yet, as the current state of technology has not taken root. The future strategy of Attocube Systems will, therefore, be to identify these markets in their early phases. The core competency in the development and fabrication of customised nano positioning systems will be taken advantage of to generate further markets and application realms, all while continuing to grow the company from within, and developing cutting-edge system solutions. Doing this aims to help bring an optimal balance into the product portfolio.

In 2008 and 2009, the product portfolio of Attocube Systems was comprised of a total of seven product lines:

1. LTSYS: Complete low temperature scanning probe microscopes and systems.
2. nanoSCOPY: This product group includes linear servo motors, revolving cylinder engines, as well as a goniometer and low temperature microscope. Attocube Systems offers different versions of this microscope; as a scanning force microscope, as a near-field optical

microscope, as a confocal microscope, and as a scanning tunnel microscope.

3. nanoTOOLING: Testing instruments for technology that operates under extreme conditions.
4. nanoPOSITIONING: Positioning technology as described above. Prices for these products range from 100,000 to 300,000 Euro.
5. attoCONTROL: This product line offers a software interface for the communication of standard data processing technology as well as instrumentation and automatic control software. Price range: 1,000-15,000 Euro.
6. attoOPTIONS: Positioning systems accessories, including microscopics. Price range: 100 – 5,000 Euro per delivery.
7. attoSOLUTIONS: Tailor-made customer solutions. Price dependent on the complexity of the solution provided.

Tobias Lindenberg explained their product portfolio as follows:

> *"This is a product portfolio that's developed over the years from, not just our own ideas, but also in many cases from what customers have asked us to deliver. In some cases, we've been able to develop a system or product they want in a relatively short amount of time. Other times, this can take a while. After a while, you start to get a feel for what you're able to do and what you're not able to do."*

One of the great challenges at this point is optimising the value chain. All those interviewed agree that just about all of those customers in the research community were very tolerant of errors in the systems or products in the beginning years, but their demands have increased since then, as noted by Tobias:

> *"Our capacity has become more serious. The products now have to be a lot more reliable, and that means we have to work that much more professionally. Everything now has to be well-coordinated. With the industrial customers, their requirements are downright perfectionistic compared to the colleagues in research. With mass production, error-prone technology can incur very high expenses."*

A first step in effective quality control is ensuring the position of the quality manager in the company. At the end of 2007, this person had the following tasks:

1. Testing product quality
2. Maintaining process quality (ISO certification)
3. Ensuring and checking customer quality
4. Serving as controller

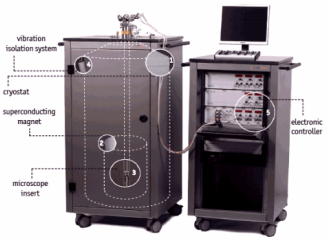
According to Dirk, cooperation with Porsche Consulting was of great assistance in professionalising the quality process:

> *"We worked out an innovation and production roadmap which describes in detail each individual step of an effective, efficient quality assurance."*

Furthermore, expansion of suppliers, 'just-in-time' delivery, purchasing of components to minimize vertical integration is continually developed and adapted accordingly into the organisation. In addition, the production facilities need to be correspondingly organised as well. The organisational and information structures, particularly in the areas of planning, financing, accounting, and materials logistics are continually optimised as the company develops and grows. Risk management (now required by corporate law) is also being implemented.

Figure Two: Product Portfolio

LT*SYS*: Modulares Meßsystem



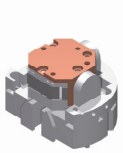
nano**SCOPY**: Mikroskope

nano**TOOLING**: Testgeräte

nano**POSITIONING**: Positionierungsgeräte

atto**CONTROL**: Kontrolleinheiten für Elektronik und Software

atto**OPTIONS**: Zubehör



atto**SOLUTIONS**: Maßgeschneiderte Lösungen

The developers at Attocube Systems are not running out of ideas for innovation. Along with the continued development of the product portfolio above, there is currently work being done on a 'go between', as Tobias Lindenberg calls it:

> *"This is designed most of all for those customers that already have a positioning system, but who are looking for additional modules for special applications."*

Although there was always the intention of growth via entry into the industrial market segment, this was always somewhat neglected. This was due to the success enjoyed with the R&D customers, which itself took up a great deal of internal resources. It was also due to a lack of funding, as Dirk explained:

> *"In terms of financing, we were always open to starting up partnerships. Every year we talked to three or four different investors. We did this to get the hang of it, we wanted to understand how the world of investors ticks,*

and learn how to speak their language. For example, no investor is going to be interested in an annual rate of return growth between three to four percent, even if this is closer in touch with reality than anything else he's looking at. No, potential investors get interested when the numbers are at ten percent annually. But it wouldn't have been like us to have claimed something like this. So in the first years, we were pretty uninteresting for potential investors."

Wittenstein AG

At the start of 2007, the motion control specialists Wittenstein AG from Igersheim (Germany) started being mentioned in terms of a potential strategic partnership (reference Appendix Four). This company and its 1,300 employees worldwide are a national and international symbol of innovation, precision, and excellence in the world of mechatronic drive technology. Wittenstein products can be found everywhere in applications requiring the utmost precision in propulsion, steering, and control. According to Dirk:

"There are tremendous synergy effects to be achieved here with what we develop, produce, and market. Wittenstein continues to focus on motors based on traditional technology, while we deliver with our product portfolio the necessary know-how in the nano realm to our target group in the research community. With its products and systems, Wittenstein opens the door for us to industrial customers. This is a market segment where we're still not where we want to be."

However, as Dirk readily admits, this strategic partnership has not been totally undisputed within the walls of Attocube Systems:

"There's been some critical voices raised and some concerns: What's the next step? What's going to happen with the spirit of Attocube Systems if another management comes in? What's going to happen with my job? etc. It's the famous double-edged sword. On the one hand, growth costs money, and we now have a strong, stable partner at our side who's going to help us to grow faster. On the other hand, our structures and processes will have to change and correspond more closely to our large partner."

In terms of what could happen within the value chain as a result of working together with Wittenstein, the following fundamental decisions need to be made:

1. Which customers and/or suppliers/stakeholder points of contact can be taken care of by both companies, and which can be taken care of by only one of them?
2. When both companies operate together, questions such as the following need to be answered:
    a. Which design elements should be used and positioned, and how?
    b. Which employees will be assigned to what tasks, and when and where?
    c. Which means of communication should be used and applied, and how?
    d. Who is the contact person for sales, contracts, etc., and what exactly is this person responsible for?

A clear description of tasks is required as it will have a strong influence on the future reputation of both companies according to Dirk:

> *"Although there's good chemistry between us and the people at Wittenstein, there's still a lot of question marks on the part of the employees that need to be cleared up."*

This cooperation also has a positive side, which Karin Höfling highlights:

> *"After all the ups and downs of the early years, I'm happy for the management team that we now have a strong foundation to build on. Over the years, the personal situation of each individual has changed. Most of the 'old veterans' now have a family. Having a strong financial partner at our side helps make possible the right balance between job and family. Our employees are, as always, highly motivated and proud to work at Attocube Systems. However, a system, a job description, leadership, these are all expected. First, commitment is a very 'soft' concept. Its influences are not always clear, which is why most of those in the world of physics kind of grin when they hear the topic mentioned. Second, there is in fact a point at which an employee's individual commitment starts to wane due to the size of a company. At a certain amount of employees, the power of*

others' examples no longer works. It's these kinds of things that we really have to look at to see what we can do in response. There's no doubt that our values as a company find their way into these processes, it's just hasn't been made clear exactly how. This hasn't been a problem up to this point. Until now I've simply shown an interest in the individual people, and wanted to know what he/she also likes to do during their free time. That's how I was able to get a general picture of them. There's certainly room for improvement when it comes to this."

Wittenstein is a highly distinguished company when it comes to human resources. Since 2007, it has been an official holder of an industry trademark recognising them as a particularly family-friendly company. They have successfully implemented a family-oriented personnel policy, achieving with an entire palette of programs the ability to harmonise family and career for their 1,300 employees. Nothing is left out: flex time, day-care for the kids when school is out, or home office are available. There are programs for those with new babies, movie weeks for the kids, even a Christmas party. The family-friendly company philosophy includes everything from work hours to personnel development, family-oriented leadership, all the way to services or leisure offers for families (reference www.presse.wittenstein.de). Höfling and Haft both agree:

"If this partnership materialises, we really hope that we'll be allowed to borrow some of these structures and processes for our own personnel selection and development, and not have to start from scratch."

In the beginning, Attocube Systems employees were true all-rounders. Today, however, clear responsibilities and definitions of tasks are becoming increasingly important within the company. Start-ups have a tendency to draw strong personalities to them. As Christoph Bödefeld recalls:

"This mix of responsibilities led to some heads banging together, although the advantage of a small company is that employees over time look for their own area of responsibility and can establish themselves there."

This means that clear structures within the company will be indispensable. To be sure, this may rob the company of a certain amount of its original flexibility, but it is nevertheless necessary for a well-flowing interface management, particularly in the case of a partnership with Wittenstein (reference Appendix Four). A clear structure will allow all company stakeholder requirements to be taken into consideration (including the needs of the customers, employees, suppliers, the media, etc.).

End of Year Report 2009

After more than seven years of establishment, this high-tech company with its 25 highly qualified employees now has a turnover of 4.5 million euro annually, and the orders keep coming in. Dirk was delighted that the auditors had also given it a positive report:

> *"Exemplary reporting, organisation, data management and company documentation, particularly for such a new enterprise – this was in their report! We've run in the black since our founding. We've created a company in Munich that's also established a foothold in the international business world. And all this without requiring an excessive amount of outside capital. These are things that make us stand out from a lot of other entrepreneurs. I hope it is an encouragement for people to make their ideas and dreams a reality without the help of considerable investment from other sources."*

In spite of this success story, the question remains for the management team at Attocube Systems: What is the best method for the growth and development of the company?

Appendix One

Company Founders Resumes

Dr. Dirk Haft

Born 1969 in Munich, Haft studied physics in Munich and Paris. Doctoral work in the field of semiconductor physics and near-field microscopics. In addition to his physics studies, Haft was also active as a freelancer starting in 1990 in the field of IT services and database programming, establishing a solid customer base in Munich and the surrounding areas. Depending on the workload, at times three freelance assistants were employed. This company was transferred in 2001 to a partner and still exists today. As chairman of F&W Mobile Phone Innovative Systems AG in Augsburg (Germany) from 2000-2002, Haft obtained entrepreneurial experience concerning venture capital and business law, mass markets, and production environments. He is still a shareholder and scientific advisory board member for the company nautilusfilm GmbH in Dorfen (Germany). He has also been a member of the Center for NanoScience (CeNS) in Munich since 2003. Dirk Haft has been the sole CEO of Attocube Systems since its founding in November of 2001.

Dr. Stefan Reineck

The founding members of Attocube Systems met the business angel Dr. Stefan Reineck while they were developing the plan for their business. Dr. Reineck has outstanding connections to industry. He has been active in a variety of technical enterprises, founding his own company in 1998 which he then sold to an American enterprise. He serves as a financial expert and scientific consultant at Attocube Systems. In addition, he monitors the company's business as the chairman of the board of directors. Dr. Reineck was named CEO of Steag-Hamatech AG in 2002, a publicly traded high-tech company active in the field of CD/DVD equipment manufacture. His first-class contacts in this area are a tremendous asset to Attocube Systems.

Prof. Dr. Khaled Karrai

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Curriculum Vitae

Family name:	Karraï
First name:	Khaled
Born:	Febuary 15th, 1962
Citizenschip:	Dual: Tunisian and French
University education:	
1979-1984	University education in Physics and Engineering at the National Insitut for Applied Sciences (INSA) in Toulouse - France
June 1984	Engineering degree - INSA Toulouse - France
1983-1984	Solid state physics (DEA Physique du solide) - Université Paul Sabatier, Toulouse - France
July 1984	Physics master degree (major in Solid State Physics) - French DEA
1984-1987	Research period toward a Doctoral degree, at the High Magnetic field laboratory of the Centre National de la recherche Scientifique (CNRS) and Max Planck in Grenoble under the direction of Prof. Gerard Martinez.
Oct. 1987	Doctoral degree: Far infrared magnetospectroscopy of III-V low dimensional semiconducting structures -Universite Joseph Fourier Grenoble - France
Professional experience:	
Nov.1987- Aug. 1990	"Post doc." Research associate at the department of physics and astronomy of the University of Maryland -USA in the group of Prof. H. Dennis Drew.
Aug.1990 - Nov. 1992	non-tenure track assistant professor (assistant research scientist) at the department of Physics and Astronomy of the University of Maryland - USA.
Jan. 1993- Aug. 1994	von Humboldt research fellowship at the Technical University of Munich - Germany. Groups of Prof. G. Abstreiter and Prof. F. Koch.
Aug.1994 - Dec. 1995	Assistant research scientist at the Walter Schottky Institut of the technical university of Munich - Germany.
1995 - 2006	Tenured Associate Professor at the Physics department of the Ludwig-Maximilians-Universität München, Munich, Germany.
Jan. 1999	Founding member of the "Center for NanoScience" (CeNS) in Munich.
Dec. 2001	Co-Founder of AttoCube Systems AG, Board of Directors - manufacturing cryogenic scanning probe microscopes.

Appendix Two

Market Data and Competition (Business Plan excerpt)

The Nanotechnology Market

The influence of nanotechnological findings on the development of markets in electronics, data storage, functional laminates, and precision optics has been seen for years. Today there are clear influences of nanotechnology on the booming billion-euro markets of pharmaceuticals, medical diagnostics and analysis, as well as the production of chemical and biological catalyst surfaces. This trend is expected continue. There was a worldwide turnover of 55 billion Euro in 2001 for the market of products that have some kind of connection to nanotechnology[1].

The Micro and Nano Positioning Market

The increasing importance of miniaturisation represents a critical growth factor for companies in the micro and nano positioning industries. In this market turnover growth rates of more than 50 percent were achieved in the last two years. Future prognoses of the largest competitors also assume a double-digit growth rate for the coming years[2]. Attocube Systems divides the market for its positioning systems into two segments:

1. Research and development (R&D)
2. Industrial clients

Research and Development (R & D)

The dynamic and potential of R&D in nanotechnology is seen most clearly in the foundings of several new centers of expertise in Germany (reference www.kompetenznetze.de). Further examples of this positive trend are the following, newly-founded international nanotechnology centers:

1. CeNTech, Münster, 2003
2. iNANO Center, Aarhus, 2002
3. FIRST, Center for Micro- and Nanoscience, Zurich, 2000

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[1] Source: VDI Technologiezentrum

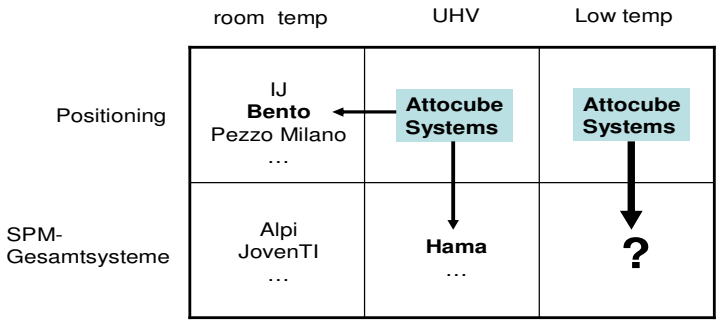
[2] Source: AMRO-Kinsley business development report

4. University of Notre Dame: Center of Excellence in NanoScience and Technology, 2000
5. CNSI: California Nano Systems Institute, 2000
6. CeNS: Center for NanoScience, 1999
7. Center for Science in Nanometer Scale, 1998
8. NanOp: Competence Centre for the Application of Nanostructures in Optoelectronics, 1998
9. IBM Nanoscale science and technology group, 1997

The R&D customers can be divided into two further sections. First, the institutions who have to position down to nanometer precision at low temperatures, that is, those conducting low temperature microscopics as found, for example, in semiconductor research. The second group consists of institutions who do this work at room temperature, as found, for example, in biotechnology or the life sciences.

Attocube Systems will first serve the R&D low temperature scanning probe microscopic market. In this market the company aims to use its competitive head start to make as many inroads as possible. The medium-long term plan is to transfer existing knowledge to additional technology as a means to also offer room temperature measurement instruments.

Figure Three: Growth Strategy in the R&D Markets



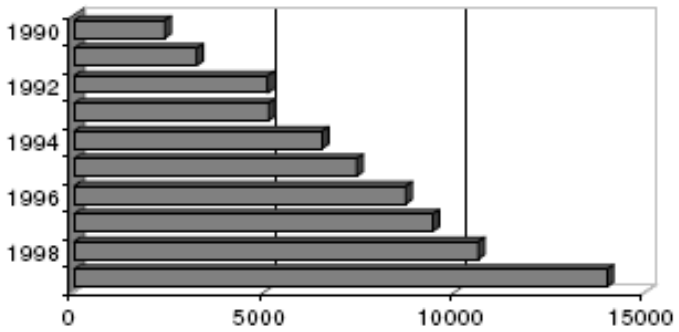
Translations: SPM Gesamtsysteme = Scanning probe microscope systems

In terms of new microscopic technologies, the June 30th 1994 Instrument Business Outlook indicated a volume of $165 million USD for the year 1993 for semiconductor providers, at a growth rate of 20 percent. For 1996, the scanning probe microscopics market alone reached $170 million USD[3].

From 1997 to 1999, the market leader Creative Tools was able to achieve an annual turnover growth rate of around 20 percent[4]. The amount of scientific publications in the field of scanning probe microscopics between 1990 and 1999 (reference figure four) is a clear indication of the rapid growth in this area of research.

Assuming the given facts (1996 total market volume of €170 million) and a moderate growth rate of only 10 percent, the entire market volume for scanning probe microscopics was estimated at €270 million for 2001, and €400 million for 2006.

Figure Four: Amount of Scientific Publications on the Topic of Scanning Probe Microscopics, 1990-1999[5]



[3] Source: Media information from the company Creative Tools

[4] Source: Instrument market briefings

[5] Source: INSPEC, BIOSIS, MEDLI

The market focusing on low temperature, ultra-high vacuums, or systems able to operate in strong magnetic fields (an important market for Attocube Systems) comprised only 10 percent of the overall market. It was therefore estimated at about €40 million for the year 2006.

Industry

The potential customers of Attocube Systems include the high-tech industries of semiconductors, bio and nanotechnology, as well as telecommunications. Increasing miniaturisation of products will require highly flexible positioning systems of the utmost quality. The systems offered in the R&D realm have a wide, flexible application spectrum as their focus. On the other hand, easy-to-use, highly integratable machinery is expected when creating technology for industrial customers. These high-tech markets are currently enjoying brisk growth at an annual average rate of 10-30 percent. No data or market studies for the specialised industry of micro and nano positioning are currently available from Attocube Systems.

Based on the competition's turnover numbers in this industry, Attocube Systems estimates the worldwide total market of micro and nano positioning systems to have been €300 million for the year 2001. It was also assumed that the positioning realm grew proportionally to the markets mentioned above, that is, at least at an annual rate of 20 percent. For market entry into the industrial market, Attocube Systems is focusing on the OEM supply of the industrial microscope systems of other manufacturers, sold together with the nano positioners made by Attocube Systems.

The unrivaled flexibility of Attocube System's actuators is able to overcome all technological barriers to market entry. Attocube Systems will also be striving for entry into the telecommunications sector by applying its broad capabilities in the field of optoelectronics, and anticipates exceptional growth potential in this business. Around one-fifth of the total micro and nano positioning systems market (€300 million in 2001) will be focused on Attocube System's specialisation in the

OEM and optoelectronics segments. This was a market volume in 2001 of €60 million. For 2006, this volume was €150 million.

At the start of 2004, the company Bento entered into a strategic partnership with Attocube Systems. The market entry of OEM positioners began in February of 2005. Intensive negotiations are being conducted with companies from the industries of microscopics, medical technology, and electronics. Turnover in this area of mass production has the potential to climb into the million euro sector.

Competition

The internationally operating competition can be divided into two types of companies: Laboratory suppliers with a wide palette of products, and specialty suppliers for positioning systems. The former includes suppliers that offer positioning systems as only a part of their wider portfolio in the field of optics. These fast-growing companies concentrate on the development and delivery of optical systems in the fields of IT and communication as well as industrial manufacturing. The most important companies here are:

1. Silos AG: 1999 turnover of €70 million, €78 million in 2000.
2. Aircraft: 1999 turnover of $142 million, $253 million in 2000.

The positioning technologies offered by both of these companies is based exclusively upon traditional technology and combinations, leading to complex, bulky, expensive machines. This is a clear disadvantage when compared to products sold by Attocube Systems. Furthermore, as the competition is increasingly concentrating on their core competencies (which are clearly in the realm of optical products), Attocube Systems will be able to maintain its competitive advantage.

The second type of operation is comprised of companies that primarily concentrate on micro positioning, nano positioning, nano automation, and piezo technology.

1. Kinsley Instruments, Inc.: 107 employees, 1999 turnover of $14.2 million, $20.5 million in 2000; subsidiary of Sixpro since December 2000 via a $275 million acquisition.

Kinsley appears to be the number one competitor from a technology standpoint. Its actuators deliver almost the same performance at room temperature as those sold by Attocube Systems. However, at a price of €30,000, Kinsley's products are twice the cost, and their low amount of flexibility is also another advantage of Attocube Systems when it comes to these kinds of industrial system solutions.

2. Hama Nanotechnology: 170 employees, 1998 turnover of €20 million, €25 million in 1999.

Hama's turnover comes primarily from scanning probe microscopes and electron spectroscopes. The nano positioner they offer is comparable in price to Attocube Systems, although not usable for certain important applications. Due to the low amount of lifting force of the Hama motor, its use in most industrial industries is not likely. Additionally, Hama made contact with Attocube Systems in 2002. An extensive agreement from that point on was in place allowing Hama to market and sell worldwide the systems from Attocube Systems that work under vacuum conditions. Both companies also began cooperatively developing and selling microscopic systems that operate under vacuum conditions. Furthermore, some of Hama's own products were replaced by products from the Attocube Systems product range. This activity resulted in Hama achieving in 2004 hundreds of thousands in turnover.

3. Grosskopf Nano: No official data is available on this company, as it is not a public firm (that is, neither a German *GmbH* nor an *AG*). However, some information does exist, according to which the company is only enjoying minor growth, and does not intend to be deeply involved in international markets in the near future[6].

[6] Source: The academic Internet scene

Grosskopf Nano offers high-precision micro and nano positioning systems that, upon observing their level of innovation, would appear to stand in direct competition to Attocube Systems. However, these systems can be used at neither low temperatures nor within magnetic fields.

4. Technologische Geräte (TG) GmbH: 120 employees, 1998 turnover of €13 million; €17 million in 1999.
5. Kingstown Ltd.: 110 employees, 1999 turnover of $9 million; subsidiary of AOD Inc. since March 2000 via $210 million acquisition.

The actuators offered by these two companies (which both have very similar product palettes) are also distinguished by their high precision. However, they lack a wide range of adjustment. They are also not suited for use in extreme conditions.

Market and Competition: Conclusion

Nearly all of the competition enjoys a double-digit rate of turnover growth. New markets will require new suppliers of precision positioning units. These companies will have to differentiate themselves from the competition through innovative technologies, meeting the specific needs of customers, offering a wide range of service, and having a low cost of ownership. With the technological know-how of the founders, its product quality and flexible product design, as well as its clear technological advantages, Attocube Systems is more than ready for this challenge. It is set to make its mark and excel among its existing competitors. Its market entry faces no real threat in the form of price decreases by the competition. The complexity of these kinds of systems simply doesn't allow enough leeway for this kind of pricing approach.

Appendix Three

Milestones Achieved by 2001

7.6 Erreichte Meilensteine (bis 2001)

Folgende Vorarbeiten sind erfolgt:

- Teambildung abgeschlossen.
- vorhandene Marketinginstrumente: Messeausstellungsstücke, Präsentationsfilm, Internet-Domains, Warenzeichen, Vanity-Rufnummern, CI (Logos, Briefpapier, Visitenkarten, Messeposter, Produktbroschüren).
- 1. Testserie 1999/2000: 7 Positioniersysteme und 1 Tieftemperaturmikroskop erfolgreich gefertigt und verkauft.
- Aussteller auf 3 Messen (Sensors 2001, Laser 2001, DPG 2002).
- Gesamtsieg beim Münchner Business Plan Wettbewerbs MBPW 2001: Prämie DM 50.000
- Zum Stichtag 18. Juni 01 wurde erfolgreich das FLÜGGE-Programm für Dr. Dirk Haft und Dr. Christoph Bödefeld beantragt.
- 21. Nov. 2001: Gründung der atto**cube** systems AG.

7.7 weitere Meilensteine

- Anfang 2002: Investition des Business-Angels.
- Bis März 2002: Recruiting-Gespräche. Weitere potenzielle Mitarbeiter aus dem Umfeld des Center for NanoScience (CeNS), München, werden angesprochen.
- Jan. 2002: Wahl der Geschäftsräume. Universitätsnahe Räumlichkeiten wurden gefunden und angemietet.
- Jan. 2002: Aufnahme der Produktion und Start von Marketingaktionen.
- Feb. 2002: Auslieferung der ersten zwei Positioniersysteme. Für den Eingang der zugelieferten Teile werden 6 Wochen veranschlagt; Zusammenbau, Tests und Qualitätskontrolle sind binnen zwei Wochen zu erledigen.
- April 2002: Produktanpassungen für die USA abgeschlossen.
- Mai 2002: Auslieferung des ersten Tieftemperaturmikroskops.
- Juni 2002: Erster Zahlungseingang in der Größenordnung von € 35.000.
- Sep. 2002: Fertigstellung der Softwareansteuerung der Controller.
- Okt. 2002: Neue Produktplatzierungen (Rotationsmotor ANR100, ANPz30)
- Nov 2002: Liquiditätsminimum überwunden, insg. 7 Mitarbeiter
- Kontostand zum 31.12.2002: € 158.000
- Jahresabschluss 2002: Umsatz 340 T€, im ersten vollen Geschäftsjahr bereits ein Gewinn von € 16.000 und damit schwarze Zahlen!
- Jan. 2003: 50% des Darlehens von € 100.000 wurden bereits getilgt.
- März 2003: Aussteller auf der APS, American Physical Society, mit eigenem Messestand, 40 Interessenten aus USA.
- März 2003: Aussteller auf der DPG, Deutsche Physikalische Gesellschaft, mit eigenem Messestand.
- Juni 2003: Auftragsbestand 350 T€.
- Jahresabschluss 2003: Umsatz 870 T€, Gewinn 5.000 T€
- Januar 2004: Auftragsbestand 900 T€
- Februar 2004: Entwicklungserfolg: Konfokales Mikroskop für tiefe Temperaturen mit weltbester Auflösung fertig gestellt.
- August 2004: Einstellung drei neuer Mitarbeiter
- Oktober 2004: Neue Produktplatzierungen: 5 Positionierer mit Wegmesssystem (LIN), Goniometer (ANG100) und Industrie-Handsteuerbox (ANC106)
- Jahresabschluss 2004: Umsatz 1.5 Mio € und ein vorläufiger Gewinn von 300 T€

Appendix Four

Information on Wittenstein AG

Wittenstein AG is comprised of seven fields of operation, each with its own subsidiary: servo drives, servo drive systems, medical technology, miniature servo units, innovative gear technology, rotary and linear actuator systems, and electronic and software components for drive technology. Wittenstein AG develops, produces, and sells high-precision gear motors, complete electromechanical drive systems, as well as AC servo systems and motors. Its applications include robotics, machine tools, packaging technology, materials handling and process engineering, paper and printing, medical technology, as well as air and space travel. Wittenstein AG has more than 60 subsidiaries and locations in over 40 countries that operate in all major global technology and business markets.

Figure Five: Wittenstein AG Company Values

WITTENSTEIN AG Unternehmensphilosophie

Unsere Vision
WITTENSTEIN will dauerhaft für seine Kunden weltweit ein exzellenter Partner sein mit intelligenten Komponenten und beherrschbaren Servosystemen auf dem Gebiet der mechatronischen Antriebstechnik.

Unsere Werte
Wir orientieren uns an Werten, die von uns nach innen und außen gelebt werden und dadurch feste Bestandteile unserer Identität sind:

Verantwortung
Wir bekennen uns zur **Verantwortung** gegenüber unserer Zukunft und der Gesellschaft:

- **Wir** entwickeln, produzieren und verkaufen hochwertige Produkte und Lösungen für die Bedürfnisse unserer Kunden in einem sich ständig wandelnden Markt
- **Wir** fördern Eigenverantwortung und Teamgeist. Wir erwarten von uns Bereitschaft zur Leistung, Kooperation und Überprüfung unserer Arbeit auf Regeln, Effizienz und Wirtschaftlichkeit. Unser unternehmerischer Erfolg sichert unser soziales Handeln

Vertrauen
Wir schaffen **Vertrauen** durch menschliche Beziehungen, die auf gegenseitiger Wertschätzung beruhen:

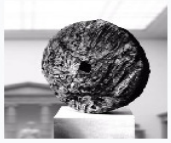
- **Wir** wollen mit unseren Kunden, Partnern und Mitarbeitern Bindungen eingehen, die Vielfalt und Kreativität fördern zum Wohl einer gewinnbringenden Partnerschaft
- **Wir** sind stolz auf unsere beflügelnde Unternehmenskultur. Bei uns bedeutet Führung Vorbild sein und Raum schaffen, damit jeder seine Fähigkeiten optimal entfalten und das Unternehmen mitgestalten kann

Figure Six: Wittenstein AG Company Values Continued

Offenheit
Wir leben **Offenheit** vor und pflegen eine transparente Kommunikation, damit unsere Antworten nicht einseitig, sondern allseitig sind:

- **Wir** gestalten Beziehungen und bilden mit allen Mitwirkenden Netzwerke, die fruchtbar und werthaltig sind
- **Wir** sorgen innerhalb des Unternehmens für eine Kommunikation, die aufrichtig und respektvoll ist

Innovation
Wir lassen uns jeden Tag aufs Neue von unserem Erfindergeist inspirieren und streben nach stetiger **Innovation**:

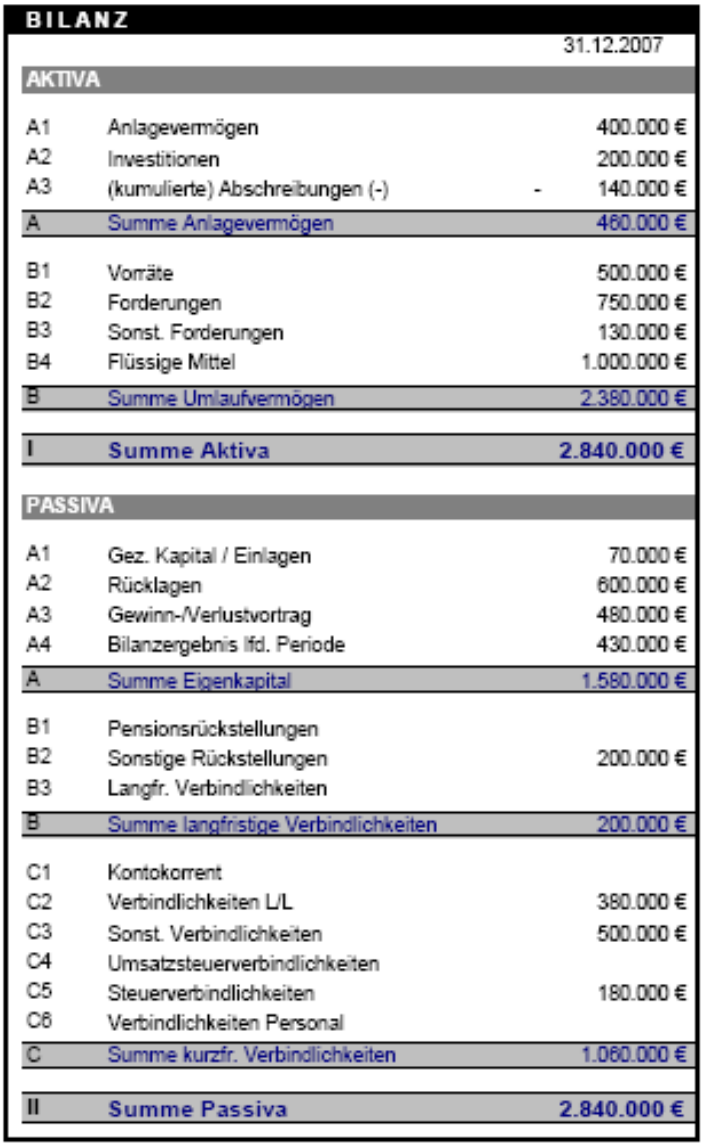


- **Wir** denken an Lösungen, die noch nicht existieren und schlagen neue Wege ein, damit die Vision von heute zur Realität von morgen wird
- **Wir** bringen mit unserem Wissen, Forschen und Weiterbilden eine Geisteshaltung hervor, die uns und unseren Partnern neue Horizonte eröffnet. Aus den wechselseitigen Impulsen entsteht eine Dynamik, die zukunfts- und erfolgsweisend ist

Wandel
Wir begegnen dem **Wandel** mit Zuversicht. Wir sehen die Veränderung als Chance zur Weiterentwicklung, die uns und unseren Kunden nachhaltigen Erfolg sichert:

- **Wir** beteiligen uns aktiv am fortwährenden Prozess der technologischen und gesellschaftlichen Veränderung. Der Schlüssel unseres gemeinsamen Handelns bleibt immer der Mensch. Die Würde des Menschen steht bei uns daher im Mittelpunkt
- **Wir** orientieren uns am Erhalt der Lebensgrundlage künftiger Generationen. Unsere Lernbereitschaft öffnet neue Wege und macht uns fähig für die Zukunft

Figure Seven: Fiscal Year 2007



BILANZ			
			31.12.2007
AKTIVA			
A1	Anlagevermögen		400.000 €
A2	Investitionen		200.000 €
A3	(kumulierte) Abschreibungen (-)	-	140.000 €
A	Summe Anlagevermögen		460.000 €
B1	Vorräte		500.000 €
B2	Forderungen		750.000 €
B3	Sonst. Forderungen		130.000 €
B4	Flüssige Mittel		1.000.000 €
B	Summe Umlaufvermögen		2.380.000 €
I	**Summe Aktiva**		**2.840.000 €**
PASSIVA			
A1	Gez. Kapital / Einlagen		70.000 €
A2	Rücklagen		600.000 €
A3	Gewinn-/Verlustvortrag		480.000 €
A4	Bilanzergebnis lfd. Periode		430.000 €
A	Summe Eigenkapital		1.580.000 €
B1	Pensionsrückstellungen		
B2	Sonstige Rückstellungen		200.000 €
B3	Langfr. Verbindlichkeiten		
B	Summe langfristige Verbindlichkeiten		200.000 €
C1	Kontokorrent		
C2	Verbindlichkeiten L/L		380.000 €
C3	Sonst. Verbindlichkeiten		500.000 €
C4	Umsatzsteuerverbindlichkeiten		
C5	Steuerverbindlichkeiten		180.000 €
C6	Verbindlichkeiten Personal		
C	Summe kurzfr. Verbindlichkeiten		1.060.000 €
II	**Summe Passiva**		**2.840.000 €**