60 YEARS

1951–2011

Stegne 37, SI-1000 Ljubljana, Slovenia

2

The first working team, 1951

The year 2011 marks a special anniversary for Magneti Ljubljana, d.d., as it celebrates 60 years of producing magnets. We can be proud of our rich tradition, as in the European Union this type of manufacturing is a true rarity. It has not been easy for us, as the company, throughout its history, has been subject to radical market changes, but although the origins of our production were humble and difficult, we have always had a clear vision for the future.

I took over the role of managing director of the company Iskra Magneti in 1986. From that day up until today we have invested heavily in development and quality and in that way we have developed technologically advanced and superb quality products for our customers, who are mainly well known companies from countries within the EU. Over the years of development we have also developed a wide range of different products, and are currently the only producer of AlNiCo magnets in Europe.

In recent years production has been difficult for us due to severe price competition from China and the economic crisis, which has most acutely affected the automobile industry. In 2010 we were also surprised by restrictive quotas on the export of raw materials from China, which limited our access to rare earth raw materials and caused their price to increase. As until recently the world's only operating mines for rare earth metals were in China we were very badly affected by these measures. Fortunately now the opening of new mines around the world is accelerating and I believe that after this difficult period better times are coming for our company, in which we will be able to compete at an equivalent level with Chinese suppliers.

Despite all these adverse factors we have not only survived but we have even succeeded in keeping pace with new technological advances and to develop new innovations of our own. So in 2010 we were successful in registering our own patent for NdFeB magnets. We have developed into a modern specialist European company, which produces high quality products and whose name is synonymous with quality even at a global level.

The fact is that for 60 years already Magneti Ljubljana has been striving to fulfil its mission, which is above all to satisfy the needs of its customers. The key to success has always been investment in development and quality. On the basis of quality and many years of reliable business we have gained the trust of our established customers and they continue to do business with us despite strong competition from China.

I believe that Magneti Ljubljana has a bright future and many opportunities for further growth, since in addition to existing markets many new areas are opening up where magnets are needed, such as hybrid cars, wind turbines and other areas of green technology.

My work presents me with a challenge which I meet with pleasure. It gives me great satisfaction that I have by my side a group of people who follow my ideas and decisions and whose innovation and productivity help improve the operations of our company.

I am also grateful to my predecessors who invested in and developed the company before me and enabled it to survive for many decades and achieve this honourable 60 year anniversary.

I would also like to take this opportunity to sincerely thank each and every individual, past and present, for their effort, support and loyalty. I believe that in the future we will continue to work together to build this story of success.

Albert Erman
Managing Director
Magneti Ljubljana, d.d.

60 YEARS 1951–2011

»Nulla tenaci invia est via«

"For the tenacious, no path is impassable" has been one of the guidelines of the director of the company Magneti Ljubljana, d.d. and his co-workers.

The company today is a small but significant producer of permanent metallic magnets in Europe. In today's unpredictable economic climate the company is confronted with numerous economic and technological challenges: high prices for energy and raw materials, China's monopoly on rare earth metals and the ever more stringent requirements of customers.

The Institute of Materials Engineering, Faculty of Mechanical Engineering, University of Maribor, has for a number of years cooperated closely with Magneti Ljubljana, d.d., in terms of both daily production support as well as in research and development. In support of production, cooperation has focused on providing quantitative and qualitative characterization of the microstructure of materials by using optical and scanning electron microscopy.

Cooperation on research and development began in the late 1980's with the development of continuous casting of AlNiCo magnetic alloys. In the 1990's cooperation expanded to the study of optimising technologies for sintered NdFeB magnets and the development of LaNi5 type alloys for hydrogen storage. LaNi5 type alloys for hydrogen storage are key materials for hydrogen storage in the form of metal-hydride and for production of nickel metal hydride batteries negative electrode (Ni-MH). During the project we tried replacing the conventional casting process with the fast solidifying "melt spinning" method, which increases the homogeneity and fine-grained microstructure, reduces the elimination of unwanted phases, and thus partially or completely avoids the need for further heat treatment. Exchanging the methods was shown to improve the current and energy performance of the electrode and extend its useful life.

Cooperation today is focussed on development of granular polymer bonded NdFeB magnets, where the company has identified new market potential. Demand for polymer bonded magnets in the automobile industry is constantly growing, and it is possible to use granules with the injection moulding process to produce large series of small permanent magnets with complex shapes.

That is our brief story, which here and now cannot and must not end. It cannot because of our stubbornness and persistence, and must not because our colleagues and all those around us, through their work and diligence, deserve a bright tomorrow.

Doc. Dr. Mihael Brunčko
Prof. Dr. Ivan Anžel
Institute of Materials Engineering,
Faculty of Mechanical Engineering
University of Maribor

The integration of knowledge into products

at the company Magneti Ljubljana, d.d., is globally considered to be at an enviable level

Magneti Ljubljana, d.d., is undoubtedly a company which has already been successful for 60 years. The main activities of the company are manufacturing magnets by gravity casting in a mask after the Croning procedure, manufacturing with sintered powders, and by injection moulding. In recent times we have jointly developed special dental alloys and other alloys. Magneti Ljubljana, d.d., utilises the complete range of magnetic materials, including AlNiCo, SmCo, NdFeB and polymer based materials.

The company has obtained in its years of development numerous quality certificates, which were essential for successfully marketing products with high added value around the world.

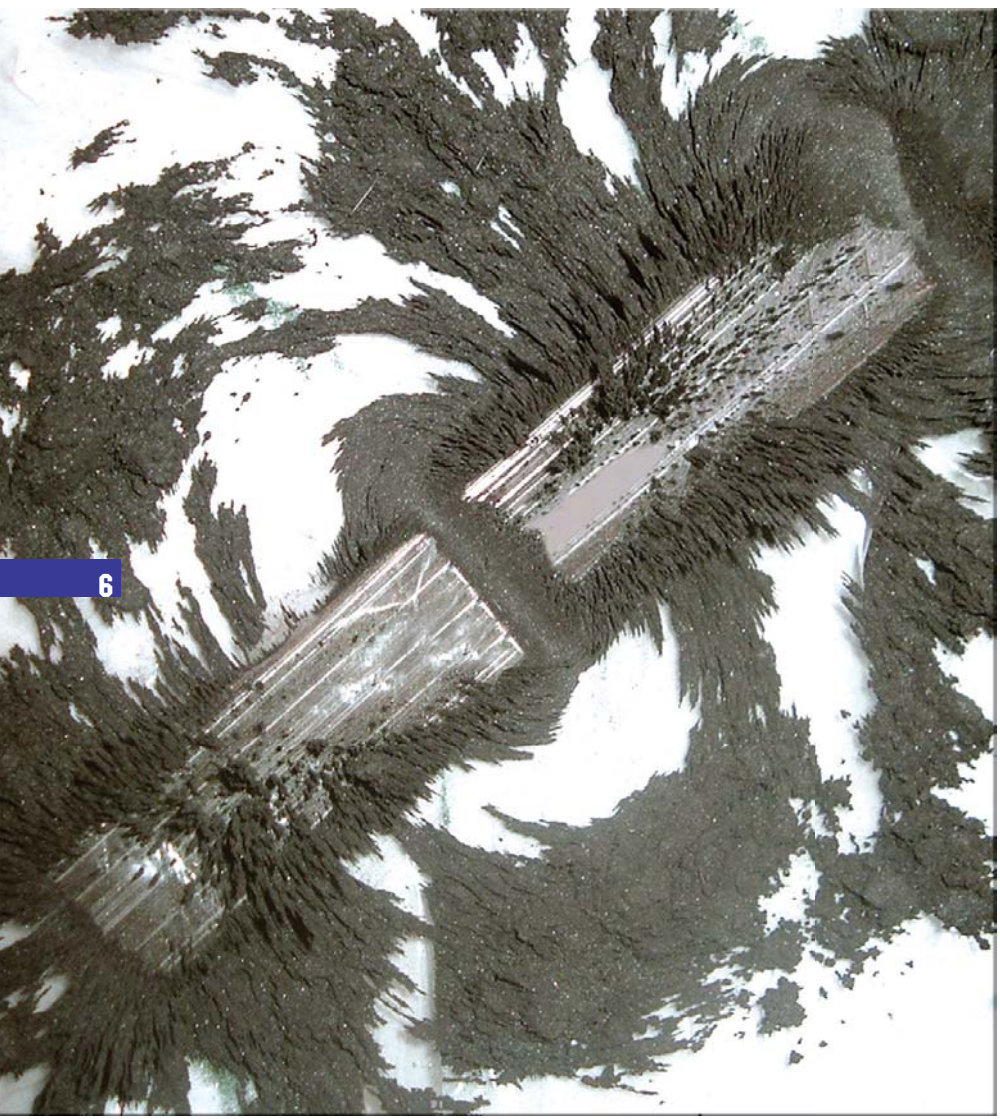
The integration of knowledge into products at the company Magneti Ljubljana, d.d., is at an enviable level, but it is clear that these results did not come about by themselves. It required a lot of hard work and sacrifice from managing director Albert Erman and his team for the company to develop to the level it has achieved today.

The company has its own development department, which actively cooperates with universities and other institutes. I would particularly like to stress that the company's success is the result of excellent cooperation and mutual understanding between professionals within the company.

Cooperation with the University of Ljubljana, Faculty of Natural Sciences and Technology, Department of Materials and Metallurgy, is undoubtedly important for both partners and represents an important part of the development of the company Magneti Ljubljana, d.d.

Prof. Dr. Primož Mrvar
Head of Department for Foundry
Faculty of Natural Sciences and Technology
University of Ljubljana

magnets
ARE ALL AROUND US



Today's way of life would be unimaginable without magnetic materials, which create their own permanent magnetic field.

So called permanent magnets are present in numerous accessories and devices. Without them digital watches would stop, radios and televisions would not work, all electrical connections would fail. The world as we know it today would cease to exist. The number of permanent magnets in the average household is around fifty, while for the needs of industry and the military this figure rises to more than a thousand.

But it was not always so.

The word magnet comes from the Greek *magnetis lithos*, meaning 'stone from Magnesia', a region on the coast of the Aegean Sea in modern day Turkey.

The earliest written records of the magnetic properties of materials come from more than 2500 years ago in India, China and ancient Greece. Even in such distant past times people had already discovered magnetic properties by observing the mineral magnetite, which mariners later used for making the first simple compasses.

The connection between electric currents and magnetic fields was discovered in 1820 by Hans Christian Oersted. Bringing a compass near a wire through which a direct electric current was flowing, he noticed that the needle of the compass turned perpendicular to the direction of flow

of the current. By moving the compass needle around the wire Oersted was able to investigate the magnetic field, which appeared in the form of a circle of lines of magnetic force around the wire.

Today, after more than a hundred years of research, our understanding of the natural forces of attraction and repulsion of magnets enables the use of magnetic resonance imaging in medicine, the development of computer components, televisions and other electronics. The properties of magnetic force do not only benefit mankind though, their use can also be found in nature. It is known that certain species of birds, butterflies and other insects navigate by sensing the Earth's magnetic field.

the history
AND DEVELOPMENT OF THE COMPANY

Origins

The first factory for permanent metallic magnets in Yugoslavia was established on the initiative of the Institute for Electrical Connections (IEV - Inštitut za elektro zveze) at the start of the 1950's because of the needs of the market. Production processes were started under the leadership of then IEV technologist and later director of the new magnet factory, Drago Zrimšek.

Production of the first cast permanent magnets in Yugoslavia was connected with signal generators, which were developed in 1951 in the workshops of the Metallurgical Institute in Ljubljana. The discovery made possible the process of melting metal cast in an induction furnace, then pouring it into sand moulds to create castings which had the necessary properties that allowed them to be magnetised.

In 1952 the factory was moved to premises previously used by a coffee roasting company, at Celovška cesta 207, where the mass production of aluminium-nickel alloy (AlNi) magnets began, for use in the manufacture of radio loudspeakers. The company employed twelve technical experts and scientists. The manufacture of more complicated magnets from aluminium-nickel-cobalt alloys (AlNiCo) was introduced in 1954 and is connected with start of the use of cobalt which enabled the

Former Milan Vrhunec coffee roasting plant located on Celovška cesta 207.

production of magnets of higher quality and smaller dimensions.

In 1959, the first efforts to start export activities had a major influence on the development of the company, triggering demand for higher quality and the use of more advanced technology.

Moving to new premises

Due to the political preference for conglomerates of companies, in 1961 the company became part of the ISKRA group of companies, more specifically, part of 'electronic industry elements' (IEZE – industrije elementov za elektroniko).

Greater demand for the company's products required an increase in production capacity, because of which the decision was made in 1963 to build a new factory at the company's current location in Stegne. Construction was completed in 1967 and the new premises, with an area of 1500m2, allowed the introduction of what was at that time the most advanced production technology.

In order to expand its product range in the area of sintered permanent metallic magnets the company bought its first Degussa sintering furnace, which is still in use today. It also imported a new 50-kilogram casting furnace from Switzerland with a Brown Boveri motor-generator, which greatly increased production capacity.

Due to the need for faster production of forms, the so called croning device was made within Magneti's production. This device has replaced manual production of forms with machine production. Both acquisitions have made possible the mass production of cast permanent magnets in the company.

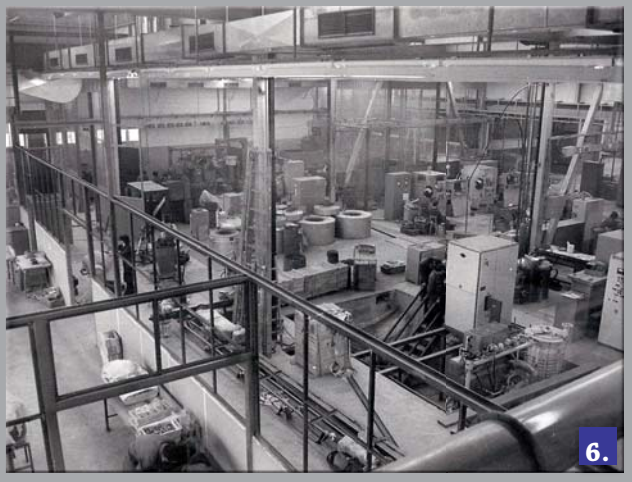
Period of Growth

With its new infrastructure the company was able to cover the entire demand for permanent metallic magnets in Yugoslavia. The main product at this time was hot pressed bonded magnets, which the company supplied for Siemens Italy.

Production was increasing, and the number of employees was also growing with it. The company employed 75 people and produced 100 tonnes of magnets a year. In 1980 work began once again on constructing extra production facilities, which was partly co-financed by the Yugoslavian People's Army (JLA – Jugoslovanska ljudska armada). The JLA also co-financed the purchase of a 15-kilogram vacuum casting furnace, a Leybold induction sintering furnace and a 100-kilogram Ema casting furnace. The acquisition of new business premises allowed a threefold increase in the companies production capacity. The production area was increased by 2300m2.

Production in the new facility started on the 30th anniversary of the founding of the company.

In 1986 the company's annual turnover totalled around 6 million German marks, of which 10 percent was accounted for by export activity, which took place through ISKRA Commerce. Half of the company's production was intended for the needs of Slovene industry, the other half for the Yugoslavian market and the military.



1. *Preparation of the construction site.*

2. *Erecting the roof, 20 February 1981.*

3. *Laying the foundations, 26 March 1981.*

4. *Covering the roof, 29 June 1981.*

5. *New production premises, Stegne 37, November 1981.*

6. *Production hall, November 1981.*

1951

30 years of ISKRA – magnet factory

1981

1.

2.

3.

4.

1. *Working team at 30th Anniversary.*

2. *In the old factory in Stegne.*

3. *In the new factory.*

4. *Working team on excursion in Ravne, 1965.*

5.

6.

5. *Magneti during construction.*

6. *Magneti factory in 1981.*

omenim le Mirana Jarca, ki ga žal ni več med nami.

Sami dobro veste, kako nam je postajalo tesno v starih prostorih. Vse večje zahteve po najkvalitetnejših magnetih na domačem in tujih trgih so nam narekovale gradnjo in povečanje strojnih zmogljivosti za našo proizvodnjo. Pol lanskega in vse letošnje leto smo gradili in ob tem delali tudi v težjih razmerah, zlasti zadnje mesece. Mislim, da je prav, da ob tej priložnosti pohvalim ves naš delovni kolektiv, ki je v mrazu in težkih pogojih pokazal, da zna in hoče delati.

7.

7. *In the laboratory of Dunja Gregorčič.*

8. *Former director of TOZD, Lojze Sever.*

let.

Hkrati so svojemu namenu predali nove delovne prostore in adaptirani del stare tovarne.

NEKAJ MISLI IZ GOVORA LOJZETA SEVERJA NA OTVORITVI

Direktor TOZD Lojze Sever je na proslavi 30-letnice najprej kratko orisal pomen zgodovinskega dne 29. novembra 1943 in narodnoosvobodilnega boja. Nato se je dotaknil prvih entuziastov, partizanskih elektronikov v Bazi 99 d v Starih žagah, oz. Črmošnjicah. Tako je po vojni iz strokovnjakov v Ljubljani in partizanov, ki so prišli iz Starih žag nastal Institut elektrozveze. To je bila prva ustan

8.

Tovarna magnetov na Celovški 1951.

Na tem inštitutu so rabili elemente za elektroniko in ker so bili izključno navezani nase, so se lotili tudi proizvodnje elementov. Tako so nastale tovarne kondenzatorjev, tovarna uporov, tovarna potenciometrov in leta 1951 so začeli pripravljati proizvodnjo magnetov in to je rojstna letnica naše tovarne.

Trd je bil začetek. Ni bilo strokovnjakov, ni bilo izkušenj, ni bilo prostorov, celo gradbenega materiala je manjkalo, da bi si zgradili lastne proizvodne prostore. Zato se je proizvodnja magnetov preselila v Pražarno na Celovški 207. Tu so leta 1952 nastali prvi magneti, ki so bili hkrati prvi trajni magneti narejeni v Jugoslaviji. Pionirsko delo v razvoju je opravil tehnolog in razvijalec Drago Zrimšek. Ves čas, od prvega dneva nastajanja prvega generatorja za proizvodnjo visoke frekvence in pri nastajanju prvega livarskega lonca je pomagal naš sodelavec, Miodrag Miloradovič.

To so bili prvi začetki. Sledil je nagel vzpon proizvodnje in tudi kvalitete magnetov. Prav naša Tovarna magnetov je omogočila, da so nastali prvi domači radijski zvočniki z našim magmetom. Leta 1967 pa se je naša tovarna preselila v nove lastne prostore tu v Stegnah, to so bili prostori, v katerih smo delali do lanskega leta. Tu je nastajala nova tehnologija dela, tu smo začeli z izdelavo vse kvalitetnejših magnetov, kjer so imeli velike zasluge naši razvojniki tehnologi, naj kaj nedovršenega. Novi delovni prostori bodo omogočili uvesti novo tehnologijo dela. Nova strojna oprema pa nam bo dovoljevala do 5 krat povečati proizvodnjo v lažjih lepših in bolj zdravih pogojih dela. Delali bomo vse sedanje oblike magnetov, vendar bomo izdelovali tudi nove, zahtevnejše, ki bodo zahtevali povečal, saj bomo pri povečanem obsegu dela rabili več ljudi, zlasti strokovnjakov za novo tehnologijo in vzdrževalcev.

Prostori, ki smo jih na novo zgradili merijo 2000 kv.m, hkrati pa smo docela prenovili tudi stare prostore in zdaj imamo za svoje delo na voljo 300 kv.m kar je stalo okrog 130 milijonov dinarjev.

Gradbena dela v novi hali je opravil velenjski Vegrad, adaptacijo pa ljubljanski Gradis. Za sodelovanje se zahvaljujem vsem sodelavcem teh dveh gradbenih kolektivov, prav tako delavcem v investicijah delovne organizacije v SOZD in bankah.

Mislim, da govorim iz srca vsem, če rečem, da smo z resnim 30-letnim delom take pogoje dela zaslužili, s to investicijo pa smo odprli vrata novi, sodobni, avtomatizirani in perspektivni proizvodnji. Še več bomo prispevali za jugoslovansko elektroniko, še več bomo tudi izvozili.

Ob tridesetletnici čestitam vsem jubilantom dela. V novi tovarni pa želim vsem nam: „Srečno“.

F. Kotar

V TOZD SPECIALNI ELEMENTI so v petek, 20. novembra, na skromni pa prisrčni slovesnosti podelili nagrade in priznanja jubilantom 30, 20 in 10-letnega dela. Na slovesnost so povabili tudi upokojence in krvodajalcem so podelili priznanja. Vse je pozdravil namestnik predsednika Delavskega sveta Vido Hatze. Zahvalil se je jubilantom za zvestobo Iskri in upokojencem za njihov prispevek pri ustvarjanju temeljev za delo v Iskri SEM. Jubilejna priznanja so prejeli: za 30 LET: Anton Polajnar in Jože Kervin. Za 20 LET: Magdalena Jurič, Franc Korošin in Peter Šiler. Za 10 LET: Franc Miklavčič.

Development of the magnet factory was followed by Slovenian newspapers. This article was published on the 30th anniversary of Magneti Ljubljana, d.d.

Change of Company Management

In 1986, the then managing director Mirko Čokan, who was the catalyst for directing the company towards production of samarium-cobalt (SmCo) magnets, was replaced by the current managing director Albert Erman.

On taking over the role Erman completed and implemented the necessary investment plan for the SmCo magnet production line, which began operation in 1988, and increased production capacity for sintered AlNiCo magnets, which in turn required large investments that were financed by loans and grants.

Leaving the ISKRA Group

A period of high inflation and the start of Slovene independence, which began in 1989, signified one of the most difficult periods in the history of the company.

The company had since 1961 been part of the ISKRA group, which meant amongst other things that it did not have control over its own cash flow. Its assets were also used for financing of other basic organisations of associated labour (TOZD - Temeljna organizacija združenega dela) in the ISKRA group. The lack of autonomy encouraged the company management to start the process of leaving the group.

On 15 November 1989 the company became the first TOZD to leave the ISKRA group, an act which was not in line with the prevailing ideology at that time and which provoked many negative responses. Withdrawal from the group required a lot of work on the reorganisation of the company, establishing its own commercial, financial and human resources departments, which had until then been organised as part of the ISKRA group common departments.

On the basis of a contract for the transfer of company assets and restructuring, the internal purchase of 55% of the company from the Republic of Slovenia fund for development was done on 2 November 1992. The price of the company after official valuation, which was carried out by a German company, was 1,682,000 DEM (German Mark). This was lower than it would have been otherwise, due to the negative business in the years 1989-1992. The biggest problem was presented by the condition that for privatisation 20% of the aforementioned amount had to be secured in cash. With privatisation of the company today's ownership structure began to take shape.

Slovene independence for the company meant the loss of the Yugoslavian market, so it was forced to break into the European market. In the first year after the country's independence the German company Bosch offered strong support to Magneti Ljubljana, with which cooperation had started in 1987 and still continues successfully today.

The Award of Quality Certificates

In 1993 the company gained the ISO 9001 quality certificate, which prescribes standards for the fundamental questions of quality management and the main principles of management. This was the first of numerous quality certificates awarded,

KAJ, KAKO, ZAKAJ

Tovarna Iskra Magneti je novembra pridobila certifikat kakovosti ISO 9001

Kakovost prežema tovarno

Inovatorjem so letos izplačali za 115.000 mark nagrad ali 20 odstotkov vrednosti prihranka

»Zadovoljni smo s kakovostjo magnetov, ki ste jih dobavili v tem letu, in se vam zahvaljujemo za vaše zavzeto in pozitivno sodelovanje. Prepričani smo, da boste raven kvalitete izdelkov obdržali in še izboljšali ter s tem utrdili že tako uspešno sodelovanje z našim podjetjem,« je med drugim zapisano v pismu, ki ga je direktorju tovarne Iskra Magneti d.d. Albertu Ermanu poslal direktor firme Bosch iz Nürnberga. Iskra Magneti je 100-odstotni dobavitelj magnetov, ki jih Bosch vgrajuje v zavorne sisteme ABS. Sredi decembra bodo v Iskri Magnetih, kjer izdelujejo najrazličnejše vrste magnetov, dobili v roke certifikat 9001. Certificiranje je 9. in 10. novembra že opravilo nemško združenje za certificiranje sistemov kakovosti DQS.

Pismo direktorja Boscha in standard ISO 9001 nista naključje, saj pogovor z direktorjem Ermanom pokaže, da so si v minulih letih zastavljali vedno nove in nove cilje in jih tudi dosegali. Cilj – ISO 9001 – so si zastavili pred tremi leti in pričeli trdo delati. »Bistvo tega standarda je, da je vsaka faza dela natančno opredeljena. Proizvodnja magnetov terja visoko, izredno zahtevno tehnologijo, ker je procesna in terja ogromno znanja. Hkrati je to izjemno rizična proizvodnja, saj je tehnološki razvoj pri kupcih zelo hiter. Tako smo, denimo, v trenutku izgubili kupca za 30 odstotkov naših izdelkov, ker je pričel izdelovati telefonsko slušalko brez magnetov. Pred dvema letoma se nam je zgodilo, da so cene niklja in kobalta na borzah v enem mesecu poskočile za 100 odstotkov. Zato moramo voditi tovarno ciljno. Cilji so zapisani in izobešeni po vsej tovarni, da vsi vedo, kaj želimo doseči. ISO 9001 pravzaprav pomeni, da ves postopek izpeljemo ekonomsko optimalno. Vse postopke izvajamo po zahtevanih tehnoloških predpisih. Pri nas ni več delovnega mesta, ki ne bi bilo predpisano. Kakovost tako ne pomeni le kakovosti izdelka, je način opravljanja vsakega dela, od medsebojne komunikacije naprej, s tem da je jasno opredeljena odgovornost vsakega zaposlenega. Pri nas se ve, kdo pije in kdo plača,« je pojasnjeval direktor Albert Erman, ki je v podjetje prišel pred dobrimi sedmimi leti. Takrat so pet odstotkov proizvodnje izvozili na Zahod, 50 odstotkov v druge republike Jugoslavije, ostalo pa so prodali v Sloveniji.

»Inovacije so nas rešile…«

V podjetju jih od 150 delavcev 100 dela v proizvodnji v dveh, po potrebi tudi v treh izmenah. »Letošnji promet znaša 9,5 milijona mark, prihodnje leto načrtujemo 12 milijonov mark. Kljub tako dobrim rezultatom ne bomo povečali dobička. S 30-odstotno povečanim obsegom proizvodnje bomo dosegli enake rezultate, ker smo morali cene znižati, sicer ne bi mogli prodajati. Konkurenca je izredna in lahko rečem, da so nas rešili inovatorji. Cene smo lahko nižali le na račun inovacij. Inovatorjem smo letos izplačali za 115.000 mark nagrad ali 20 odstotkov prihranka, ki so jih podjetju prinesle inovacije. Sodelujemo tudi z različnimi inštituti, ministrstvo za znanost in tehnologijo nam sofinancira štiri naloge, vendar ugotavljamo, da znajo v laboratorijih marsikaj narediti, velike težave pa nastanejo pri prenosu v proizvodnjo. Zato zahteve do inštitutov vedno bolj zaostrujemo. Hočemo imeti rezultate,« pravi direktor Erman.

Albert Erman: »Tovarno vodimo ciljno… «

Njihova konkurenca niso več proizvajalci z Daljnega vzhoda, temveč iz Poljske, Češke, Rusije, kjer imajo manjše dajatve državi, sicer pa največ izvažajo v Nemčijo, na Madžarsko in v Turčijo, letos 64 odstotkov proizvodnje, ostalo (za 2,5 milijona mark) pa prodajo doma. Vso povečano proizvodnjo (za 2,5 milijona mark) bodo v letu 1994 prodali na tuje. Zato da bi lahko tekmovali s konkurenco, vsako leto vložijo v razvoj od pet do deset odstotkov prihodka. Kljub tem poslovnim uspehom pa direktor Erman ugotavlja, da delničarji ne bodo mogli odkupiti podjetja.

Podjetje Iskra Magneti je s Skladom za razvoj sklenilo pogodbo o prenosu družbenega kapitala in preoblikovanju v delniško družbo. V skladu s pogodbo je podjetje za zaposlene odkupilo 55 odstotkov delnic, preostalih 45 odstotkov pa naj bi jih odkupilo v naslednjih sedmih letih, za kar so ga pooblastili delavci. Do odplačila celotne kupnine delničarjem ne bodo izplačevali dividend. Po tolmačenju nekaterih strokovnjakov bo moralo podjetje za tisti del dobička, ki bo nekaj let namenjen za odkup podjetja, plačevati od 62,5 do 65 odstotkov davka. Albert Erman, ki meni, da bi morali spodbujati notranji odkup podjetij, ne pa ga dvojno obdavčevati, skuša to vprašanje rešiti na ministrstvu za finance.

ALENKA VILFAN

An article about quality being the main aim of the company, which acquired standard ISO 9001 in November 1993, was published in the Slovenian daily newspaper Dnevnik on 13 December 1993.

which were a condition for the commencement of the company's serious entry into the European and world markets.

In 2000 there followed the award of certificates ISO 14001 and VDA 6.1. ISO 14001 is a standard which regulates responsible environmental practices. It applies to the fulfilment of legal requirements, the efficient use of resources and preventing pollution of the environment. It represents one of the most important tools used by organizations worldwide in order to limit the problems that their activities pose to the environment. VDA 6.1 is a German quality standard for management and production processes.

In 2002 and 2003 there followed the award of certificates ISO/TS 16949 and OHSAS 18001. ISO/TS is a standard which regulates the quality management system and gives special emphasis to the prevention of defects and control of the entire supply chain. OHSAS 18001 regulates the area of management of employees' safety.

Because of the company's goal to enter the market for the rail industry the company has started activities for gaining the IRIS certificate, which is the reference quality standard for the rail industry.

Introduction of Technological Solutions

The development of the production process has been strongly influenced by the introduction of information technology solutions. Investment and innovation in the fields of automation and information technology has allowed automatic control of the production process and the elimination of the effect of human error.

In 1993 the company introduced a system of computerised records with information on the state and plans of production, which enabled better optimization of the whole production process. Furthermore, significant progress in the integration of the production sector and sales was made by the implementation of a system of computer terms and confirmation of internal orders, which was introduced by the company in 1996.

The New Millennium

Like most industrial activities the manufacture of permanent metallic magnets has been subject to constant competitive pressure. In the last fifteen years the majority of factories in Europe which were engaged in the production of AlNiCo magnets and rare earth magnets (Remag) have closed down.

Ever fiercer competition in the market required significant investment in development for optimization and cost reduction of existing processes and the introduction of new products.

From being a manufacturer of permanent metallic magnets for the needs of domestic industry, Magneti Ljubljana has succeeded in growing to become a world-class company, both in terms of volume of business and control of business processes. In a very short time there has been a substantial increase in the product range. The purchase of a vacuum sintering furnace in 2001 enabled mass production of SmCo magnets. The same year production of polymer bonded magnets began, and after the expiry of the patent rights of the Sumitomo company in 2008 production of

"Certificates were important for the development of the company, as they defined each working phase and in this way enabled that the same result was achieved without unnecessary additional activities. In practice this meant that employees commenced to work in accordance with the standard regulations of the working post"

Marko Mrak, Head of the Production Department Magneti Ljubljana, d.d.

1 *and* **2.** *Construction of the extension, 15 March 2005.*

3 *and* **4.** *Construction of the extension, May 2005.*

5. *Production hall, Stegne 25*

6. *Connecting bridge.*

1, 2, 3 *and* **4.** *Our customers in our company: Bosch Eisenach, Alstom, Maxon and Hager Group.*

5. *Director of the company and the president of the supervisory board visiting China.*

6. *Signing the long term loan agreement with SID bank.*

New business premises in the extension of the building located at Stegne 37.

neodymium iron boron magnets (NdFeB) finally began as well.

Expanding the product range required growth in production capacity, so the business premises at Stegne 25 were purchased in 1998, with an area of 1800m2, where production of SmCo magnets moved at the start of the new millennium.

Construction in 2003 of a 2000m2 extension to the building at Stegne 37 was followed in 2008 by the purchase of additional land and business premises adjacent to Stegne 25.

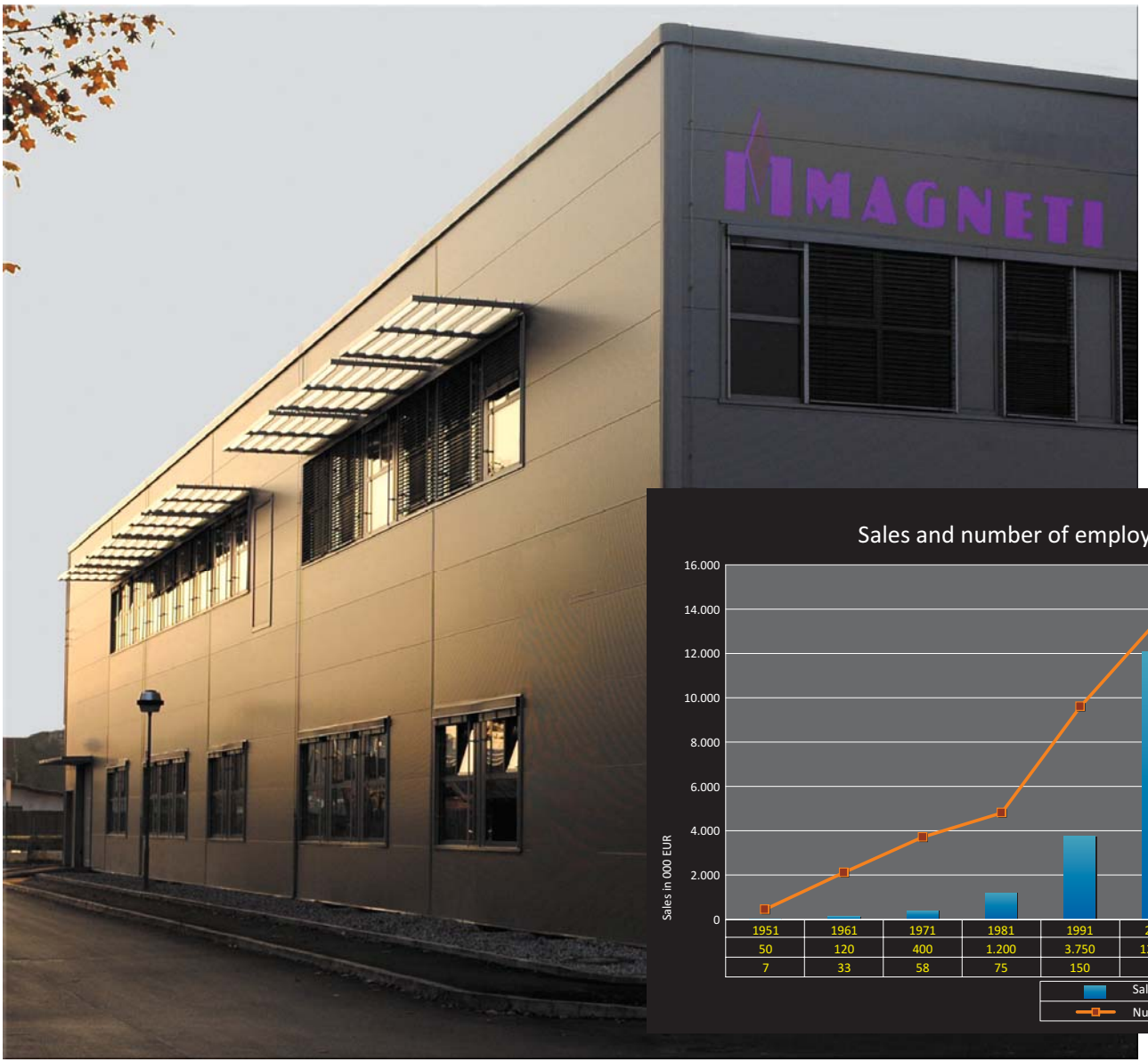
The Company Today

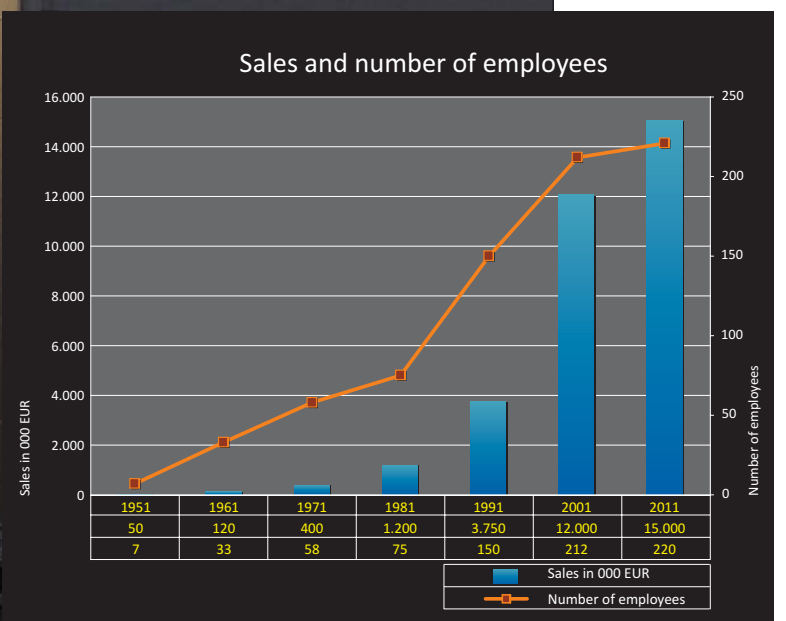
In the market for magnetic materials from rare earth metals conditions are becoming strained. The effects of the economy are unfavourable, access to raw materials is limited, competition is strong, and there is a trend of declining sales prices that is particularly evident in the automobile industry, which represents Magneti Ljubljana's largest market.

Today the company strives to adjust to the demands of a growing market by exploiting competitive advantages such as knowledge, creativity, tradition and flexibility. The key long-term goal is to increase market share and maintain the position among the leading producers of permanent metallic magnets in Europe.

The company's activities are primarily focused on the fast and efficient development of new products and the cost optimization of existing and new complex products and systems with greater added value, reducing the quantity of waste, increasing the proportion of secondary raw materials

WE STRONGLY BELIEVE THAT BY ATTAINING THE SATISFACTION OF OUR SHAREHOLDERS AND EMPLOYEES AND HAVING A PROFESSIONAL APPROACH, WE WILL BE ABLE TO CONTINUE OUR MISSION IN THE FUTURE.





and recycled materials used, achieving the most favourable purchase prices for basic raw materials and services, optimizing energy use and the automation of labour intensive operations and operations where customers require “zero defects”.

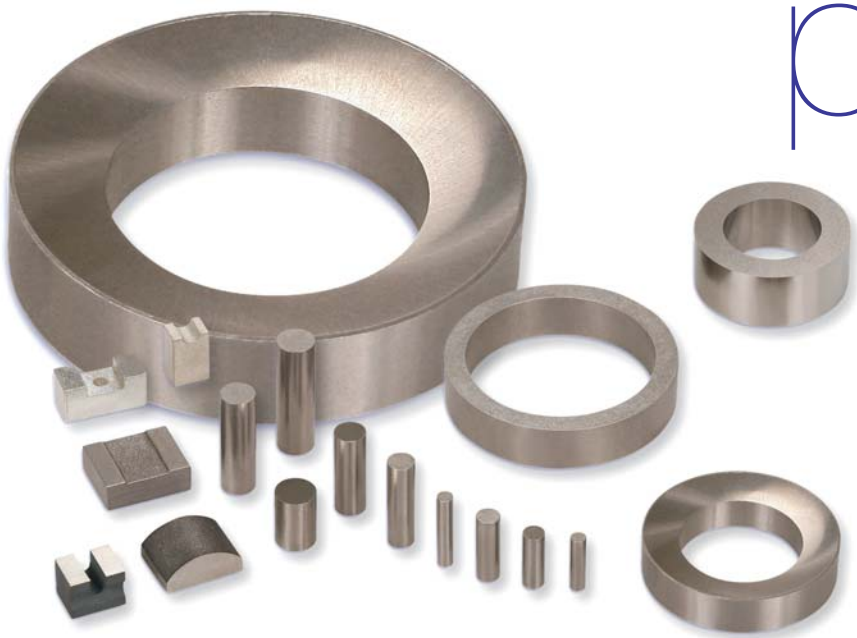
With its development plan the company wishes to diversify the production program and develop materials which are tailored according to customers’ specific needs, and follow technological trends in high-tech industries, particularly the automobile industry and the manufacturing of sensors, measurement instrumentation and professional electronics. We are developing programs which have potential for growth and have an effect on improving fuel efficiency and reducing CO2 emissions in all types of internal combustion engines, thereby increasing the competitive advantage of our customers and complementing the main business activities of the company.

The company gives a great deal of attention to caring for the safety of employees at work, realising that everyday production work means exposure to various possible risks. Since the acquisition of occupational health and safety OHSAS certification in 2003 there has been noticeable progress in the productivity of employees. The management of Magneti Ljubljana are aware that its capable and loyal employees are the greatest asset of the company and will therefore continue to strive for their professional development and collective welfare.

1. *Management team in 2011.*

2. *Work team of Magneti in August 2011.*

products



LIMAG

Magneti Ljubljana d.d. has been producing cast AlNiCo magnets for more than 50 years. This experience and the necessary technical knowledge for the manufacture of this type of magnet assures that all the needs of customers are fulfilled. Because of their greater density, cast AlNiCo magnets have stronger magnetic properties than sintered magnets of the same class. On the other hand, due to economic reasons, casting technology, in comparison with sintering technology, is usually more suitable for producing magnets of larger dimensions.

SIMAG

As well as cast AlNiCo magnets Magneti Ljubljana d.d. has also been producing sintered magnets for decades. Market proven efficiency in manufacturing this type of magnet assures the fulfilment of all customers specific needs. Due to the slightly lower density of sintered AlNiCo magnets they generally have slightly lower magnetic properties compared to cast AlNiCo magnets. However, due to the different production process more complex shapes can be created. Sintering technology is due to economic reasons more suitable for producing AlNiCo magnets in smaller sizes and more complex shapes.

REMAG

Magneti Ljubljana d.d. produces two different types of high energy magnets from rare earth metals: samarium cobalt magnets (SmCo5, Sm2-Co17) and neodymium iron born magnets (NdFeB).

SmCo

In comparison with AlNiCo magnets, SmCo magnets have much higher coercivity, which means that they require more force to demagnetise them. In comparison with NdFeB magnets, SmCo magnets work at higher operating temperatures and have better temperature stability. Due to their high magnetic properties they are particularly suitable for applications where the relationship between magnetic properties and the size of the magnet is very important.

NdFeB

NdFeB magnets can be produced with numerous grades of magnetic properties. Although their maximum working temperatures are generally lower than for AlNiCo and SmCo magnets and they have worse corrosion resistance, NdFeB magnets are used for a wide range of applications.
Today NdFeB magnets (both sintered and bonded) have the dominant share of the permanent magnet market.

Polymer bonded magnets

The company began producing polymer bonded magnets in 2001. It is therefore a relatively new part of the production range, but one which is growing from year to year, and is expected to continue to grow in the future. Magneti Ljubljana d.d. produces various types of polymer bonded magnets, based on a number of types of magnetic materials and binders.

Polymer bonded magnets are the most suitable for products of very complex shapes and a wide range of dimensions and magnetic characteristics.

Magnetic Systems

Magneti Ljubljana d.d. has many years of experience of the production and supply of different types of magnetic systems, for example gripping/holding magnetic system and systems which are used as components in different measurement and sensor systems and in different types of electric motors.

Sintered Iron Structural Parts

Magneti Ljubljana d.d. can manufacture different types of sintered iron structural parts to customers specifications.

Soft Magnetic Composites

Soft magnetic composites for different types of electric motors and other applications can be made depending on the materials commercially available to Magneti Ljubljana d.d.. Tools and production processes are designed in accordance with the customer's specifications.

Special Vacuum Cast Alloys

Magneti Ljubljana d.d. has production capacity for vacuum casting and heat treatment of numerous types of specialist alloys, such as copper based alloys, alloys for hydrogen storage, alloys for batteries, dental alloys, and various other types of master alloys.

FOR 60 YEARS MAGNETI LJUBLJANA D.D. HAS STRIVED TO FULFIL ITS MISSION. SIXTY YEARS OF CONSTANT ACTIVITY AND SATISFACTION OF CUSTOMERS AND THEIR REQUIREMENTS FOR QUALITY, QUANTITIES, PRICES AND DELIVERIES.

gallery
OF PRODUCTION MACHINES

Fanuc LR Mate 100i robot, 2001

Automatic unit which doses magnets, magnetises them and measures magnetic flux. Magnets are then demagnetised and separated into magnetically good and bad magnets.

MM5 machine for magnetic measurement, 2004

Use of Hall effect sensor to measure magnetic properties enables the device to operate continuously.

AMM-R1 and AMM-R2 machines, 2005

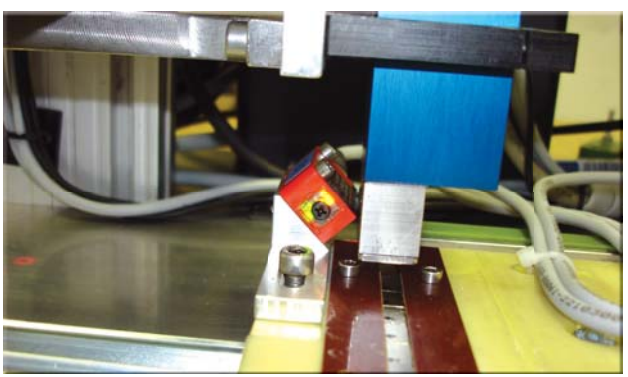
Machine with new technological solution for performing the manipulation of magnets during the measuring procedure. During development the problem was the measurement principle, as due to their small size it was not possible to grasp magnets with a classic mechanical gripper. Therefore the procedure uses a vacuum suction system.

Robotic unit for injection moulding, 2007

The core of the unit is a cartesian robotic manipulator, which transports pallets with injected components from the machine tool to the operator and inserts pallets with parts for injection into tools. The job of the operator is to fill and empty the pallets.

ADM1 machine, 2008

Machine for controlling the dimensions of rod shaped magnets, which uses lasers to check the dimensions of the magnets and in the case of too great a deviation eliminates them.



Machine for labelling magnets, 2010

Due to the trend for customers labelling magnets, we have developed in the company a machine which prints a spot at the desired place on the surface of the magnet.

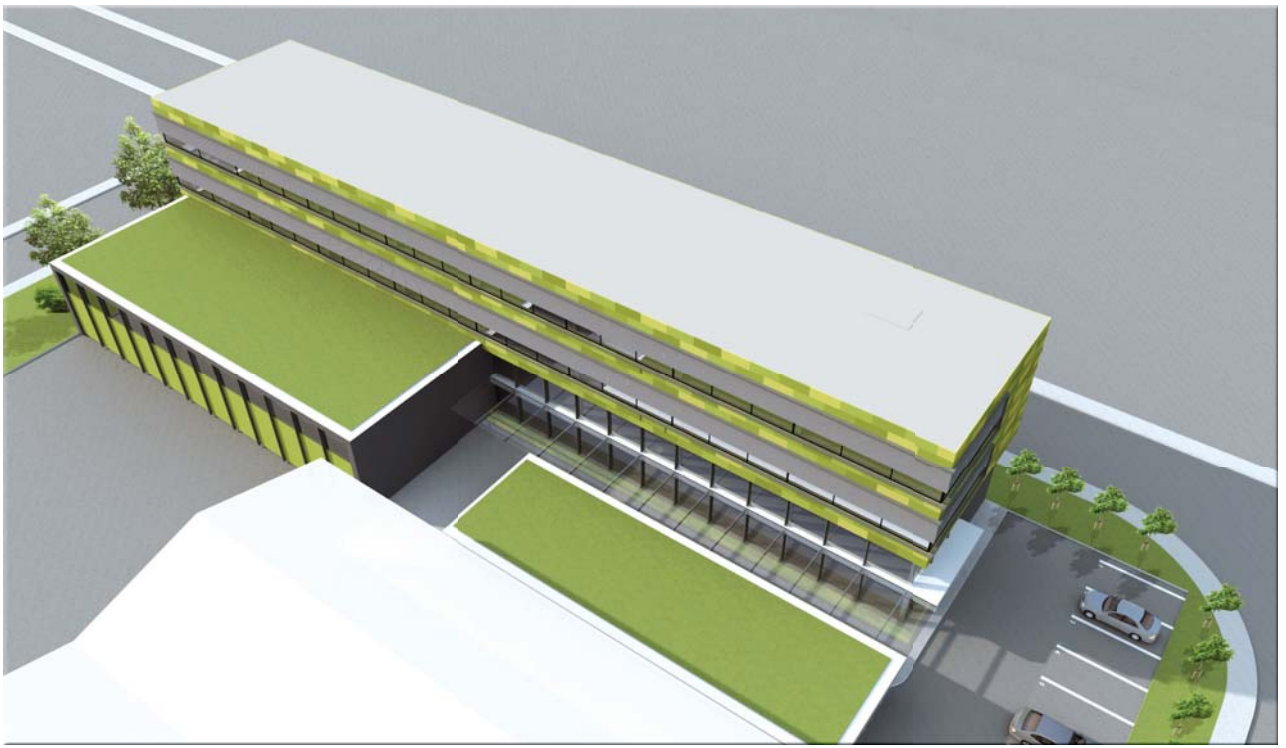
The machines presented are just a few of around thirty which have been introduced in the company since 1997. The development is the product of the combined work of a wide circle of colleagues.

vision

Quality products, precision, punctual delivery and quick response to all our customers demands are especially important for the satisfaction of our customers. Special attention will continue to be paid to expanding the culture of innovation, which will contribute to improvement in every business process. With training for every employee and quality recruitment we will improve the level of ability for every work area and for new programs or projects.

By 2015 Magneti Ljubljana wants to increase its market share among global producers of Remag SmCo, NdFeB and polymer bonded magnets. With the planned opening of new rare earth mines around the world the company will be able to avoid strong price pressure from Chinese manufacturers and so achieve greater competitiveness in the marketplace. Increasing production volume will be achieved with sales in the Asian, African and North and South American markets.

Special emphasis will be given to technology for recycling all waste materials and the introduction of the production of different types of vacuum fusion alloys. The company has defined as one of its main goals, market penetration in the areas of rail transportation, wind energy and other green industries.



milestones

1951	The company is founded, on the initiative of the Institute for Electrical Connections
1952	The company moves to the former premises of coffee roaster Milan Vrhunec at Celovška cesta 207, where production of AlNiCo magnets begins
1962	The company joins the ISKRA group
1967	The company moves to its present site
1981	The first extension to the site is built
1988	Production of SmCo magnets begins
1989	The company leaves the ISKRA group. Manufacture of the first vacuum furnace, and purchase of the office building at Stegne 25
1992	Successful Privatisation of the company
1993	Awarded ISO 9001 certificate by DQS
1995	The company is renamed Magneti Ljubljana, d.d.
1999	Production of magnetic systems begins
2000	Awarded certificates ISO 14001 BVQi and VDA 6.1 BVQi
2002	Awarded certificate ISO/TS 16949 BVQi
2003	Awarded certificate OHSAS 18001
2004	Construction of new production facility
2009	Production of NdFeB magnets begins

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