

EISENBEISS GMBH: INTELLIGENT GEARS AND THE PATH INTO A NEW BUSINESS

Knowledge Dimension:
Business Model Development

Basic Teaching Case
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This case was developed solely as the basis for class discussion. Cases are not intended to serve as endorsement, sources of primary data or illustrations of effective or ineffective management.

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Imagine driving in your car and suddenly the oil lamp lights up. The signal immediately shows you that probably the engine of your car is not sufficiently supplied with oil and, in the worst case, a fatal engine damage might occur. To avoid such a damage, the check oil indicator light shows you to fill up oil or to go to the nearest garage. Given that gear damages are most commonly a result of oil problems, Eisenbeiss GmbH, the gear manufacturer for customers in the machinery and plant construction, asked themselves: If it works for a car, why shouldn't such a control mechanism work for our gears in industrial machines? Therefore, the traditional machine builder entered the new field of sensor technology and electronics for the development of an oil sensor (GearControl-Oil) that is also available with an internet connection (GearControl). The new product consequently is an important instrument to implement Industry 4.0 in the production processes of end customers. Taking on a pioneering role with its new product, Eisenbeiss faces some challenges: How can our customers be made aware of the usefulness of the new product? What about data security issues in times of the internet of things? What should be the strategic role of the new product? Does it have the potential for a new field of business or is it just an add-on to our existing products?

Eisenbeiss GmbH - Background note

In the year of 1911, Emil Eisenbeiss, his son Artur and later Heinrich laid the foundation to the company formerly known as E. Eisenbeiss Söhne. Initially a machine workshop in Ebelsberg, the businessman and mechanical engineer Eisenbeiss turned the initiative soon into a serious contender in gear making after re-locating to Enns. In 1946, under the leadership of Heinrich Eisenbeiss, the company started to focus on reconstruction. Due to its success it expanded by establishing a new assembly plant and office blocks. In 1961, the company celebrated its 50th anniversary as well as the enlargement of the foundry. The following years were marked by prosperity and expansion. Only during the structural crisis in the 1970s Eisenbeiss needed to adjust and started to shift the company's focus to marketing and export activities while at the same time replacing piece work with a system of wage premiums. Exports in Europe increased mainly to Scandinavian countries during the next decade, but Eisenbeiss was also making a name in South America, Turkey, Korea, Egypt, Tunisia and Israel.

By the end of the 80s, the company had to face an internal structural imbalance between the machine factory and the foundry, which had earlier been separated for accounting purposes. This eventually culminated in the company's insolvency. In December 1994, Eisenbeiss reopened its doors again under the new leadership of Gerhard Burgholzer and a new approach towards restructuring and reorientation. The company re-established itself successfully on the market by



1998 by introducing the „Torque Master“. This Eisenbeiss invention made it possible to torque 40% more than before - a real benefit for Eisenbeiss' customers in the machinery and plant construction and the basis for further outstanding ventures of the company.

When Gerhard Burgholzer took over the company in 1994, structural and cultural change were his main focus. The challenge to it was to find a new way without losing essential parts of the past that were worth holding on to like quality and precision-mindedness. Two qualities the company had been known for since the beginning. At the same time, Gerhard Burgholzer had to target the company's lack of cost transparency and product differentiation. In order to implement his objectives, Burgholzer introduced new principles of management. One emphasis was given to employee responsibility. Therefore values like fairness, trust, honesty, openness and commitment became integrated into the company's culture. This led to the adoption of modern ideas such as the empowerment of management teams by giving them more autonomy based on their field of expertise. Burgholzer himself ever since has encouraged debate and has supported managers actively.

Changes were also made in relation to business parameters. Precisely, a reorganised department structure was introduced in order to professionalise in the marketing area and to enhance the pooling of resources as well as the delegation of responsibility. The departments were equipped with value-added functions, grouped by product families. This led to a reorientation towards the customer and created a framework, which could target the niche of specialised, customised solutions - a trend that was identified as crucial to the company's future success.

Gerhard Burgholzer saw the real competitive advantage in the company's size. Eisenbeiss was big enough to effect 80% of its operational steps in-house while investing in cutting-edge technologies and modern machinery. Counting around 200 employees in 2018, Eisenbeiss however also is at a critical juncture between a medium- and large-sized enterprise. Consequently, the top management and other division managers are faced with the decision to either grow quickly in order to make the transition to a large-sized enterprise or to maintain the smaller and more flexible structures of a medium-sized company.

“And that's exactly the difficult size. So I believe that this is a very critical size of turnover, where you have to look either to grow quickly and get over it or consciously say ok, we will stay below it.”

Division Manager Heavy Industry

Since the mid-1990s, under the leadership of Gerhard Burgholzer, Eisenbeiss has been once again playing at the top. The company does not fear to reorient itself and thanks to the structural



changes, the company is able to listen to the market and to adequately react to customer demands in time.

With an export rate of 98% in 2018, Eisenbeiss today serves machinery and plant construction firms from the steel and aluminium industry, the energy technology industry and the food industry with its special gear solutions. To increase the share of gearing service in the company, the development of the GearControl oil sensor (GearControl-Oil) began in 2009. Under the lead of the current CEO, Valborg Burgholzer-Kaiser, GearControl was further developed to include, beyond oil condition monitoring, the monitoring of gear condition and lubrication (GearControl). Based on this, a holistic GearControl solution for Eisenbeiss gears (i:Gear4.0) was developed in the subsequent years.

The new GearControl products

Gears are the most efficient and cost-effective transmitter of speed and torque. However, they have one major shortcoming: the bearings and tooth systems have to be lubricated and, thus, require continuous maintenance. Given these deficiencies, which also triggered the development of Eisenbeiss' GearControl, the firm pursues a strategy to integrate sensor technology and, thus, intelligence into industrial gears. GearControl is a new type of gear support system that, in addition to traditional condition monitoring systems, not only gives a warning when a problem occurs, but, through a predictive maintenance approach, also indicates disorders before an actual damage occurs. Therefore, both the service life and the efficiency of plants can be maximised. GearControl allows multi-parameter analyses, such as the supervision of lubrication oil supply, lubrication oil quality and oil condition as well as the development of vibrational parameters in order to evaluate the current gear condition and its individual components. By means of sensor technology, the electrification gives the gears a further boost in reliability. Consequently, also printed operating instructions are to increasingly be replaced by electronic systems.

GearControl not only includes sensor technology, but also the interpretation of measurement data and the derivation of recommendations for action. This makes the knowledge of gear and lubricant manufacturers available to all of Eisenbeiss' customers. The customer consequently benefits from the prevention of gear damage, maximum operational reliability, extended maintenance intervals and planned downtimes. For Eisenbeiss, this feature is a USP to stand out from the competition as the new GearControl system also ensures the fulfilment of current and future market requirements in times of Industry 4.0 and the Internet of Things. The company develops new transmission technology based on field data, which facilitates the understanding about specific gear requirements and the more targeted construction of new gears respectively. Through that,



Eisenbeiss is able to gain a technology as well as a price advantage, which results in a higher contribution margin.

Currently, GearControl is available in three different versions: *GearControl-OiL*[®], *GearControl*[®] and *i:Gear4.0*[®]. GearControl-Oil is an oil sensor that is available as a pure measuring unit in the Monitoring Edition or with a more comprehensive scope in the Expert Edition. The Expert Edition thereby includes a “care-free” package with application-specific parameterisation of threshold values, the generation of condition-dependant maintenance intervals and advice from Eisenbeiss gear experts. With its integrated traffic light system, GearControl-Oil shows the status of the oil condition: green means that everything is all right, orange means that the gear needs to be checked and red indicates that the gear should be turned off immediately. The plant operator can consequently avoid any “flying blind” between laboratory analyses by taking action without any delay before a severe damage occurs to the gear system. Until now, the oil sensor however is not installed as a standard feature in Eisenbeiss’ gears. GearControl as a system configuration is a comprehensive monitoring system for gears (see Appendix A). In addition to the oil sensor (GearControl-Oil), this version includes a VPN connection to the Eisenbeiss server. *i:Gear4.0* is a single source gearbox solution that combines a tailor-made Eisenbeiss gear with the comprehensive gearbox condition monitoring and perfection system. For a more detailed comparison of the functions of the individual GearControl versions, see Appendix B.

As in every product development process, firms go through their ups and downs. In barely any project execution, all things work out as originally planned and deviations from fixed project schedules or targets need to be reckoned. More importantly, new product developments can have a significant impact on firms in that not only processes and structures change, but also strategic directions. Let’s take a look at Eisenbeiss’ most prominent challenges and changes regarding product development, marketing and sales as well as business model and which deliberations for improvement the firm makes today...

Product development process

While the idea for developing something like an oil sensor originated in 2005, Eisenbeiss has only started the product development process actively in 2009 (see Appendix C). A strategy workshop in 2009 thereby was a milestone in laying the project’s foundation. Arriving at a first marketable product in 2013, Eisenbeiss further developed the oil sensor to a more advanced and contemporary version including an internet connection that is today known as “GearControl”.

Given that gear damages are most commonly a result of oil problems and around 80% of gear damages result from improper lubrication (see Appendix D), the gear manufacturing company



began to look for ways to tackle this challenge. Eisenbeiss' Head of Service Department & General Manager cuts right to the chase of the matter "if it's possible in the car industry, it must also be possible in our company". In 2005, the company therefore was first to engage in the use of endoscopy devices for the inspection of gears and used an actually simple idea to develop an entirely new product.

"In the middle of the 2000s, so around 2005, 2006, there once was a statement that [name of automaker] can tell that the oil change intervals of their cars do not run after a certain time, but only if necessary. If a driver always drives a lot of short distances, oil change intervals will be earlier and if he always drives long distances, he will have longer oil change intervals. And this question came from the former managing director and now owner of Eisenbeiss. We consequently pursued this question and said that this could be something for our gears as well - to implement something so simple, such a simple idea, eventually into our product, our gears."

Division Manager Development

As a further advancement to the endoscopy devices, an oil condition sensor (GearControl-Oil) was developed. This sensor functions self-sufficiently, but can also be utilised as part of the more advanced GearControl system. Because Eisenbeiss as a mechanical engineer broke new ground with the development of the oil sensor and because sensor technology or electronics originally were a new matter for the firm, an external sensor manufacturer to which the Division Manager for Development had earlier personal contacts was commissioned. The external firm supported Eisenbeiss in concretising the product idea, formulating a product concept, developing the first product prototypes, conducting field tests and guiding the transition of the product into series production.

"The idea was to put all these rigid oil change intervals, the manual and so on into a script in form of a sensor. Although more or less unaware of what they were supposed to measure, Eisenbeiss then approached us [i.e. the sensor manufacturer] with a few ideas from a couple of reports from research associations for drive technology."

Development Manager GearControl¹

The biggest technical challenge in the start phase of the product development process was to identify the right parameters in order to process the information relevant to determine possible needs for action.

"Some measurement parameters were a challenge. In principle, the sensor itself was relatively straight forward, but some parameters took us up a lot of time."

Development Manager GearControl

¹ Eisenbeiss' Development Manager GearControl was formerly employed at the sensor manufacturer who supported Eisenbeiss in the development of GearControl-Oil. In 2013, the Development Manager switched to Eisenbeiss and, since being involved in the product development process from the very beginning, is the head of development of GearControl products.



The cooperation with the external sensor manufacturer was characterised by the fact that he, as a development partner, regarded the oil sensor as a product, which he could sell himself. However, not for the specific application in gears, but for the hydraulics sector. Consequently, a fast development of the product was pushed by the sensor manufacturer in order to be able to market the oil sensor as quickly as possible. For Eisenbeiss, this meant that damages in gears could be prevented from a very early stage - the benefit of the oil sensor was therefore not only present for the customer, but also for Eisenbeiss itself, since complaints could immediately be reduced.

"The development was relatively rapid. On the one hand it was positive because [name of sensor manufacturer] saw a product in it, but we were under no timely constraint because our business ultimately was the manufacturing of gears. For us it was a development project, but for [name of sensor manufacturer] it was of course a product they wanted to sell and have a response thereof. The security for [name of sensor manufacturer] was that if we feel that the sensor is in order and approve its development, then we take a certain number of items from him and, in return, his investment pays off. [...] If this was a product we would have developed ourselves, given the importance of this sensor for our product, it would have taken us much longer. The real advantage was that the development partner saw a product in it and wanted to market the product as quickly as possible too."

Division Manager Development

"From the development point of view, the first phase was extremely productive because there was no such pressure with regard to quantity yet. As soon as there was a prototype, which worked quite well and where [name of sensor manufacturer] thought, this is actually already the fulfilment of the specifications, one went very fast in going into serial production."

Development Manager GearControl

Apart from external consultants and electronics manufacturers that were involved in the development of GearControl-Oil, case companies participated in the testing and the further development of the oil sensor. However, carrying out field tests on a product such as GearControl was difficult because the sensors only initiate when there is actual damage to the gearbox. Managers at Eisenbeiss acknowledge that providing the new product free of charge to selected lead users that guarantee long term and all-time accessible field tests could have enriched the development of the product.

The oil sensor was further revised internally between 2013 and 2014 and is now manufactured exclusively for Eisenbeiss by independent external suppliers. For the advancement of the oil sensor to a holistic system solution (i.e. GearControl), a provider of electronic services was engaged to create the first concept prototypes between 2012 and 2013. In 2013, an in-house development employee who was formerly an employee of the sensor engineering company and therefore knew the product by heart, had switched to Eisenbeiss and has been fully responsible for the development of the series-capable product GearControl since then. Additionally, since 2013, Eisenbeiss has extensively engaged in presenting and discussing their product concepts at



international trade congresses and received the Upper Austrian Innovation Prize in 2014. By 2015, the development of a first market-ready product of GearControl was completed and was ready to be delivered to customers shortly afterwards. Until today, Eisenbeiss regularly cooperates with experts in measurement technology, transmission and oil condition monitoring as well as interns, students and graduates for research and development purposes. Since the introduction of GearControl to the market, the product has continuously been further developed and modified and is currently (2018) undergoing a facelift to reduce costs and to integrate the development results in a cost- and performance-optimised manner.

Marketing and Sales

As a pioneering company for oil sensors in the gear industry, Eisenbeiss was rather reserved in announcing the new product at the beginning and it took some time until the new product was actually adopted by the market. A major reason therefore lay in the fact that the idea for GearControl did not stem from the customer side, but coins from Eisenbeiss itself. Because the company secured a unique selling proposition with its new product, the sensor was protected and not sold to the competition, preventing it from being implemented in external gears. In this regard, Eisenbeiss' Division Manger noted two possible procedures: in the sense of open innovation approaches on the one hand, one can develop a new product with a wide range of customers. The threat thereby are competitors who quickly pick up new ideas and the risk of imitation arising thereby. On the other hand, one can use the advantage of being a first mover by developing a new product with only a few selected customers and then quickly introduce the product to the market. The general assessment from Eisenbeiss' top managers is that the presence of comparable products would have increased acceptance at the outset. There are now competitors that are following up in terms of developing comparable products. However, these are usually not direct competitors of Eisenbeiss (i.e. gear manufacturers), but reside in other areas such as hydraulics, which require different operating conditions. In accordance to this, requirements for sensors in the hydraulics area do not correspond to those of industrial gears.

"If there had been ten others on the market who would have had this product, it would have been easier for us because then it would have come about together. But when you're a pioneer for something it's extremely hard. [...] Yet there is no comparison product - still not, one must say. But my opinion at the time was that if there had been more comparable products on the market, then the demand from the customer side would have evolved much faster. But that just wasn't the case."

Head of Service Department & General Manager

The responsibility for the marketing of GearControl lies within the sales department and the individual divisions. Consequently, Eisenbeiss does not have a dedicated marketing department



that assumes the marketing of GearControl. This can be considered as problematic given that Eisenbeiss is not directly connected with the end customer, but only with the plant manufacturer. The firm therefore sees an additional hurdle in the fact that the plant manufacturer has little interest in introducing GearControl to his customers, meaning the plant operators. Partly this resistance arises from the need of the plant manufacturer to acquire knowledge about GearControl and its functions, which in turn would imply an additional investment in time and considerations how to incorporate GearControl in pricing deliberations.

“You can very quickly calculate the advantage to the end customer. The problem with the end customer is that he, as plant operator, is only interested in a complete solution and not in detailed specifications of the built-in gear. Plant manufacturers consequently are just interested in providing a competitive overall solution and not in presenting any specific details of a machine that could ultimately increase machine prices which is hard to accommodate in the competitive landscape.”

Division Manager Heavy Industry

“It certainly was difficult because it took us a long time to realise that we are presenting the benefit to our customers in machinery and plant engineering. Then we were wondering if the plant manufacturer actually presents the gear’s benefits to his end customers, speaking of surveillance and so on. That’s gone down a lot.”

Head of Service Department & General Manager

Gearboxes are designed for "fatigue strength" and are normally not checked regularly in mechanical engineering. As the importance of digitalisation in the producing industry is increasing, the upper management levels of Eisenbeiss’ end customers (i.e. the plant operators) are increasingly open to Industry 4.0 and the benefits of pulling data out of their machines to enhance efficiency in work processes. Many top management teams consequently expedite monitoring and surveillance in the course of digitalisation. However, employees who work directly on the machines (e.g. maintenance staff) cannot yet accept the benefits of new technologies, such as Eisenbeiss’ oil sensor, for their work. On the one hand, this arises from their preconceived notion of being "devalued" in their expertise and knowhow by increased automatization and digital support. On the other hand, a major reason for the resistance towards products such as GearControl originates from the lack of involvement and the opportunity to participate in decision-making processes in terms of new technology implementation.

“I think it’s a pity that the practitioners, the people who are directly involved in this matter, are way too far away from where decisions are made afterwards.”

Head of Service Department & General Manager

“Condition monitoring is a tiresome topic because nobody can sell it, because nobody wants to buy it. [...] It is too complicated for the maintenance technician, too expensive for the purchaser



and it could replace the maintenance technician. And they've managed it without [Condition Monitoring] so far - why would they need it now?"

Sales Engineer Gearing Service

GearControl is an important step in meeting the current and future market requirements in the transition towards Industry 4.0. However, the internet connection of the GearControl system increases the transparency of customers and theoretically enables access to data of their machine usage. Customers are justifiably sceptical about this. Especially in the steel industry, concerns about data security are most noticeable. Although larger steelworks aim at operating their machines autarkical, they fear that new technologies provoke the leaking of expertise and knowhow.

"Our division managers are with [the customer] and the customer asks what [GearControl] is and what it can do. Of course, the system has the ability to read out data - also for us. Therefore, customers have concerns regarding data security issues. But this is not a problem unique to our firm."

Head of Service Department & General Manager

On the other hand, the data transmission enabled by GearControl, provides a certain degree of security for Eisenbeiss as this can uncover possible maintenance errors caused by customers. The "circumvention" of warranty conditions, e.g. due to incorrect gear operation or non-compliance of oil change intervals, could thus be avoided. In general, the customer has the possibility to opt-out on the internet connection with GearControl. Up to now, about 50% of customers have made use of the opt-out variant immediately after purchase. Of the remaining 50%, around 20% opt out after some time. Eisenbeiss is therefore thinking about ways to increase the acceptance of GearControl. Some deliberations thereby go into the direction of offering the Monitoring Edition of GearControl, meaning the measuring device that the customer can parameterise himself, at a higher price than the Expert Edition, which offers the possibility to connect to Eisenbeiss' GearControl server and includes a carefree package.

Business model

Eisenbeiss' drive to grow in 2009 in large part triggered the development of GearControl. The major aim also was to increase the service and repair of gears - the oil sensor should thereby be the icing on the cake. Today, the gearing service accounts for around 20-25% of sales. With GearControl, Eisenbeiss can position itself as a technology partner for the customer, especially among pioneers of Industry 4.0. Although GearControl accounts for only a marginal part of the turnover, the product is a decisive purchase criterion for Industry 4.0 pioneers in the industry.



For customers with GearControl, Eisenbeiss is also the first point of contact for repairs and maintenance. With a GearControl "Care Package", customers also have the option of extending warranty periods. In addition to increasing sales, the aim of the care package is to strengthen customer loyalty.

"The customer always has Eisenbeiss as his first point of contact on site. This gives us the chance to offer a technical solution to a problem that he doesn't even see yet. Of course, this would be a huge advantage."

Development Manager GearControl

The business model and strategic orientation have not changed because of GearControl. Eisenbeiss' core product remains the gear - GearControl functions as a by-product. However, in 2018, attempts have been made to expand the customer base by upgrading competitors' gears (i.e. non-Eisenbeiss gears) with GearControl. The product is thus no longer sold only to customers with Eisenbeiss gears, but also to customers with competitors' gears.

"Technically, [GearControl] works very well, but as an independent product one would do more work than necessary because Eisenbeiss is supposed to build gears and should concentrate on that. [...] It's a sales add-on, it's not a main product - it's easy."

Sales Engineer Gearing Service

For larger orders, Eisenbeiss now considers to install the oil sensor as a standard feature in Eisenbeiss gears, as the sensor would only have a marginal impact on the price of the gear. Though for smaller and less costly orders (e.g. extrusion gears), customers still seem hesitant because the installation of a sensor is perceived as unprofitable compared to the simple replacement of the gear. Eisenbeiss is thus thinking about alternative pricing models to adequately incorporate the new product in its portfolio.

Summing it up

Technically, GearControl is a full success and although Eisenbeiss is taking on a pioneering role with its new product, the firm faces some challenges: How can our customers be made aware of the usefulness of new product? What about data security issues in times of the internet of things? What should be the strategic role of the new product? Does it have the potential for a new field of business or is it just an add-on to our existing products? In light of the firm's goal of intensifying service and repair as a complementary area to their core activity, the manufacturing of gears, these are important questions to deal with.



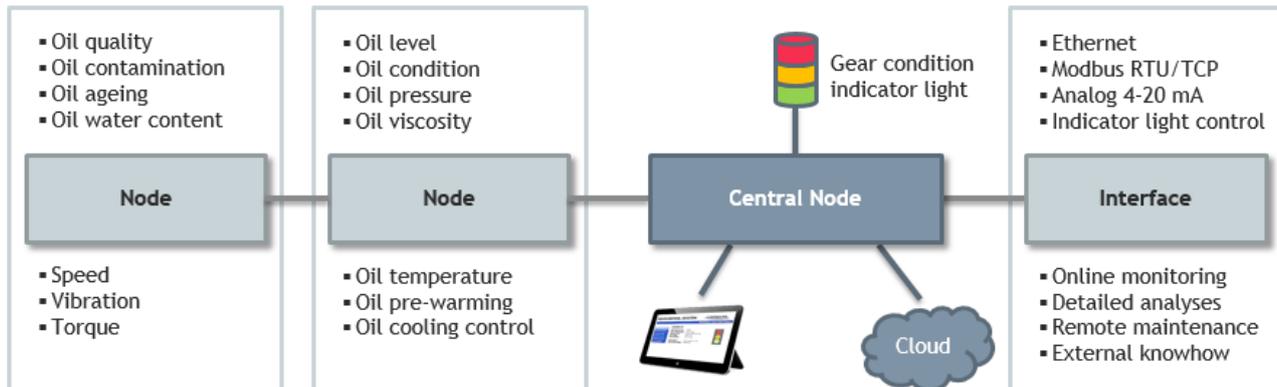
Questions for discussion

Use a business model canvas to illustrate the changes in Eisenbeiss' business model when introducing GearControl and specifically elaborate on the questions below.

1. Describe the product development process of GearControl. What could have been improved (e.g. with regard to customer integration, lead users, cooperation with external partners and moment of launching the product)?
2. Eisenbeiss struggles with the typical problems of a first mover on the market. What are the advantages and disadvantages of being first on the market?
3. Which distribution channels does Eisenbeiss currently use? Are there any problems you can detect in this regard? Which channels could increase the success of GearControl and how can they be established?
4. How could Eisenbeiss strengthen its value proposition? Think of aspects such as data security and transparency, after-sales service, GearControl as a standard feature or the care package.
5. How is the GearControl product line currently integrated into Eisenbeiss' business model? What different views does Eisenbeiss have on this? What could be improved?



Appendix A: How GearControl works



Source: Eisenbeiss GmbH

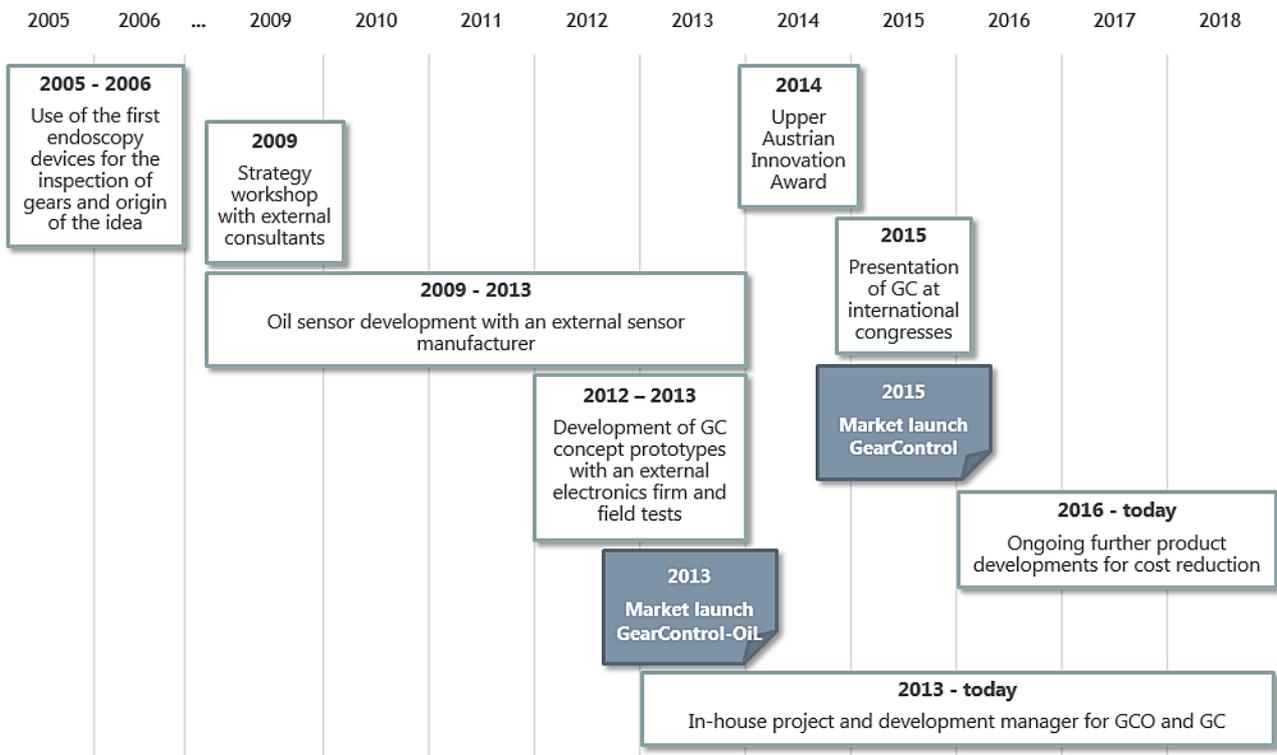
Appendix B: Comparison of GearControl versions

	GEARCONTROL-OIL®	GEARCONTROL	i:GEAR4.0®
Oil condition monitoring	x	x	x
Lubrication monitoring		x	x
Stress monitoring		x	x
Operating parameter monitoring		x	x
Gear condition monitoring		x	x
Operating parameter control		x	x
Remote maintenance		x	x
Operating parameter optimisation			x
Perfective servicing			x
Optimised maintenance intervals			x
GearControl-Care			x

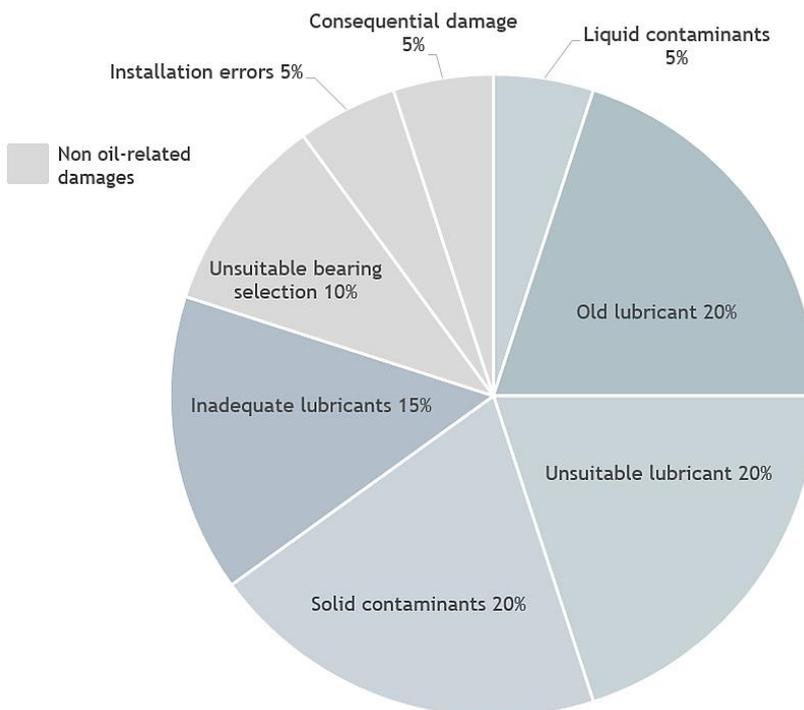
Source: Eisenbeiss GmbH



Appendix C: Timeline of product development



Appendix D: Reasons for gear damage



Source: FVA, 2009