

“Probably,
they’ll always need it...”



1938 · | · 2013

75 years of capacitor production in Gera

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A chronicle on 75 years
of capacitor production in Gera

by Stefan Hochsattel



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Greetings



When the SIEMENS corporate group set up a new capacitor manufacturing unit in Gera, this laid the foundation stone for an economically powerful enterprise. An important impulse for sustained economic growth was set for the entire region of Eastern Thuringia. Soon after its establishment, the capacitor factory became the largest and most important factory in the city of Gera and the whole region. Its significance for the region holds good until today.

After German re-unification, the company could establish a foothold in the free market and grow to become one of the worldwide leaders in their line.

Important for the success of this company is the remarkable elan and the confidence of its management and employees with which they have mastered deep-impacting existence-threatening interventions. For the first time, in the post-war confusion with occupation and dismantling, and for the second time during the difficult years of re-orientation after the peaceful revolution of 1989.

It has always been the medium-sized enterprises that have given the processing industry in Thuringia its economic weightage. It is the endurance power of their entrepreneurs coupled with the motivation of their employees that has ensured that the economy in Thuringia is back on its feet and has shown considerable growth rates. Who would have thought many years back that Thuringia would have a lower rate of unemployment than, for example, the large state of Northrhine Westfalia?

ELECTRONICON in Gera is an example of a medium-size enterprise that is deeply rooted in the region and knows to combine the advantages of Thuringia as an industrial location with its own entrepreneurial expertise. The example of the Geran capacitor builders shows that it's not always imperative to have high technology

only; even well-established products and components that look "simple" at a first glance can be produced in a competitive manner in Germany and will continue to do so.

The products of ELECTRONICON play an important role in one of the fundamental challenges of our time: the turning towards a more efficient and sustained utilization of the limited energy resources of our planet; this is only possible by using innovative solutions for producing, transmitting and using electrical energy.

For this important task, I wish the traditional company ELECTRONICON and all its employees success, happiness and creativeness.



Christine Lieberknecht
Prime Minister of the State of Thuringia

Preface



Between 1993 and 1994 many of my friends and relatives often asked me: "Why are you fighting for a trust company that has emerged from a broken down government-owned enterprise and is - with just a fraction of the erstwhile number of employees - still in losses"? When I then drove to Berlin in 1994, two days before New Year's Eve, to sign the not-so-appealing

contract for purchasing ELECTRONICON, some really believed that I had totally gone mad.

I had my initial contacts to the capacitor builders in Gera in the sixties. My company in Merseburg needed capacitors for the production of reactive power compensation systems. We were in a planned economy; there was no alternative to the capacitors from Gera. We never received as many capacitors as we needed, only as many as the State had assigned to us. Sometimes the nice ladies of the Sales department managed to get a few more - something I then rewarded with a small gift.

Towards the end of the seventies, I was lucky to build up the company SYSTEM ELECTRIC in Hessen, West Germany. Even here, we couldn't have done without capacitors; but now we had many alternatives. In order to be competitive in the free market economy, I laid great emphasis on quality; however, there were sometimes problems with the capacitors we purchased and our supplier at that time could not, or did not want to, implement my technical requirements. It was always clear to me that a good capacitor was a lot more than just two long strips of metallised film. It was at such a time that I remembered the capacitor builders from Gera. Although earlier, they had never been in a position to deliver the numbers of capacitors that we needed and definitely not at the time we needed them, their quality had always been right.

In the beginning, I purchased the capacitors from Gera by paying in hard currency via the GDR Foreign Trade Import/Export; later, after re-unification, through direct contact with the Gera capacitor builders. The times had changed and the people, especially those in sales, needed to change their attitude as well. They did not allocate anymore - they just asked how many capacitors of which model I needed, and now the purchase had often to be rewarded with a small gift to the customer. We should never forget what a long and difficult way this has been for the people.

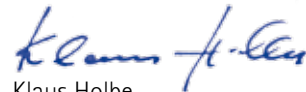
It is almost a given thing that the quality of the capacitors from Gera was always right. When there was then the opportunity to acquire ELECTRONICON, it was for me a done thing, too, to submit an offer because it is the dream of most PFC equipment makers to have their own capacitors. However, this was not all that easy. The privatisation of ELECTRONICON was a thriller from the first to the last day and I will not hide the fact that the path was not easy for many. The only thing that matters today is: We were successful and our ELECTRONICON has become a globally recognized specialist for film capacitors despite all prophecies of doom that had forecasted a collapse. Capacitors from Gera are today ensuring safe operation in millions of household appliances and luminaires, in high speed trains, wind parks, in the automobile industry, in steel plants, on ships, on oil rigs and in hundreds of thousands of variable speed drives.

Practically, nothing moves without capacitors in the field of power electronics engineering and I am convinced that this will remain so for quite some time. But we have to face the fact that the number of competitors and duplicators is increasing.

We cannot, and do not want to be the cheapest ones. But we can do all that is in our power to be the best possible partners to our customers. For this, we are offering innovative problem solutions that provide great benefits to the customer in visible quality - conceptualized and manufactured in Germany.

With a thanks to Mr. Hochsattel for successfully working on the history of the Gera capacitors, I wish that the capacitors from Gera will continue to be applauded by the technical world in the 75 years to come. We should all be proud to contribute to the same.

Sincerely



Klaus Holbe
CEO

Parkstrasse 1, from 1942
Gera's "first address"
for capacitors



The Beginning: SIEMENS in Gera



Land was just too expensive and labor very scarce - this was the situation in the Berlin of the outgoing nineteen-thirties when, under the pressure of the rapidly rising need for components of radio and transmission technology, SIEMENS&HALSKE introduced an expansion of the production of components. In the run-up to the upcoming war, strategically important companies were explicitly asked to expand with additional production sites in lesser exposed areas. Hence, on the 24th November 1938, the company rented the land and buildings of the deceased shoe manufacturer Kobitzsch in Gera for expanding its capacitor manufacturing facilities; the goal was to build there a new factory of the Capacitor Technology division of "Wernerwerk R". Organizationally, the 460 employees that were initially engaged in Gera were first placed under the Arnstadt factory for Radio Engineering; they wound and assembled vaseline-impregnated paper capacitors for applications in the radio and telecommunication industry.

Having started as an ancillary supplier for radio production in Arnstadt, the factory received a major thrust after the outbreak of the war: a new building was erected on the expanded site of Neue Strasse 16 in the year 1941; this was followed by the constructions of large production sites in Parkstrasse 1 and on the area of the armoured tanks barracks in Gera-Tinz. From early 1942, major parts of the capacitor production in Berlin were shifted by SIEMENS&HALSKE to Gera and the Geran

"Wernerwerk für Rundfunktechnik" was now managed completely independently of Arnstadt.

The expansion of the location in Gera was forced since the parent factory in Berlin Charlottenburg had increasingly become the target of bomb attacks and been considerably damaged. Finally, in the year 1944 the entire capacitor production of the Charlottenburg works was shifted to Gera, and with the re-location of the Central Laboratory in early 1944 all capacitor-related Research and Development moved to Gera, too.

At the ca. 1.5 hectares site at Parkstrasse/Neue Strasse and at the site in Tinz, approx. 3150 employees, with a majority of them being women, produced the entire range of capacitors by SIEMENS. The approx. 18 million capacitors produced in Gera in 1944 included oil and vaseline impregnated metal-paper capacitors (paper dielectric between metal sheets) and also the famous tropicalized Sikatrop capacitors, MP capacitors (the original form of the capacitors with metallised electrodes), electrolytic capacitors as well as Styroflex capacitors (metal sheets with dielectric made of polystyrene sheets). Ferrite cores, layered resistors, earphone speakers and sound pick-ups supplemented the product range. Also, one of the first metallising systems in Germany for metallisation of the paper for the MP capacitors was built and operated in Gera and formed the corner stone for the long tradition and pronounced know-how of the Geran capacitor builders in using metallised dielectrics.



The Zwietusch plant of SIEMENS&HALSKE in Berlin- Charlottenburg; part of the initial capacitor production was located here. The fourth floor in the right wing housed the Central Laboratory that was then finally shifted to Gera in 1944.



Sikatrop –"SIEMENS Keramik tropfenfest". Built for reliable use even under extreme conditions. Many of these capacitors are working perfectly even after 70 years.



MP capacitors; sealed with bitumen for protection against environmental effects.



Styroflex. A plastic sheet was already in use as a dielectric here.



MP capacitors in a filter circuit.



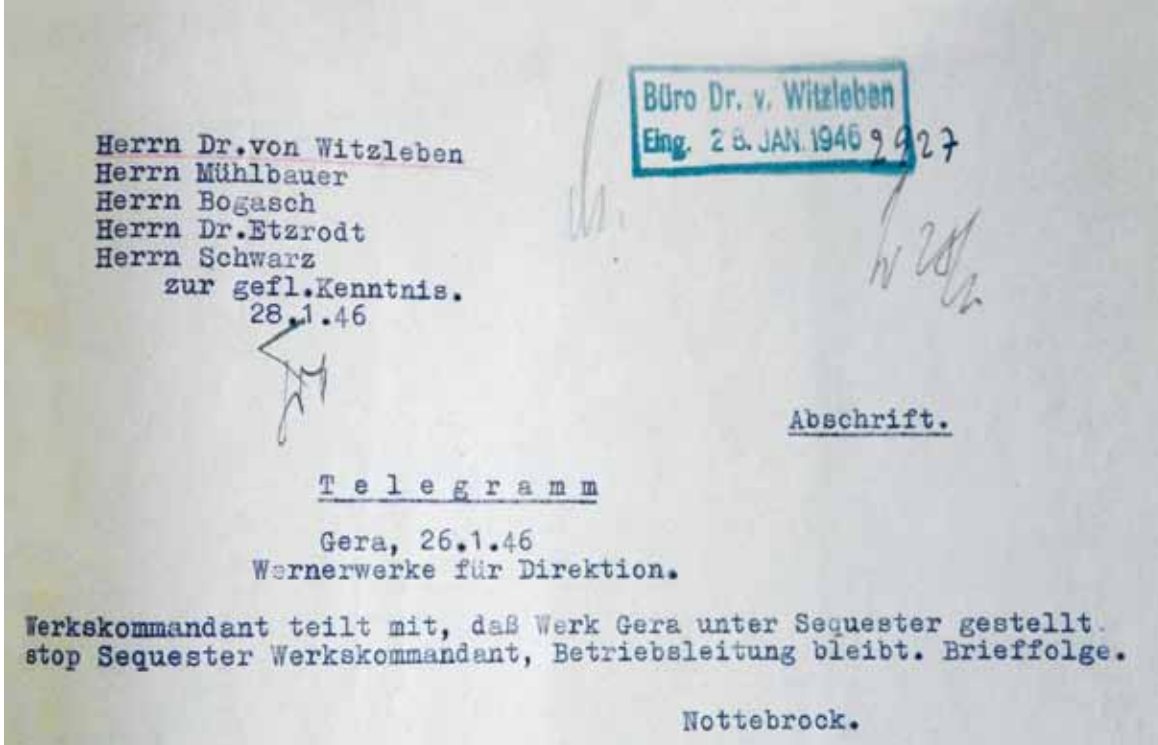
View into one of the assembly halls (1943)

The end of the war signalled a deep caesura: shortly before the end of the war, the industrial centre and railway node Gera was the target of massive bomb attacks on 6th April 1945. The SIEMENS factory was one out of 54 affected factories; on account of the considerable damage, production here suffered a lot.

When the American troops that had first marched in cleared the city in the end of June in accordance with the decisions of the Jalta Conference to make way for the Red Army, a large part of the SIEMENS executives and developers joined them with more than 25 tons of important machinery and documents. In the forthcoming years, these would form the main cadre for the new SIEMENS capacitor production - first in Erlangen,

then in Heidenheim in Southern Germany. This then gave birth many years later to today's competitor TDK (EPCOS).

However, this "cloak-and-dagger operation" was nothing compared to the stupendous blood letting that was now to follow. With recourse to the German Reparation Services promised to them, the members of the Soviet occupying forces cleared up the factory twice - firstly in September 1945 and then once again in early 1948 - every time by about 70 to 80 %; and both times, the capacitor workers rolled up their sleeves, restored the plant, improvised wherever possible from what was left behind and restarted the production.



The time has come! Executive director Nottebrock informs the Berlin Headquarters on 26.1.1946 about the forced administration that has just been imposed by the Soviet occupying forces.

And more than that: In all this confusion, the developers of the (still) SIEMENS factory successfully implemented a path-breaking innovation between 1946 and 1948: the development of the first metallised Styroflex capacitor - thus, the first capacitor metallisation on a plastic film.

After having been placed on 26th January 1946 under mandatory Soviet management, the factory was formally taken over by the Soviet Union as Reparation Service via an SMA order on 2nd November 1946 and affiliated to a Soviet Company for Electronics Engineering named "Isolator"; in this form, it had to provide reparation services by delivering capacitors.



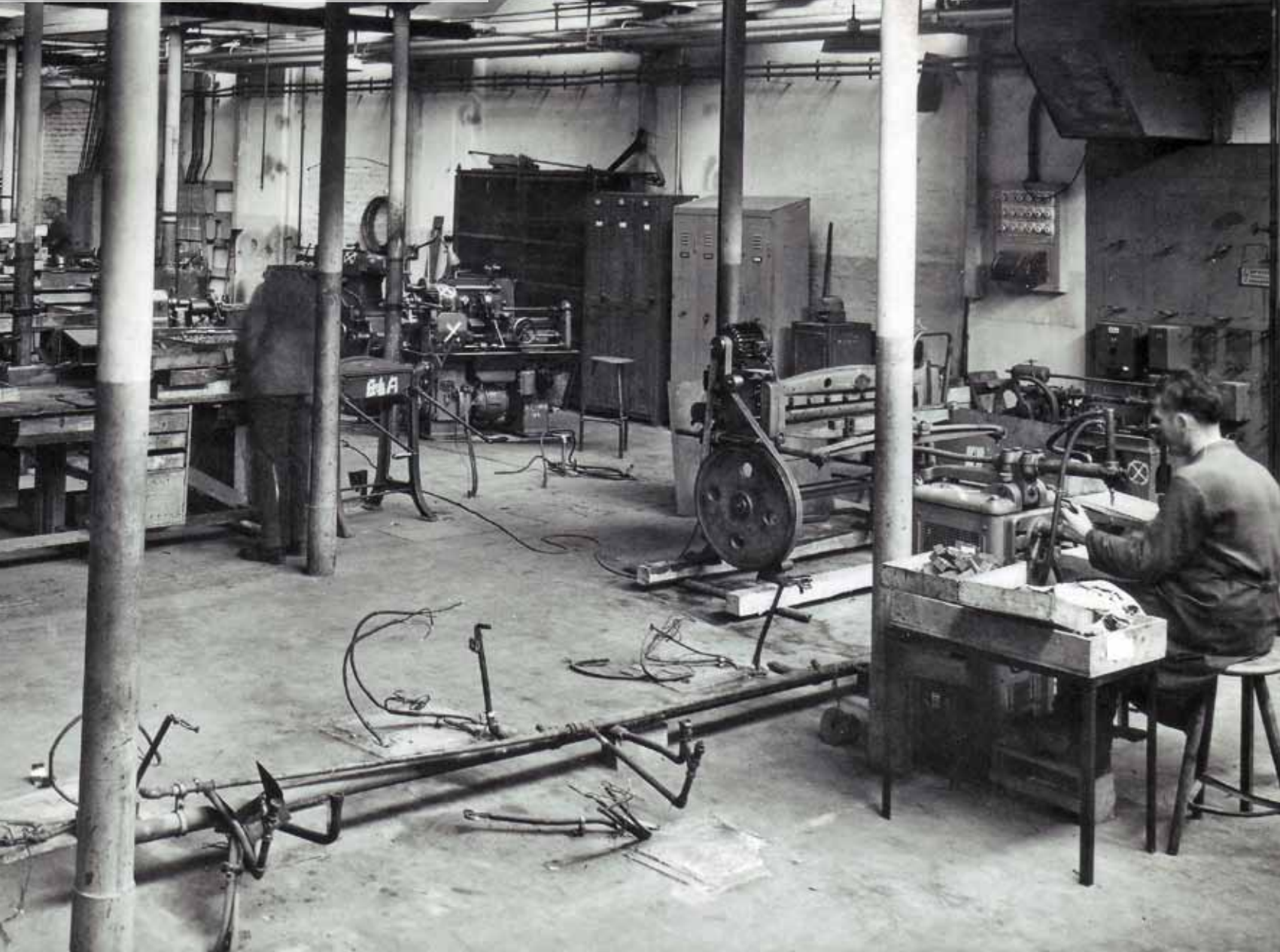
Dismantling in 1948: The equipment was first sent to the reloading point in Alexandrowsk and from there to Leningrad.



Rediscovered: This device for measuring the thickness of paper was brought to Leningrad as part of the 1948 dismantling and is till-date in the possession of ELKOD, a capacitor manufacturer located in St. Petersburg.

Left: The gate at Parkstrasse at the time of the end of the war. The armed guard continues to be a riddle: Red Army members did not wear shirts. German factory guard? American GI?

Traces of dismantling can still be seen in the parts production department here. Something was left behind - thus securing a restart. (By the way, the head of the man at the work station on the left was not dismantled. He just turned suddenly at the time the picture was taken.)



The Initial Years of the VEB Kondensatorenwerk Gera



The scanty leftovers after the second dismantling were transferred to the German side on 14th June 1948 and at a ceremony on 20th October 1948 they were officially "handed over to the German people": the nationalized factory functioned from then on under the new name of "Volkseigener Betrieb (VEB) Kondensatorenwerk Gera" ("People's Owned Company Capacitor Works Gera"), in short: K-W-G, and was simultaneously assigned to the Leipzig-based "Vereinigung Volkseigener Betriebe (VVB) Radio- und Fernmelde-technik R-F-T". Although factually incorrect, amongst Gera's citizens the abbreviated name "RFT" became for many years synonymous with the capacitor factory.

Even if most of the equipment had been lost, the factory's workers, their knowledge and their experience had remained. They completed the restart with full enthusiasm - tentatively, for the last time. Since August, five winding machines had been running again and by the time of the formation of VEB, 229,470 windings and 150,600 capacitors had already been produced.

As the almost only East German manufacturer of low voltage capacitors, the factory in Gera experienced a speedy push-start. Still in 1949, an enhanced combined low/high voltage bath branded "Self-Made" started production by forming of foils for electrolytic capacitors. It turned out to be the first significant new erection



Not much left: "Kobau", the workshop for cylindrical capacitors, was completely cleared - just like most of the rest.



Ceremonious event for the foundation of the "People-Owned Enterprise" (VEB): At the table, Gera's mayor Boehme (second from left) with Voigt, the Chief of VVB RFT ("Association of People-Owned Enterprises of Radio and Telecommunications Equipment")



The winding department for electrolytic capacitors around 1950:

The winding was manual and mostly done by women.

RFT

The community brand "Rundfunk- und Fernmelde-Technik" was taken by many Germans as a short name for the capacitor factory.



The "Televisor T2 Leningrad", manufactured as reparation service in the Saxonia Works in Radeberg.



Being there is all that matters: K-W-G displaying its new power factor correction capacitors at the Leipzig Trade Fair (around 1955)



Vacuum chamber for oil impregnation of paper capacitors

Left: After extensive dismantling, almost all the means of production had to be reconstructed/redesigned and manufactured. Metallising chamber for metallisation of paper, 1950

of industrial production equipment in the Soviet occupied zone. The newly set-up equipment for surface-roughening of aluminum foils in stationary etching technology facilitated the capacitor manufacturers to offer, for the first time, high voltage capacitors with significantly increased capacitance.

1949 also saw the first "own" exports of K-W-G: Amounting to a fairly humble 32,000 Marks, cable-balancing capacitors for the telecommunication industry were sold to the Soviet Union. This was soon followed by more sizable export transactions. Between the years

1950 and 1954, the factory delivered hundreds of thousands of electrolytic capacitors for the so-called Televisor Program of the SAG Saxonia Works Radeberg, whose television set "T2 Leningrad" became an export hit to the USSR.

Finally, in 1951, it was possible to restart the production of oil-impregnated smoothing capacitors, MP DC capacitors and paper capacitors in ceramic tubes - something that had remained interrupted since the first dismantling of the factory.



From the start of the fifties, the buildings in the Ebelingstrasse that had already been acquired in the forties were used once again for the expansion of the production facilities.

When the power-shortage-ridden East German state remembered about the advantages of nation-wide power factor correction, the capacitor factory in Gera entered the manufacturing of phase shifting capacitors large scale.

For the almost inevitable impregnation with chlorine diphenyle ("Chlophen", or "Orophen"), suitable production and research capacities were created in the years 1951 and 1952 in the neighboring Ebelingstrasse 6 by restructuring and expanding existing production buildings of the former X-Ray plant Radiologische AG. The company did also expand outside the region: In 1952, a new factory was set up in Goerlitz with massive support from Gera for the production of tubular and block capacitors as well as polystyrole and small paper capacitors. After the official declaration of the Gera factory as GDR's lead enterprise



Production of large capacitors - here a picture from the sixties.

for capacitors, there was a systematic segregation of work and product range between Gera, Goerlitz and the Electronics Factory Freiberg which had been set up in 1947 for the manufacturing of capacitors as well.

The significance of the Gera plant across the industry was proven another time in April 1965 when the field office No. 68 of the Technical Department of Electrical Engineering within the German Office for Measurements and Testing of Goods (DAMW, since 1973 called ASMW) moved into the building complex on Parkstrasse. This existed till 1989 and carried out the classification tests for all fixed capacitors which had to undergo obligatory testing (except ceramic capacitors). In December 1970, it received sealing authority and could from then on grant quality seals in its own capacity and issue sealed certificates. Further, this field office also carried



Oil-filled phase-shifting capacitors from the second half of the fifties.



Styroflex capacitors existed not only with metal foils but also with metallised plastic films. The foundation for the latter had been laid between 1946 and 1948.



Capacitors with quality seal "1". This quality seal was allotted by DAMW.



The idea of the first independent company logo was born out of a contest in the company magazine "Der Funke".



1958: The new symbol is protected through worldwide registration.



Amongst the older generations, the floods in the year 2013 evoked memories of the major flood of 1954 which had also converted the entire factory premises between Parkstrasse and Ebelingstrasse into a big lake.



out the approbation tests for import products before the same could be approved for sale in the GDR. With a firm view on its hosts, the field office regularly monitored the quality proceedings of the K-W-G in close co-operation with its quality department at the factory and organized operations' checks. Appropriate measures were put in place to solve complaints from customers.

In 1954, the Gera-based developers achieved further progress by switching over from paper capacitors to much smaller foil capacitors (Styroflex). Since spring, the association brand "RFT" with factory number "904" shone with the first own logo: A "G" in a circle interrupted by the capacitor symbol; this was the first sign of increased self-confidence marked on the capacitors.

However this initial approach to one's own brand logo was replaced in April 1958 by a new logo which was to accompany the factory right into the second half of the seventies and to national and international fame over the next twenty-odd years: The "G" now being interrupted by four horizontal lines symbolizing a multi-layered dielectric.

And the Parkstrasse now produced much more than just capacitors and ferrite cores. Between the years 1954 and 1960, the company also tried its hands at manufacturing toys such as railway bridges and tower cranes as well as display cabinets and, however quaint this may sound, electro-mechanical scythe sharpeners (to those who still know what that is!!). Those closer related to capacitor profession were the 54,212 tweeters



Product catalog from 1953



"Flyweight": One of the earliest examples of this flash device can still be found in the City Museum of Gera.

and the major hit of the year 1955: the photo flash "Pi-onier" weighing only 2.8 kg was considerably lighter though perhaps still not more handy than the other flash devices of those times; with a total production of 1569 devices, even this remained nothing more than an episode. In the subsequent years, such "side businesses" almost came to a standstill.

Despite battling itself with the consequences of the war, the GDR did also provide developmental aid in the Far East. 157 East German architects and engineers supervised the construction of the legendary factory number 718 in Beijing: the gigantic electronics conglomerate was a combination of the most varied production lines for components for radio and television on an area of 500,000 m².

And thus, in 1956, after the completion of the one-year training for about 17 Chinese technical experts in K-W-G, ten capacitor specialists moved for a period of more than one year to the Chinese Capital City in order to organize the setting up of metallisation and capacitor manufacturing in one of the stately workshops built in Bauhaus style. The building complex of this gigantic mammoth factory has now been converted into a Center for Modern Art and Culture; and right in this center, in some parts, ceramic capacitors are still being manufactured. A trip to China, even a lengthy stay there are nothing special today. On the other hand, the voluntary transfer of know-how is not very popular. In those days, it must have been exactly the opposite.



25-year old trainee Pao Chi Kwung with development engineer Wilhelm Benesch in the "Technical Center" of the K-W-G.



Perhaps still the original nameplate: „Capacitor Factory 798“, part of the 718 conglomerate



Beijing 2013: Even today, parts of 718 are still manufacturing



Some of the factory halls are housing modern Chinese art today and are really worth visiting.



For the first automatic forming machine, its inventor Franke received a patent.



The manufacture of the ten millionth electrolytic capacitor with rough foil was duly staged and celebrated..



In the restructuring phase of the late fifties and early sixties, many other trends overlapped. On the one hand, the production of electrolytic capacitors (in the factory jargon in short: "Elkos") flourished in Gera. Smallest size capacitors that could be easily fitted on printed circuit boards were in great demand. The first 4 mm miniature Elkos from Gera were used in 1957 in hearing aids manufactured by the Radio Devices Factory in Koelleda. They belonged, amongst other things, also to the compact interiors of GDR's first transistor radio, the legendary "Sternchen". In the year 1958, tenth year of the people-owned enterprise, the employees also then celebrated the production of the ten millionth electrolytic capacitor made with roughened foil. On the other hand, the metallised film capacitors received a major development thrust by the rapidly growing miniature electronics, mainly in information and measurement technology. Second in the world (only SIEMENS was faster),

the engineers of K-W-G brought the laquer film capacitor onto the market. These capacitors had a very thin coat of laquer that functioned as a dielectric; the new capacitors which went into mass production in 1963 amounted to only 10 to 15 % of the size of traditional metal-paper-capacitors. Due to lack of external industrial sources, the technology and equipment required for manufacturing had to be developed and manufactured inhouse completely "from scratch" by the rationalization department. Furthermore, from 1959, automatic winding machines produced in Dresden replaced the former manual winding machines.

In the course of the steeply growing need for AC voltage capacitors with metallised paper dielectric ("MP"), the focus now turned to basic modernization and expansion of the metallisation process which was still based on the SIEMENS procedures of the 1940s. As the



"Sternchen", the first East German transistor radio. The three Elkos from Gera are clearly visible. In the year 1959 alone, 200,000 miniature elkos were put into these devices.



imports of complex technology from the West were especially and consciously tightened after the building of the Berlin Wall (one feared that the need for spare parts might later serve the West as a means for political pressure), the umbrella organization VVB initiated the localized development of vacuum metallisation chambers through an associated manufacturer of special machines in Gornsdorf; by the mid-sixties, five of these found their place in the Ebelingstrasse. For the metallisation of lacquer film, however, the decision was made in October 1964 in favor of the import of equipment from West German specialist Heraeus.

After the induction of a large reconstruction of the factory in the Parkstrasse in the beginning of 1963 and the opening of a second location in Gera-Untermhaus in



Five metallisation chambers Made in GDR stood right up to the seventies in the basement floor of Ebelingstrasse.
Left: Newly built in 1963 - the building at the main entrance of Parkstrasse

1964, a separate school for exhaustive training of apprentices and qualification of employees was opened in September of the following year. The K-W-G completely handed over the production of low volt electrolytic capacitors to its sister concern in Freiberg and concentrated in a focussed manner on the development and manufacture of lacquer film, metallised paper, MP alternating current and high volt electrolytic capacitors now. In case of the latter, the Gerans once again jointly determined the world lead when they were crowned to be the best - and what was specially worth celebrating - ahead of rival SIEMENS in presenting a new generation of Elkos with high switching capacity. As a result of other measures for streamlining the product range and successful export businesses, the factory increasingly established itself as specialist for lighting, motor and power capacitors.



The eternal rivals: in the ideology-driven fifties, the name SIEMENS often had to serve as THE enemy.



One million switchings had to be endured for a classification as "Elko with high switching capacity". Among the main customers was the rail engine builder Lokomotivbau Elektrotechnische Werke in Hennigsdorf where sets of 30 to 40 such capacitors were interconnected.



Two renowned reference objects: Hotel Rossija and COMECON headquarters in Moscow.



Only the best for the winding department: automatic winding machine by MAG Hamburg for larger diameters.



MP AC capacitors such as this one were installed in Moscow's prestige objects.



Catalog for high voltage capacitors, 1962



Apart from the intended increase in productivity, the redesigning and expansion of MP production in the Sixties brought forth a major improvement in the working conditions.

In the year 1966, 36,000 lighting capacitors were delivered with a major sense of pride to the new head office of "COMECON", economic council of the Eastern Block countries in Moscow. Another prestige object was the furnishing of the world's largest hotel of those times, the ROSSIJA in Moscow with 5,200 AC capacitors. Between 1965 and 1970, the annual sale of motor capacitors jumped up from 659,294 to 2,498,603; the numbers of lighting capacitors grew from 151,931 to 1,644,055 pieces p. a.

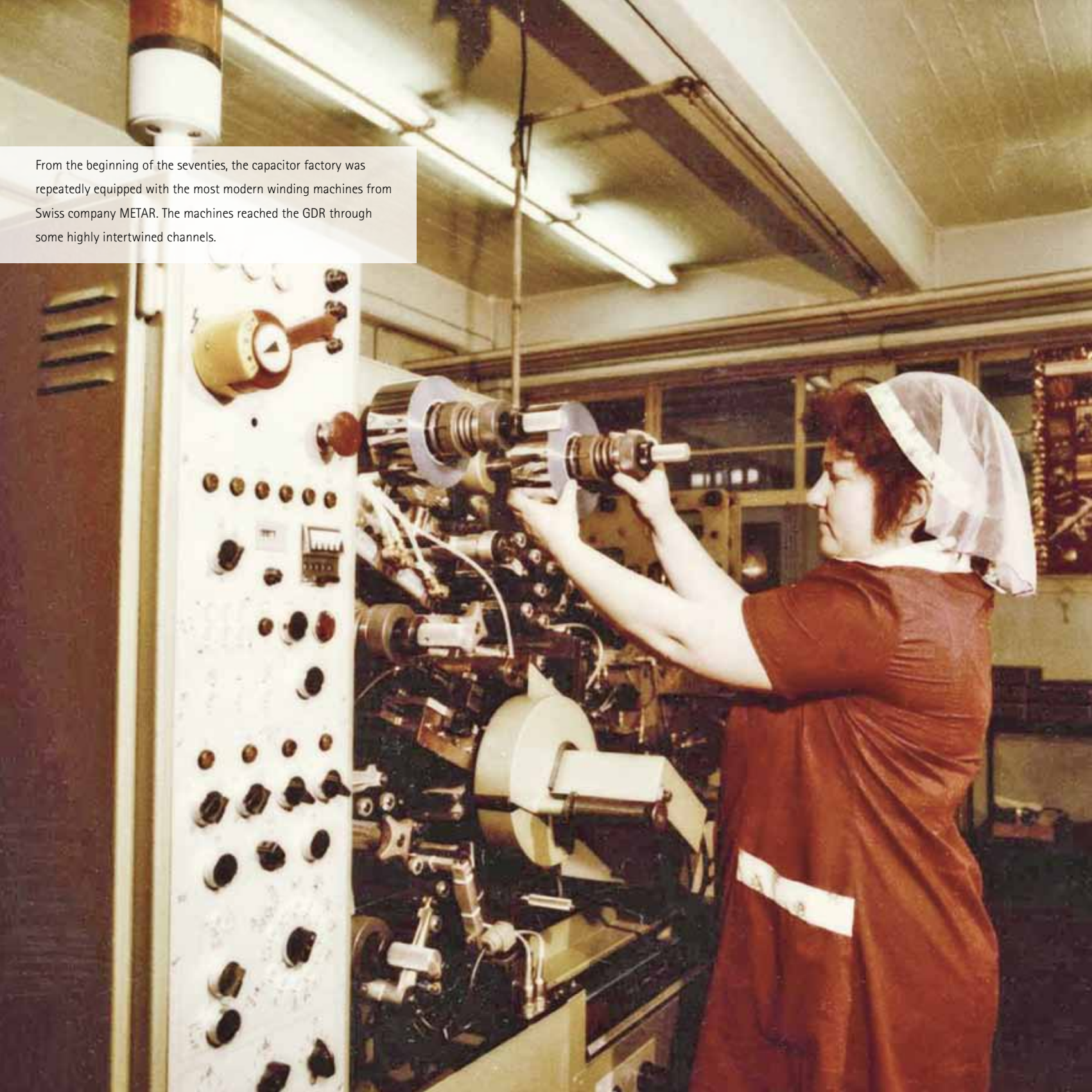
To keep pace with the growth, the Gera capacitor makers expanded their MP production from 1967 onwards by adding a new production line as well as more powerful impregnating chambers imported from the West German manufacturer Leybold. Added by another substan-

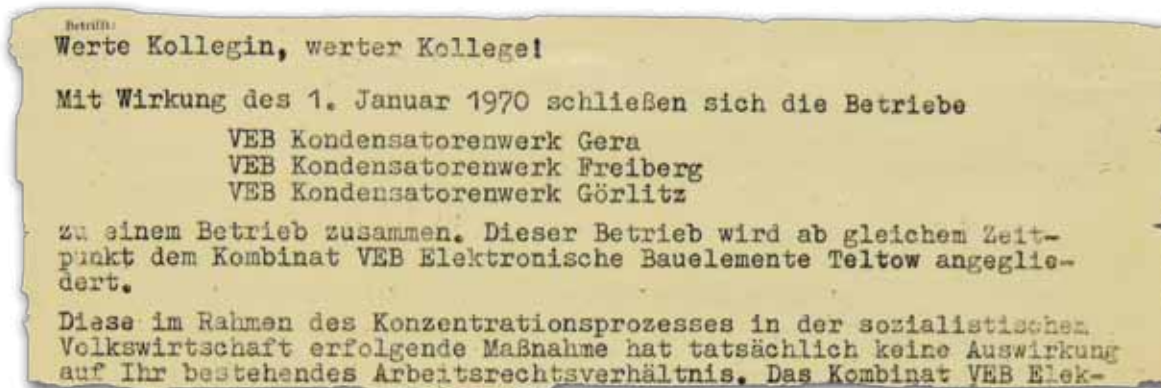
tial set of chambers from Leybold Heraeus obtained in 1973/74, these were considered across Europe as the most modern ones of their times. From 1974 onwards, the K-W-G was also regularly furnished with modern winding machines of Western make. By the end of the GDR in 1990, a total of 19 automatic machines by Swiss market leader METAR had entered the winding shop in Gera; these were supplemented by several special machines for large windings from MAG Hamburg and numerous Italian automatic machines for small windings. The country's political rulers thus paid tribute to the important role of the capacitor production in Gera as a bringer of hard currency for the East German State: particularly with lighting and motor capacitors, the company could achieve growing turnovers mainly with customers in Western and Northern Europe.



Amongst the AC capacitors, it is mainly the MP lighting and motor capacitors that ensure growing exports in the seventies.

From the beginning of the seventies, the capacitor factory was repeatedly equipped with the most modern winding machines from Swiss company METAR. The machines reached the GDR through some highly intertwined channels.





Left: Managing Director Schmidt informs the employees at the beginning of 1970 about the merger with the capacitor factories Freiberg and Goerlitz and the integration into the conglomerate EB Teltow.

“Welcome to Restructureville” – the Conglomerate Years



In the GDR, the fate of a factory was often designed on the dashboard, so to say, as an “armchair decision”. Well, it doesn’t really harm to try out new things in reality; however, what was done to the Gera capacitor factory and its sister concerns in Goerlitz und Freiberg in the years from 1969 onwards, seems retrospectively, mildly spoken, a bit too much of a good thing:

31.12.1969: The VEB is disbanded and loses its judicial independence; instead, it is merged with the capacitor factories Goerlitz and Freiberg and integrated into the conglomerate VEB Elektronische Bauelemente Teltow. A rather nebulous designation “Factory Kondensatorenwerk Gera” appears in the product catalogues.

February 1972: Somehow, this doesn’t seem to work properly. The factory again becomes an independent legal entity as VEB Kondensatorenwerk Gera; however, it remains part of the Teltow conglomerate.

31.12.1972: The KWG is separated from the Teltow

conglomerate again. Perhaps the joining with EB Teltow had not really been such a good idea. So let’s try something different: From 1.1.1973, the factory is declared master plant of a newly formed conglomerate “Kombinat VEB Kondensatorenwerk Gera” and legal entity for the sub-ordinate sister factories Goerlitz and Freiberg.

1.1.1977: Experimentation makes you wise: Through the merger with “Werk Elektronik Gera” of the conglomerate Keramische Werke Hermsdorf, and with a device-manufacturing branch of the Jena-based Carl-Zeiss Trust, the new conglomerate “VEB Elektronik Gera” is born; it continues to be master plant of the capacitor factories. However, now it is renamed to “Kombinat VEB Elektronik Gera”.

Anyway, all this has just been an experiment: In **February 1978** the capacitor conglomerate is disbanded. As part of fresh restructuring in the electrical industry of the GDR, the VEB Elektronik Gera as well as the other two capacitor factories in Freiberg and Goerlitz are

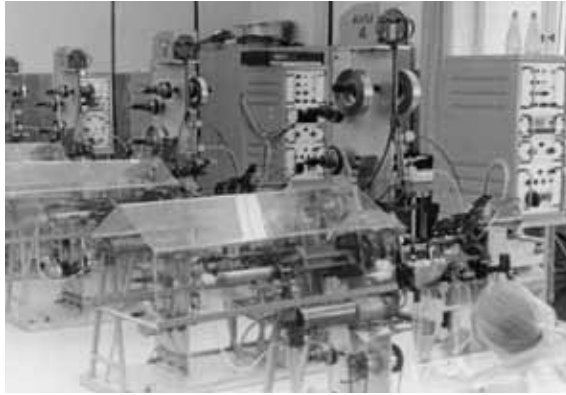
**KOMBINAT
VEB KONDENSATORENWERK GERA**
KAPAZITÄT
RFT
DDR 41 004 - PARKSTRASSE 3
Teltow 41 00 - Telefon 030 217-18 - Telefax Kondensatorwerk Gera



The G-Logo in the catalogues has been replaced by the association brand RFT; however, it continues to find its place on the capacitors.



The first metallising chamber FOBA 500/1 designed by the Ardenne Institute could metallise dielectrics up to a width of 500 mm.



These automatic winding and assembly machines from Plessey (Italy) had been used in the factory in Weinbergstrasse since 1974 for manufacturing small capacitors in MKC, MKT, MKPi and MKL technology; in 1987, they were shifted to Goerlitz along with the entire product range.



re-integrated back into the conglomerate "Elektronische Bauelemente Teltow"; however, legally, they are now at least listed as independent factories.

Despite these organizational swings, the capacitor factory continued to show new successes: already since the beginning of the seventies, the Gera capacitor builders had established close links to the Ardenne Institute in Dresden in the field of paper and film metallisation. The technical trends were more interested in capacitors with metallised dielectrics now, hence the competitiveness of new capacitor developments was decided by the possibilities of metallisation. And for the GDR, suffering from chronic lack of foreign exchange, the minimization of film imports from western countries was of strategic importance.

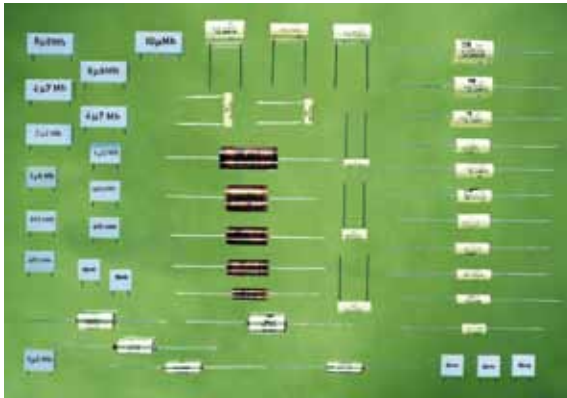
As early as in 1972, the first metallising chamber FOBA 500/1, designed by the Ardenne Institute for aluminium metallisation of laquered paper for so-called laquer film capacitors (MKL), as well as polyester (MKT) and polycarbonate (MKC), was installed. In 1974, a new metallisation process enabled the standardization of the applied paper types and thus made a big contribution to increase in efficiency. After the production of MKC capacitors (metallised polycarbonate film) had already started in 1968, 1975 saw the green signal for the development of motor and lighting capacitors for white and brown goods as well as for illumination devices. These were now based on polypropylene film (MKP) that has been in general use ever since. With its large-scale introduction into production at the beginning of the eighties, it became possible to bring about

VEB ELEKTRONIK GERA

6500 Gera,
Parkstraße 3



After the re-integration into the EB Teltow conglomerate, there are quarrels with the head office around the adherence to a separate logo. All the same, it remains so; however, it's now mandatory to be paired with the RFT logo.



The main product range of the Weinbergstrasse site: laquer film (MKL), polycarbonate (MKC), and polyester capacitors (MKT).

a reduction in volume and mass by 50 to 60 %; the power losses of the new capacitors constituted only a quarter as compared to those of the paper technology in use till then. New interference suppression capacitors could even be reduced to almost one tenth of their previous volume.

This was followed in 1976 by the new development of low voltage polyester and tantalum capacitors as well as the MKV capacitors at the beginning of the eighties; these combined the advantages of metallised kraft paper and the low-loss polypropylene dielectric in a new way and enabled further increase in performance with simultaneous reduction of volume. For brand-regulation reasons (the term "MKV" had already been in use by founding father SIEMENS), this technology was marke-



Rarity: This photo (1981) shows three capacitors with the initial marking "MKV". After branding conflicts with competitor SIEMENS, the marking was altered to "MPP".

ted by Elektronik Gera - and the colleagues from ISO-KOND who received such metallised paper from Gera - under the brand name MPP ("metallised paper with polypropylene dielectric"). And this was not without malice: in the 1990's, this term would regularly cause confusion amongst Indian customers; there, "MPP" stands for "metallised polypropylene"...



They are now the most successful export items and foreign exchange earners: motor and lighting capacitors in MP and MKP technology.



The factory section Gera Weinbergstrasse was mainly specialized in the production of capacitors suitable for PCB-mounting.



"Goebbelsschnauzen"
("Goebbels' Snouts") Made in
GDR: VEB Elektronik manufac-
tured these bizarre nostalgia
radios mainly for West German
mail order houses like
Neckermann.



A front-loader cassette deck
from the Geracord series.



The Geracord GC6010/.20/.30
sold well - in East AND West.





Simple piece: The first out of an entire series of cassette recorders was called "Minett".



Patience and deft fingers: View of the assembly line of the Minett cassette recorders.

The Formation of VEB Elektronik Gera



"In order to secure a major growth in output and efficiency, it is mandatory to establish a uniform electronics factory in the city of Gera" - this was the entry in the official directive of the central Five Year Plan of the GDR for the years 1976-80. It was the trigger for the formation of that conglomerate VEB Elektronik Gera mentioned before; the goal was to concentrate the production of capacitors of all kinds, ferrite-core storages for data processing units and cassette tape recorders for the consumer market under the roof of one large new company. As the Suedstrasse in Gera had since 1939 already homed another factory of capacitors - or to be precise, of ceramic and small film capacitors,

The "E" logo, registered in 1977 for the conglomerate VEB Elektronik Gera, soon earned the nickname "tumbled table".

trimmers and filters - in the form of a branch of Keramische Werke Hermsdorf (KWH, former: HESCHO AG), this step was not without a certain logic as far as capacitors were concerned. Even the production of ferrite-core storages through another branch of the Hermsdorf Company in Fucikstrasse somehow seemed to fit into the portfolio. However the integration of the drive and device production through the merger of a Carl Zeiss factory for magnetic tape storages into the KWH one year before (it mainly produced plug-in modules for EDP systems, also cassette drives and devices such as the "MINETT", and - since May 1977 - tape recorders under the brand name "MIRA"), did not have anything to do with the profile of a capacitor factory, and till the very end it remained only an artificial structure, even though through these more noticeable products it managed to anchor the factory into public consciousness.



From 1977 onwards, the entire production is on with the new logo. A growing part of the product range of winding capacitors is being manufactured without PCB impregnants now. But the large power capacitors are still filled with chlorinated diphenyl.



In the erstwhile HESCHO plant in the Suedstrasse in Gera, capacitors had been manufactured since 1939.



The internal training center "Edwin Morgner" offered regular professional training and also a vocational training that ended with the Abitur (high school diploma).



Managing Director Kurt Fritzsich lays the foundation stone for the new production complex at F 92 - today ELECTRONICON's main factory site.



The main entrance to the new factory.

Along with the 470 male and female colleagues of the six-year old factory branch established on the premises of an erstwhile poultry farm in the area of Prenzlau which covered almost all requirements of the GDR and the Eastern Block for interference suppression capacitors and special capacitors for vehicles and industrial facilities, and the more than 1000 employees from Lobenstein/Lehesten and Ronneburg employed in the KWH dowry "EDP-Cores and Memory Ferrites", the new large concern now had an employee strength of 5000 persons. This figure grew on till 1989 to become more than 7000.

When VEB Elektronik Gera was once again forced under the management of the conglomerate Elektronische Bauelemente in Teltow in early 1978, it was then the largest economic unit within the conglomerate with

one third of the entire production of industrial goods to its credit. It also took the lion's share of the conglomerate's exports to Western countries, earning valuable foreign exchange. Thus by the end of the GDR almost 80 % of EB Teltow's westbound exports would originate from Gera; these consisted mainly of AC capacitors for manufacturers of luminaires and motors as well as the tape recorders of the Geracord family.

It seemed that from now on only "large cakes were being baked". In the learning term of 1978/79, the factory established its own training center "Edwin Morgner" in which, in the first year of its inception, 550 apprentices were trained in 60 skilled professions. In the following ten years up to the end of the GDR and the dissolution of the vocational school, more than 3600 apprentices would finish their training here.



In the new production factories in B2, the product range included cassette recorders, drives, computers and monitors.

October 1978 saw the first spade being dug for a new factory complex at today's B 92 road: it included two five-storeyed buildings housing production facilities with a connecting section for sintering technology, another production building with an annexe for media supplies, a canteen for 1200 meals as well as an entrance building with factory health care centre. Between August 1980 and end of March 1981, approx. 2000 employees shifted to this new domicile of device production (mainly cassette recorders, drives) and manufacturing of a rich variety in ceramic capacitors. Here, and in the production centers of Lobenstein and Lehesten, around 500,000 cassette recorders of the types MIRA and Geracord (almost half of these devices being exported) and millions of cassette drives satisfying the demands of the entire East German economy were built in the years 1981 to 1985 alone.



Once the central switching unit of a large company: "Tomato", shortly before it was razed to the ground in 2013.

Reason for truly galactic pride was delivered by the MIRA device in 1983 when it even passed the test in zero-gravity aboard the Soviet space station Salut 7. Unfortunately, nothing is known about today's whereabouts of this particular device; however, across the world, not more than a handful of manufacturers should have been in a position to catapult their product to such heights.

From 1981, construction started again even at the traditional location in the Parkstrasse. Apart from a multi-functional building for Research and Development, the "Tomato" was built in 1982: the new Directorial office in Parkstrasse 3 acquired this nickname due to its red glass facade.



Space-tested and omnipresent as a dictaphone; the cassette recorder MIRA had been part of the product range since 1977.



The Development department had its own electron microscope for carrying out fundamental research.



High-rate sputter system for the coating of ceramics. World-class technology, developed jointly with the Ardenne Institute.



The micro-computer MC80; its magnetic tape mass memory used the topology of Geracord. It was priced at around 29,000 Mark.

Of High Rate Sputters and Computers

Since the beginning of the eighties, the GDR leadership tried to keep pace with the dramatic growth of the world economy through increased automation and computerization of the domestic production. At Elektronik Gera, the focus was now more on the use of industrial robots, the modernization of the EDP department, computer-aided testing processes and renovation of the machine park. As indicated earlier, high-quality machines from the West reached the factory albeit through secretive serpentine channels; but many machines and plants right up to entire assembly lines did also originate in the internal business unit for rationalization where approx. 100 employees were involved. After a three-year research period in a joint venture development project together with the Ardenne Institute, VEB Elektronik Gera set a milestone in 1980 and brought

forth a world-wide innovative vacuum coating method for ceramic capacitors. Starting in 1981, the new automated coating by so-called High-Rate Sputtering substituted silver to the extent of 5 Million Marks per annum by non-precious metals - a boon for the scarce foreign exchange reserves of the GDR.

And even more: the main factory in Gera entered the development and production of computers now. After the assembly of monitors had come to Gera in 1981 on behalf of robotron Soemmerda (a division of the GDR's leading company in the field of computer production), September 1982 saw the start of the serial production of MC80 in the Gera/Fuckstrasse unit. Even by international standards this was a fairly modern concept of a uniform computer system based on the "MICROCOMBI"



Data sheet of MC80 from 1983 under EB Teltow brand.

Of course, the Teltow headquarters took full credit for the computer.



MC80 in use in the Berlin Friedrichstadt Palace



Pretty colorful, mighty heavy, and unique: The computer-controlled light wall in the House of Culture in Gera was beyond all that one had seen so far.



The Geran variant - a sort of stone age LED TV - could simulate moving pictures and attracted envious looks from Berlin. On the occasion of preparations for a TV production, even the technicians of West German ZDF television were fascinated to see this monster in 1990. Nobody in the West could afford such a thing; well, neither would have anybody from the East after 1990.

developed originally by the Technical College in Ilmenau, consisting of keyboard, monitor, computer, magnetic tape mass memory and EPROM programming and deletion device.

Computers were quite on top of the Western embargo lists; the countries of the Eastern Block were forced to develop indigenous solutions and due to the foreign exchange situation they were also quite keen to do so. Over the years, the original MC80 evolved into an entire family of computers and logic analyzers. The MC80.30/31 that entered into user testing in December 1984 was the first fully graphical computer system of the series and gained popularity in process and robot controlling as well as in CAD workstations.

MC80 were also used for highly spectacular purposes. On the occasion of the opening gala of Berlin's "New Friedrichstadt Palace" in 1984, the stage was illuminated by a light wall of 8000 bulbs created by the computer buffs from Gera using a computer-supported light effect controlling system (of course, designed on the basis of MC80). Well, from Gera's point of view, it was now a bit slanderous that the local House of Culture - another convention and entertainment temple of the eighties - should not be having anything of that kind as well. An opportunity knocked on the door three years later: on the occasion of Gera's 750th anniversary as a city, the building was entitled its own system and made full use of that: a central MC80.30 operated 42 networked computers that controlled 10.240 colored bulbs (red, blue, green, white) to display colored animations on an 8 x 5 m wall.

Space, at last: From 1983 onwards, the metallisation chambers were shifted to the new coating centre in Gera-Pforten.



Core Competency: The Evolution of the Metallisation Centre in Gera-Pforten



Down with Orophen! The MPP technology enabled the replacement of the hazardous PCB impregnation with simultaneous reduction of dimensions.

Meanwhile, the program was tuned to winding capacitors. After the old AC capacitors on the basis of metal sheet/paper, impregnated with hazardous and environment-unfriendly Chlophen were withdrawn from the market due to international agreements, the two dielectric systems MKP and MPP could now finally establish themselves as the core technologies for lighting, motor and power capacitors.

With the change in the product range and a general increase in turnover, the own metallisation plants that mostly still came from the sixties had reached their limits.

More and more material had to be imported from the West either due to technological or capacity deficit. Again, import substitution for metallised sheets and paper was the deciding factor for action. Indeed, two new metallisation plants of FOBA type had already been developed and procured since the seventies in close cooperation with the Ardenne Institute in Dresden. Even Hanau-based Leyboldt-Heraeus GmbH had already delivered one new metallisation chamber type A850 towards the end of the seventies for the coating of ultrathin films which, till 1990, would be housed in the Weinbergstrasse factory and work mainly for the production of polyester capacitors. However now, from 1983 to 1985, fundamental expansion took place with a new metal coating centre being built in Gera-Pforten.

In close co-operation with the automation department of VEB Elektronik and VEB Hochvakuumtechnik Dresden, the Ardenne Institute provided the first, worldwide unique electron beam metallisation system of type FOBA 800/1 for this purpose in 1985. The development team of Ardenne Institute and Elektronik Gera was even crowned with the national prize of the GDR in 1985. As against other conventional paper metallisation equipment, the metal was not evaporated here in little vessels; it was brought to boil through targeted shooting with an electron beam. Strength and consistency of the metal layer could now be controlled by the retention period of the electron beam, further this was much more homogeneous than the traditional process.



Enforced by the highest authorities:

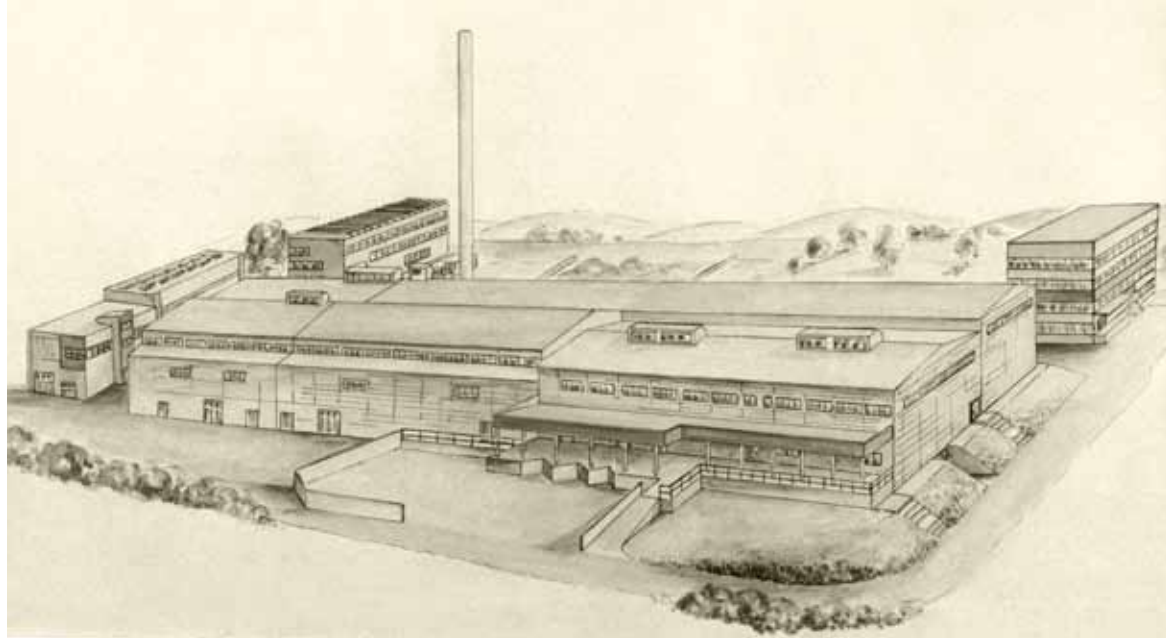
The expansion of the metallisation centre was a central project of the communist party.



The football club of the capacitor factory workers, BSG Motor RFT, existed since 1950. The team (here a photo from the sixties) was granted an own training ground in the sports complex owned by the company at Fuchsberg in Gera.



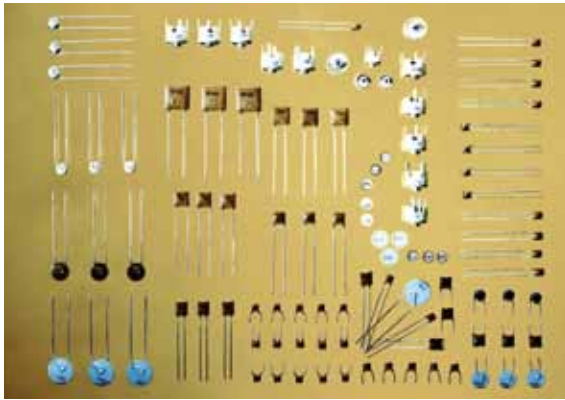
1989, the Elektronik team under trainer Srp beats Fortschritt Weida with 3:2 - and wins the FDGB district cup.



The master plan: Pforten was supposed to become the key venue as centralized metallisation shop for the capacitor manufacturers of the entire Eastern Block.

Thanks to this method, it was no longer necessary to use the vaporizer vessels which had been hard to procure anyway; however, this method needed a higher vacuum - and this caused its own problems in the production process. The most important modules of this system, such as the high voltage supply and the beam control came from the internal special machine builders of Elektronik Gera. They even progressed to become export items for interested parties from abroad (Japan, amongst others). By 1989, two more paper metallisation chambers FOBA 800 from Ardenne, two film metallisation systems A500 and A800 from Leyboldt-Heraeus, as well as slitting machines and a paper drying unit of the Westfalian specialist KAMPF were installed. Thus, paper and plastic films were now being metallised to meet the internal requirements, as well as paper demands for Isokond Berlin, and more than 100 tons of paper per year for other customers in East and West.

The customers in the West included the American companies Aerovox, NWL and Maxwell and the West German company WIMA. However, the targets were set higher: the "Bedampfungszentrum Pforten Struktur-einheit D", since 1st January 1988 an independent operational unit with 154 employees in Production, Technology, Maintenance and internal Research and Development, was now to become the central competence owner and provider for the capacitor manufacturers of the entire Eastern Block. A technical group of the Chamber of Technology was established in 1988 in Pforten and carried out research in electron beam technology. Co-operation with the Institute for Physics at the Friedrich Schiller University in Jena was initiated to explore the application of laser technology for foil packaging. The third expansion stage of the metallisation centre which was started on 29.4.1988 targeted a threefold increase in metallisation capacity.



Ceramic capacitors for PCB-assembly

July 1990 still saw the commissioning of Ardenne's first film metallisation chamber in 800mm width (FOBA-800/5); seven other proposed chambers had already been delivered in parts when the storm of political upheaval in the GDR and its Eastern European neighbors suddenly made the entire project come to a total standstill. Anyway even these parts turned out to be a blessing in the years to come - they served the successor company ELECTRONICON right through the nineties as a valuable source of spare parts.

And in the field of ceramic capacitors, the company equipped itself enormously in the eighties: in the ceramic pre-production unit ("masses processing") erected in 1984 at the site along the B92 road, ceramic masses for up to 500,000 capacitors per day were being produced using the most modern technology of those times; the factory became independent from the deliveries of

Keramische Werke Hermsdorf and saved almost 20 % of the material costs. The substitution of imported materials played - as so often - an important role as well. With 300 million pieces of ceramic capacitors per year, VEB Elektronik Gera had grown by 1989 to become one of the largest suppliers in the Eastern Block, and was one of the world leaders in 63V capacitors.

Apart from the introduction of the CD, entertainment electronics of the eighties was mainly marked by the triumphal procession of the Walkman. In the GDR, both didn't exist for a long time till Elektronik Gera presented its first own Walkman "LCS" in autumn 1988. However, due to exorbitant material costs, it could not really establish itself in the market. Who would have wanted to spend nearly half a month's wages for a Walkman? It suffered the same fate as the compact stereo-recorder GCS-8000 that had been planned for 1989: With the fall of the Berlin Wall on 9th November 1989, its days in the now opened market were numbered. Barely two weeks later, the production of the Walkman's successor model "Tramp" was stopped; the cassette recorders followed suit, GCS-8000 didn't even go into production. The early fate of these devices was a harbinger of the deep gashes that would soon after the initial euphoria of the November days of 1989 be made into the East German economy and let the capacitor factory face an almost-closure for the second time in its history.



Too late and too expensive: The cassette recorder GCS8000 was overtaken by the opening of the Wall and didn't even go into production.



Not a success either: LCS1010, the first (and only) Walkman of the GDR.



Diversity demands versatility. In power electronics, a capacitor must meet various requirements depending on the application for which it is used. Thanks to the fact of having its own metallisation, ELECTRONICON can gain advantage through highly flexible optimization of the product. Already in the nineties, this product range was very rich in connection and housing designs.



Rollercoaster Into Market Economy



In the year 1989, with more than 7100 employees and most modern production

technology in several departments which, in many cases, originated from the West, a turnover of more than 610 million Mark was achieved - by western standards, this was easily equivalent to a small corporate group. About 1545 people were working in Gera, Prenzlau, Dranske and Zwickau in the divisions of winding capacitors (annual turnover: 317 million Marks) and metalisation (7 million Marks), 988 in the ceramic capacitor production in Gera (106 million Marks), along with 1911 in the devices and assemblies production (229 million Marks) in Gera, Ronneburg, Lobenstein and Lehesten. Apart from this, the factory had strong facilities for tooling, automation and construction of special machinery (31 million Marks), numerous laboratories and research facilities, and its own vocational training centre with approx. 300 apprentices p.a.

Apart from a thousand customers within the GDR, the company could be proud of 100 directly managed export partners in 35 countries; almost 95 % of the product range of lighting and motor capacitors was exported to the West, especially to Western and Northern Europe. The latter-mentioned products were even listed by Western European national standard institutes, and the quality assurance system for the AC capacitors division with its ISO 9000 certification done as early as 1989 ranked even among united Germany's first to



have such certification. Sounds like a good base for a jump start into a new era, doesn't it!

The dream of a successful entry in the free market was very soon marred by deep disillusionment. The cassette recorders produced for the consumer market proved to be unsaleable as soon as compared directly with the products of western competitors. The collapse of the GDR economy brought about the breakdown of most local industrial customers. Simultaneously, the Eastern

Today it's one of those "matter-of-course" things but at that time it was totally new: the certification according to ISO 9000 was done by none other than its very creator, the British Standards Institute.



Based on the rich experience in device manufacturing, ELECTRONICON could establish itself for some time in the market for digital announcement systems. Quite a few municipal transport services in Germany used these innovative devices.

European economies became rather sick, and as if that wasn't enough, with the introduction of the D-Mark currency in 1990 the customers there faced foreign exchange problems. And the management's lack of experience in handling the opportunities and risks of a free market economy added their own share to the problems.

With its "Law for Privatisation and Reorganization of people-owned property", the first freely elected parliament of the GDR set course on 17th June 1990 for the systematic transfer of state-owned companies into private hands or - on countless occasions - their closure. In May 1990, the VEB Elektronik Gera had broken away from the conglomerate Elektronische Bauelemente Teltow. At the same time, the branches in Lobenstein (along with the department in Lehesten) and Prenzlau



The "Electronics" in ELECTRONICON - Echo of a bygone era.

(as well as its department Dranske/Rügen) had been separated and converted into independent GmbHs. The department in Zwickau was reprivated.

On 12th June 1990 "Treuhand" - the omnipotent privatisation agency based in Berlin - converted the VEB Elektronik Gera into "ELECTRONICON GmbH" with retrospective effect from 1st May 1990. The latter just about managed to achieve a turnover of 38.4 million DEM in the second half of 1990. Consequently, of the factory's remaining 4035 employees, almost 2870 were already under so-called "zero-hours-part-time employment", in short: they were practically jobless. Virtually overnight and without any time for transition, the former state-owned enterprise had to adapt to the drastically different cost and price structure of the free market economy.



Outdated right after the start: In February 1990, the new factory canteen in the Parkstrasse is opened ceremoniously with a large buffet. Its 1200 seats will soon be orphaned.

All of a sudden, material costs were not defined by government-dictated "industry prices" anymore; they had to be (or rather: they COULD be) negotiated with an abundance of suppliers. At the same time, the wages which had been so highly underrated and distorted due to subsidies and reallocations of the most varied sorts assumed a totally different significance now. The same was with energy costs and many other items.

Due to the haste of the hour, the adjustment to the new situation was possible only in a few areas and even that not immediately. As a result, many production divisions of the large company came to a standstill - for example, the entire production of electrolytic capacitors, cassette drives and recorders, as well as computers and monitors - with drastic consequences for the staff. All the same, at least some branches managed to become independent and establish themselves - e. g. an engineering plant for measuring and controlling technology, the chemical laboratory, various divisions of the special machines department, transport companies, a. o.

The mass retrenchment of labor forced by the political and economic events of the early nineties belongs to the most grievous chapters of the company's history and marked a bitter cut for each of the affected employees. Quite a few could easily find a foothold in new professions; however, in the structural turbulences of the entire Gera region, for many people the redundancy meant a long phase of strained job hunt and re-orientation. And for the company, this upheaval was associated with the most regrettable loss of many an experienced and well-qualified worker.



In 1992, the production of winding capacitors moved here under the address "Wiesestrasse 151".

Struggling For Privatisation

Already in its constitutive meeting in October 1990, the Supervisory Council of ELECTRONICON GmbH assumed a future manpower strength of only 1200 employees. The majority of the 20 properties in Gera and elsewhere were offloaded. The remaining production of winding and ceramic capacitors as well as devices was to be concentrated in the complex at the B 92 and in Gera-Pforten.

The following eighteen months were mainly marked by a tug-of-war between restructuring and privatisation. Giants from the field of electrotechnics, such as PHILIPS, AEG, Vossloh Schwabe or Roederstein took a fleeting look; even founder SIEMENS showed a brief interest to probe into the possibilities of a buy-back.



View of the material processing of the ceramic branch



Good news from the capacitor factory at last - after two years. (January 1993)

Well, actually, SIEMENS was already harboring thoughts of divesting some parts of its components division (which would finally happen towards the end of the nineties). Hence, it were mainly medium-sized companies that showed true interest. These included System Electric GmbH, a company based in Frankfurt and being one of the leading German vendors of solutions for power factor correction and power quality. SE founder Klaus Holbe knew the power capacitors from Gera thanks to long years of practical usage and was therefore mainly interested in this branch of the company. Even other parties were hardly interested in acquiring the company as a whole. When it became clear after intensive efforts that it would be impossible to privatise ELECTRONICON GmbH

in its entirety, the Treuhand sent the company into liquidation on 11th March 1992. But thanks to the persistent initiative of the management, the capacitor production moved nevertheless from its historical areal Park-/Ebeling-/Neue Strasse to the modern buildings along the B92 road. In contradiction to the actual plan of the Privatisation Agency to "phase out" the entire company, i. e. give it up finally, a core of 238 highly motivated people under the leadership of CEO Wiktor Jerzyna were successful in forming ELECTRONICON Kondensatoren GmbH in September 1992 – yet another re-start in the long history of the company.

An MBO by the name TECHNOCER for the business unit of ceramic capacitors, however, did not materialize. Practically all attempts to separate the production unit of ceramic capacitors failed. The remaining nearly 480 employees of ELECTRONICON GmbH continued to be employed till 30th June, 1993 in a rescue company. After that, the remainders of the company shrunk to a small core team of administrators for the remaining buildings, archives and other legacies – right up to the summer of 2003 till the last employee of the liquidated company finally locked the door and handed over the keys.



Despite excellent technical equipment and infrastructure, no capable investor could be found for the production of ceramic capacitors, masses and semi-finished goods.



New start with four product ranges:
Lighting, Motor Run, Power and Interference Suppression capacitors

Yet Another Restart: ELECTRONICON Kondensatoren GmbH

The accounts of the hived-off ELECTRONICON Kondensatoren GmbH, on the other hand, promised to show an upswing: The company concentrated exclusively on the business of winding capacitors made of metallised papers and plastic films and thus, in a certain way, came back to its original roots of SIEMENS, or rather the K-W-G. By the way, this was the division that had already been certified according to DIN ISO 9002. Thanks to the attached metallisation centre, the new company perhaps also had the most decisive competitive edge: own know-how in the basic technology and cost-efficient access to the key materials. And: There were sales channels that had been well-established for many years with noteworthy market shares in the important Western European markets. Now, these were to be expan-

ded. The lighting industry was served with capacitors for power factor correction in magnetic ballasts and with actively and passively non-flammable interference suppression capacitors. The development of competitive capacitors in plastic casing which had been initiated just in time did now prove to give good results; along with the classical product range in secured metal casing, these now gained increasing importance and would become the major support for the company right into the new millennium. In a tough competition, mainly against the Southern European but also the Anglo-Saxon and Eastern European suppliers, ELECTRONICON could establish itself in the course of the nineties as the market leader across Europe and as a dominating manufacturer across the globe. Moreover, through the so-



The modified logo from 1992 onwards.

The "new" ELECTRONICON was allowed to retain the logo of the "old" one.



Until today, the motor capacitors of ELECTRONICON are interesting especially for premium manufacturers. From the original product range of the 1990s, after all, only the high-class metal can capacitors with internal fuse have survived.

lution of a plastic can capacitor protected by a thermal fuse that was submitted in 1994 for a European patent, the developers at ELECTRONICON created a safe solution for the low-price sector.

Another new idea was born from the long years of know-how in the manufacturing of devices: in the course of the clearly recognizable era of electronic ballasts for fluorescent lamps, ELECTRONICON might make use of its good connections to the European manufacturers of luminaires and bring forth its own range of electronic ballasts to the market. After all, there were already quite a few attempts in the market to replace the classical combination of magnetic ballast, ignitor and capacitor. And thus this program started in early 1994.

The market situation for the motor run capacitors, however, proved to be much more difficult. Here, the competitive position of established Italian manufacturers as well as AEG from Berlin was back-breaking. Despite this, ELECTRONICON could push its way through in due course of time, especially with the leading manufacturers of high-quality "white goods". Renowned manufacturers such as Miele, Bosch-Siemens Household appliances and Liebherr are till date the main customers for motor capacitors with integrated safety mechanism.



Product information sheet, 1994



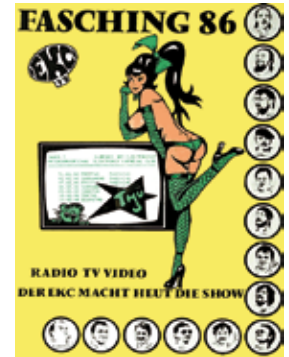
Metallisation was concentrated to one hall in Gera-Pforten in 1990-91.

Most important - and strategically a gold mine - was the strong alignment of the company with the production of power capacitors and capacitors for power electronics. Yet in 1988, there had been orders "from the top" to go slow on the production of power capacitors, to shift the production focus and specialize mainly on the export hits, namely: lighting and motor capacitors - as the key earners of valuable foreign exchange. At that time, the supplies to East Germany's economy with capacitors of higher voltage and output would have been concentrated at Isokond Berlin, or rather have fallen back on imports from ČSSR. Thanks to the inertia of the bureaucratic system and the upheavals in the autumn of 1989, these plans had then come to naught. This proved to be highly beneficial for ELECTRONICON now.



This contact-spray-line from the eighties provided loyal services till 2004. It was efficient for the so-called "mass production" because it could process large quantities of windings in a short time.

The two matured technologies MKP and MPP, additionally spiced up by the internal metallisation, provided numerous opportunities for approaching the markets, much wider than those available to competitors. Isokond who had suddenly turned into a rival could manufacture its low voltage capacitors solely in the space- and cost-intensive MPP technology. In turn, other manufacturers such as AEG Berlin, FRAKO from Tenningen, Roederstein from Landshut, Arcotronics from Italy, Comar and many others could only bring the technically not-so-strong MKP capacitors into play. The flexible access to the two technologies played a major role in being established as a vendor who was to be taken seriously especially when it came to challenging applications in the field of power electronics. Traditionally, SIEMENS was the market leader here.

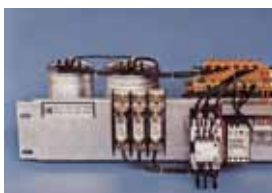


Others survived successfully as well: The Elektronik Carnival Club (EKC) established in 1977 had to act on its very own since 1990. Humor has prevailed: even today, EKC is a major factor in the cultural life of the city with up to 6000 tickets sold each year.





For more than 17 years, the assembly of capacitor banks provided invaluable knowledge for the optimization of power capacitors.



Initially a bit unwieldy: the first own compensation module in modular technology.



Short winding elements with large diameter - the key principle of ELECTRONICON's designs for power applications.

The Western markets were divided amongst the old established vendors anyway while the trusted customers of the former Eastern Block countries were still stuck in the crisis of the early nineties and unable yet to bring about significant sales figures. But there was another additional important advantage which formed a leap in Know-how that is bearing fruit till today: ELECTRONICON was the only German company, apart from SIEMENS, that could produce winding elements with diameters beyond 80mm. Windings with large diameters can absorb the current across their larger frontal surface in a much better manner and thus offer sturdy advantages in challenging AC applications.

Based on the tradition in manufacturing phase-shifting capacitors as well as the delivery of capacitor modules for a switchboard maker in Hessen which had already

taken place since 1991, the management decided to offer complete solutions in addition to the power capacitors now, meaning: automatic capacitor banks for power factor correction. The assembly of such banks was started during the first half of 1993. ELECTRONICON entered into the fray of competing with some of their main customers now, hence the resulting growth in turnover was limited; nevertheless, this step proved to be profitable as it enabled the practice-oriented involvement with one of the most important end-user applications for power capacitors. The field experience obtained in the years of PFC assembly made a major contribution to enhancing the technical characteristics and provided valuable inputs for further development of the power capacitors.



System Electric was the first German manufacturer to bring modular compensation banks into the market and has perfected this principle ever since, of course with capacitors and reactors from ELECTRONICON.

But still, the company was not privatised yet. Financially, ELECTRONICON Kondensatoren GmbH was not on the drip-feed of the privatisation agency anymore, and it had to battle for survival without the help of allowances and subsidies. Neither were there any news whatsoever about future owners. Now manufacturers, especially those of high-quality and long-life systems and equipment, are very interested in long-term technical and commercial partnership with their suppliers. At times when all around East Germany, more and more of former state-owned enterprises were being "settled", i.e. closed, the status of being under the Treuhand was anything but encouraging.

Klaus Holbes SYSTEM ELECTRIC persistently tried to win the bid for the company. Further, there was another interested manufacturer of automatic capacitor banks.

Also in the run was CEO Wiktor Jerzyna who was keen on going along with investors such as System Electric; however at the same time, he was not disinclined towards a management-buy-out, either.

Suddenly, the entire scenario became very thrilling in May 1993: even the Treuhand agency found itself under the pressure of success to finally bring about privatisation and thus, very surprisingly, an Iranian manufacturer of luminaires came into play. This deal failed literally at the last minute just because the buyer could not effect his first installment of the purchase price - or rather - had major problems even in procuring a bank guarantee. After long waiting, the purchase contract was canceled in the autumn of 1994.



Modern capacitor systems from SYSTEM ELECTRIC

Company owner Klaus Holbe at the Hanover Fair in 1998 - in conversation with Dr. Bernhard Vogel, Prime Minister of the State of Thuringia.



Klaus Holbe was already building power factor correction banks way back in the sixties. Clearly visible in his catalog of 1969: Power capacitors from Gera (in the lower part of the cabinet).

At least in this respect the privatisation agency seemed to have learnt a bit from its disastrous mistakes of the previous years and did not give away the company naively. For health reasons, the prospects of an MBO were shattered, too, a little down the line.

The years of wandering found their happy end on 29th December, 1994: a consortium with SYSTEM ELECTRIC as the key player bought ELECTRONICON Kondensatoren GmbH from the Treuhand agency after a genuine tug-of-war up to the last minute; the takeover was linked to an assurance to invest in the Gera site and maintain it with at least 170 employees. It was soon proved that the acquisition by SYSTEM ELECTRIC was totally in the interests of the company and its employees. This wasn't an investor speculating for dividend, or an anonymous fund who had bought the company;

no group of companies had absorbed the attractive technologies and business relationships so that they could be cannibalised at will. The company was also spared the sad destiny of Isokond Berlin which had been flogged off by the Treuhand in September 1992 for down payment of 30 Marks and a bank guarantee to the dubious investor Ashok Chauhan who then systematically plundered it and pushed it into bankruptcy by the end of 1994. (Interestingly enough, the same Ashok Chauhan had also actively tried to acquire ELECTRONICON from the privatisation agency in 1993 but - luckily - his attempts were thwarted.) On the other hand, the buyer of the Gera capacitor factory himself was keenly interested in the product. Main shareholder Klaus Holbe wanted just this: to produce capacitors, and he firmly believed that it was possible to do so in Germany.



Hundreds of millions of these capacitors have secured the basic utilization of capacity for the new ELECTRONICON over many years: Compensation capacitors for luminaires.

The initial years after privatisation were marked by the struggle for market shares. Of course, ELECTRONICON had been selling large numbers of lighting and motor capacitors to the important Western European markets even before the fall of the Berlin Wall. However, the nineties saw the dawning of dramatic changes especially in the lighting market: still, the upcoming electronic ballasts were much more expensive than the conventional solution consisting of ignitor, magnetic ballast and capacitor; but they were already being preferred by many because of their energy efficiency. Their substantial growth rates left no room for any doubt that the market for traditional solutions would show a downward trend in the years to come. This resulted in drastic deterioration in prices and a ruthless fight for the remaining markets of traditional components which, throughout the nineties and into the new millennium,



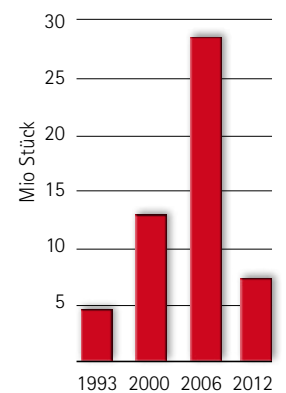
In one go, the Somatic line completes the entire assembly of metal can capacitors including the integrated pressurefuse.

led to the retreat of most of the conventional competitors. However up to the years 2004/2005, ELECTRONICON could profit from the exit of such companies as the German Südco, Prelyo (France), DNA (Spain), Cambridge Capacitors (UK), Tesla (CZ), Plessey and ATCO (Australia) and even the lighting capacitor division of AEG Hydra and establish itself as world market leader by taking over market shares.

From Gera's perspective, the lighting capacitors were once more a real boom right up to 2006/2007. In the year 2006, their sales reached a historic peak of 28.9 million pieces. And thus, between 2001 and 2004 the company even invested in one semi-automatic and four fully-automatic assembly lines for AC capacitors.



The fully automated production is profitable only for items demanded in large numbers.



The sales of lighting capacitors were really booming at the beginning of the new century - sales figures soared like wild fire.



Three of the lines commissioned in the years 2004 and 2005 were Italian standard solutions meant for non-protected lighting and motor capacitors. However, the two assembly lines for fused metal can capacitors that originated in Thuringia were much more complex. The SOMATIC line commissioned in 2006 really works as if in an advertisement video: pour windings and cans in on one side, and finished capacitors come out at the other end. Quite a few of the Thuringian developers and builders of this and similar special equipment had once worked in the conglomerate-owned rationalisation department and are profiting till today from the experience gathered there.

Strangely, ELECTRONICON's alternative product, the electronic ballast, could not benefit from the changing trends in the industry. At the time of starting production, the advantage of the branch's giants - OSRAM, PHILIPS, Tridonic, Vossloh Schwabe - was already too large to catch up with and offer any substantial competition to them. Having already reached a state of strategic significance, the electronic ballasts were handled by the market leaders through dedicated task force staff and manufactured by the millions in cheap-labor countries. With the short time and limited capacities at its disposal, Gera was not able to match any of that.



Hoped in vain for success in the traditional market: The history of the electronic ballasts was a short one.



Neither the electronic ballasts nor the capacitors for interference suppression were ever blessed with the high levels of automation of the lighting capacitors.

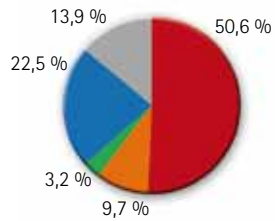
As this became clear, the management decided to stop this product range in 1997. Since then, the Gera-based company LT Elektronik that continued this product line in the following years at its own risk has grown to become an internationally successful specialist in the field of special and niche designs for electronic ballasts. Most likely, such a concept for special solutions in small and medium quantities would, in the long run, not have been economical for the scales of ELECTRONICON.

Even the interference suppression capacitors had limited success. ELECTRONICON's concept of non-inflam-

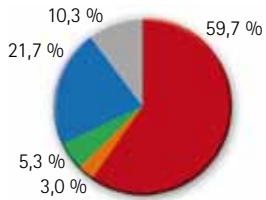
mable MP technology was ahead of its time; many customers were interested in the technological advantages it offered, however scared-off by the high cost. And basically, there was also the total lack of a complementary capacitor range in film technology at marketable prices; these were not part of the production program. It is an afterwit in the company's history that the demand for these particular capacitors - given up in 1995 and handed over to competitor EICHHOFF along with the complete winding and assembly equipment - saw a real boom right after that. Well, such is life.

Shares of the individual business divisions in the total turnover

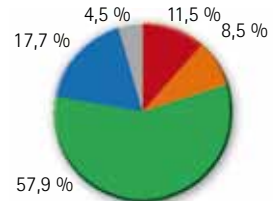
1993



2002



2012




- lighting capacitors
- motor run capacitors
- capacitors for power electronics
- power/3ph filter capacitors
- others



Regulations in the EU and also in other regions of the world, such as Australia, have in recent times accelerated the switch-over from conventional to electronic ballasts. And more than that: The light diode is about to revolutionize the lighting industry and push the conventional solutions out of modern applications even faster. In the twenty years since its re-start, ELECTRONICON has delivered more than 300 million lighting capacitors into the whole world. Unfortunately, there are no exact figures about the number of pieces that were produced between 1956 and 1992; however, one can safely assume a figure of another 100 to 150 million. Thus the production in Gera ranks among the world's largest ever. Well, it now seems as if the good old lighting capacitor that had such strategical importance in Gera's product lineup for nearly sixty years, may actually va-

nish from the product range some day. Whilst in 2001, its share in the total turnover had still been a dominating 59.7 %, it has shrunk to less than 9 % today, and this trend appears to continue.

Meanwhile, the fully automatic line by SOMATIC has specialized in the production of motor run capacitors for Germany's leading manufacturers of white goods. But even though this market appears to be stable so far, there will be more and more solutions in the future that can do without the classical motor run capacitor. It was therefore extremely important that ELECTRONICON had already declared in the early nineties that its strategic focus lay in the systematic development and expansion of its power capacitors and capacitors for power electronics.



Ceramic capacitors, former
Hescho factory in Suedstrasse

Vocational school

Sintering hall; now:
material store

Ceramics processing

PG1: Rationalisation and Tooling
department, Engineering,
Announcement systems

Sintering hall; now:
Vacuum drying and Assembly

PG2: Production of cassette drives/
devices; now: Capacitor production

PG3: Ceramic (chip) capacitors, Metal
forming dept., Offices; now: Warehouse

Printed Circuits Laboratory

Entrance building

Canteen, Library

In this aerial view of the complex at B 92 from 1997, you can see the factory buildings that are still in use (blue) along with numerous buildings that had been owned earlier (green) or have been pulled down by now (gray).



20

CHRISTOPH
F. Schmidt

New Markets, New Priorities: The Nineties

During the GDR times, the customers for the power capacitors had to be found almost exclusively in the domestic industry - and meanwhile, this was mostly gone. However, the name "ELECTRONICON" could be established pretty fast with manufacturers of PFC systems and this literally in the whole world. Apart from the traditional lighting capacitors, the rapidly growing network of distributors first concentrated on the components for power factor correction. Within a few weeks after taking over the company, the new owner had initiated the development and production of a range of filter reactors. Since the late eighties, one could observe an important trend in power factor correction: across the globe, the increasing industrial use of power semi-conductors deteriorated the quality of electricity mains; so-called harmonic distortion started to cause more and more cases of severe, often destructive interferences and resonances. In the developed industrial countries, hardly any capacitor was installed without protective filter reactors anymore. Even in the newly growing economies, the need for capacitor installations that improved not only the power factor but also the quality of the mains was apparent. It was therefore clear that the user had to be offered not only the heartpiece of any capacitor system but also a high-quality means to protect it. As the filtering of higher harmonics results in the generation of heat, they are generally a very unpopular component in any capacitor bank which can make the life of the heat-sensitive capacitor really difficult. Being the capacitor builders and



Initially only with copper winding, later also with aluminum band.

ELECTRONICON's filter reactors are renowned for their low-loss design.

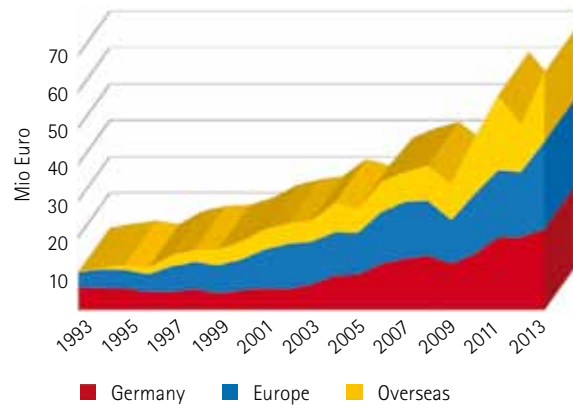
Filter reactors are the perfect complement to power capacitors. The production was first located in the main factory.

naturally concerned about this issue, ELECTRONICON paid special attention to a low-loss design of their reactors. Although this did not exactly qualify them to be called a "bargain", it definitely contributed to the efficiency and reliability of the capacitor installations. Autumn of 1995 saw the start of the manufacturing of reactors, initially with copper windings. In response to the steep rise in copper prices, these were then supplemented a few years later by aluminum reactors. Under the motto "install and forget" the reactors from ELECTRONICON became soon very popular amongst capacitor bank manufacturers from Mexico to Taiwan, from Finland to Australia, for their exemplary low power losses and stable electrical properties. Today, the filter circuit reactor is almost a mandatory additive to any power capacitor and one of the basic pillars of the company.

Seeking alternatives to the tough competitive battle in Germany and Western Europe, ELECTRONICON Kondensatoren GmbH stretched out their feelers into foreign markets with growing success and built up a network of local sales partners in many countries. In the years from 1993 to 2000, the exports tripled from 8.3 to 26.2 million DM whereby the share of overseas export increased fourteen times. Since 1995, the relations to traditional and new partners in Eastern Europe could be enlivened considerably, too. And this trend continued even in the later period: In 2011, more than half of all ELECTRONICON exports went overseas. Apart from the general reputation that German manufacturers enjoy in the world, it was basically the fact that ELECTRONICON was consistently successful in meeting the require-



Reactors with cost-saving aluminum coils are produced in band-winding technology.



The overseas share of the export market grew steadily since 1994. A large spread of overseas markets is a hard task to accomplish; however, it is the best means of bolstering fluctuations in the world economy.

ments of customers with respect to product quality, delivery service and technical competence that lead to the company's surprisingly speedy success outside Europe and made an important contribution to the successful growth in turnover. As the first medium-sized capacitor manufacturer from Germany and, incidentally, one of the first in the global branch of capacitor making ELECTRONICON launched its Internet website in April 1997, substantiating its claim to worldwide presence. Designed with ambitious graphics already, this site was still rather static in its initial stage and would over the years evolve into today's multi-faceted online working instrument for employees, sales partners and customers.



Externally they look similar to the traditional medium voltage capacitors of the competitors. However, they are quite different on the inside: dry MSD capacitors with round windings made of self-healing film.

Finally it was there, in 1997: the financial break-even. Costs and revenues were balanced out for the first time. After the difficult years of transition from public enterprise to a private company which threatened to eat away the substance, the company finally started making profit. Thus, in a relatively short period, it managed to free itself from all loans and advances. Thanks to solid budgeting and modest company policies, ELECTRONICON now regularly outshines the evaluation criteria of banks and rating agencies. And slowly, but steadily, there was a regular flow of investment activity. For the first time since 1990, two new

Metronic winding automatons from METAR were installed again in 1998 (two others and a machine from 2A were to follow till 2004). Apart from the winding machines, technical investments in the nineties mainly consisted of testing and experimenting equipment.

Using flat winding technology from the insolvency estate of ISOKOND that had gone bankrupt in 1995, ELECTRONICON undertook efforts to start its own production of medium voltage capacitors in the classical, oil-impregnated ALLFILM style. Although technically successful, this venture lacked the commercial and logistical pre-requisites for a successful market entry. In view of the strong international and local competition, there was again the view that a realistic chance of successful market shares could only be achieved through a principally new, more advantageous technical solution. These considerations converged in the concept of a completely dry medium voltage capacitor with cylindrical windings made of metallised self-healing film, possible only thanks to the manifold potentials of the internal film metallisation. Under the brand name MSD™, it has since its launch in the year 2003 enjoyed growing market success as a niche solution for applications that are sensitive with respect to ecological or fire-safety considerations; in installations with high shock and vibration stress, MSD™ has proved its worth as well.

www.electronicon.com



1997



2013



The routine check system for power capacitors from the early 1990s was ramped up considerably and supplemented with a station for testing the hermetical sealing of the gas-filled capacitors.

Soon after their market entry, the gas-filled capacitors grabbed a lion's share in the turnover of power capacitors. On the other hand, the big, heavy MPP capacitors vanished from the product range by the year 2003.



The tortoise - appealing character for the ecological medium voltage capacitor. Not everybody would get that immediately. Asian customers wondered: What does MSD have to do with soup?

For decades, vacuum impregnation had been one of the key characteristics of the production process of winding capacitors. Thanks to its excellent technical equipment and the company-owned metallisation facility, ELECTRONICON had now grown to be the only German manufacturer, apart from SIEMENS-Matsushita - and of course one of just a few worldwide - able to manufacture capacitors in MPP (i. e. metallised paper electrodes with PP dielectric and oil impregnation) or MP technology (as above, but with paper dielectric). However, over the years the quality of regular polypropylene films as well as that of the developed metallisation patterns had been perfected to such an extent that it was now possible to implement even the most challenging solutions which had been possible in MPP and/or MP

technology only so far, by using pure polypropylene windings. It became obvious that the worldwide decrease in demand for capacitor papers and high-quality impregnation oils caused rising procurement problems with respect to both logistics and cost, letting the MPP range appear to be less and less viable. And the power capacitor division of ELECTRONICON had already experienced another directive change in the preceding years: as the world's second manufacturer (even this time, forefather SIEMENS had a technical edge), the Gera manufacturers launched their nitrogen-filled and hence completely dry power capacitor "MKPg" into the market in 2000, albeit with many important design enhancements and without the potential ozone killing gas SF₆. Although the gas-filled capacitor from SIEMENS had



MAG (left, 1995) makes room for Jumbolino (right, 2008). Both photos are showing the old winding department on the second floor.

had an existence over many years already, more as an exotic bird, it was the market entry of MKPg which helped the idea of gas-filled capacitors to gain worldwide acceptance; it took another few years till other competitors had managed to present their gas variants in the market. The screw clamp terminal developed by ELECTRONICON was clearly recognized in the capacitor world to such extent that, within a short time span, it got copied (externally identical) in China and utilized in such imperfect execution by up to 12 competitors.

The success of MKPg accelerated the process of switching the entire capacitor range to metallised polypropylene film. After the production of MPP phase shifters had already been stopped in 2001, it was "Last Call" for

all MPP filter and commutating capacitors in 2003. This fundamental transition paved the way for a far-reaching modernisation of the winding process. The automatons by MAG that had still been a legacy of the GDR times and mandatory for the production of the four-layered MPP windings, were slowly phased out through a special innovation from METAR designed particularly for large-format windings: their first "Jumbolino" had its baptism of fire in 2003 in Gera. Five others were to follow between 2003 and 2010. From the erstwhile five MAG automatons, only two are still in operation today.



The "accolade": It's said, "Only when the Chinese start copying you, you've finally made it to the top." Original above, copy below. Or is it vice-versa?





Old chambers with new function: The impregnation chambers from the seventies were given a general overhaul, fitted with new controls and refashioned to serve for vacuum drying.



PFC catalogue 2004:
The first catalogue completely
without MPP capacitors.

Two other, very important areas were also affected by this change. On the one hand, the metallisation in Pforten could now do away with the cumbersome paper drying process and further, divest two of the three remaining FOBA chambers by Ardenne. Although highly interesting from a technical point of view, they could not have been put into use for film metallisation without significant expense. In 1999, FOBA 800/3 found a new application at the Fraunhofer Institute for Electron Beam and Plasma Technology in Dresden Weissig; two years later, FOBA 800/4 went to IST (Ion Beam Technology) GmbH Quedlinburg. Simultaneously, the FOBA 800/5 chamber as

well as the two systems A500 and A800 from Leybold-Heraeus were modernized and fitted with new electronic controls.

On the other hand, immersion in mineral oil was rendered useless as there was no MPP anymore. Hence oil drying and degassing had become redundant. And all impregnation chambers were now free to be used for the vacuum drying of MKP capacitors. This resulted in a considerable augmentation of efficiency and capacity reserves in this sector.



At the trade fairs, the Sales department maintains close contact to our regular customers and new prospects from around the world.

Future-proof: Capacitors for power electronics

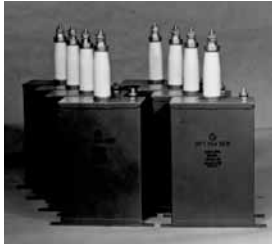
Sooner or later, a German component manufacturer with a focus mainly on standard items is bound to face competition from local and foreign suppliers. Often, price is then the only deciding factor and in many cases, the outsourcing of production to cheap-labor countries ostensibly remains as the only available alternative. Thanks to the cost advantage from in-house metallisation of the basic material, ELECTRONICON was always able to withstand this pressure - even without the option of shifting the production base. And yes: in the long run, the company can sustain only when it is perceived and valued by its customers not only as a sup-

plier but also as a strategic partner for technical solutions. But neither the capacitors for lighting or motors, nor the largely standardized capacitors for power factor correction offer any significant grounds for such technical partnership.

There are comparably few standard capacitors in so-called power electronics. The lion's share of the applied items must first be developed jointly with the user and optimized in long-term processes. This is exactly where technical partnership is needed. It strengthens the competitiveness of the product not only on the basis of



Catalogue of capacitors for power electronics, 2002



High voltage capacitors from the nineteen-fifties.



In power electronics, there are rarely standard situations for the capacitor. Mostly, the capacitor must be customized to suit the special form, connection and design requirements of the customer.

In the mid-nineties, ELECTRONICON was one of the few manufacturers who were still masters of traditional MKV (MPP) technology.

price but also on the long-term reliability of capacitor and supplier, and subsequently forms the foundation for long-term co-operation. Actually, they had always been there: high voltage capacitors were already a part of the program in 1949, smoothing capacitors were added in 1951. And the catalogues of VEB Elektronik listed smoothing capacitors and paper capacitors for thyristor commutation, too.

However, up to the nineties, all these capacitors only lead a shadowy existence. In 1993, its first complete financial year after the formation as a new company, ELECTRONICON sold power electronics capacitors for a

meagre 654,200 Marks that constituted just about 3.2 % of the total turnover. Not restricted any more by the dictates of a planned economy, the Gera developers did first try to play on the advantages of MPP technology such as high voltage and current strength. Very soon, their commutation, smoothing and filter capacitors had turned into an insider's tip and become a welcome alternative to established competitors' products, as well as substitutes for out-of-production items of former branch leaders, such as BOSCH or SEL. But still, they didn't gain the expected broad market success, and often failed to be considered in new projects. This state continued through the nineties where despite growing sales figures, it was never possible to raise their share in the company's total turnover to much more than 5 %.

The breakthrough came at the dawn of the new millennium. It was the same old song: the customer asks for the even smaller component to gain advantages for his application by reduction of space, weight and cost. Since the most important characteristic of a capacitor - its capacitance - is determined mainly by the distance of its plates, the minimization of the intermediate separating layer, i. e. the dielectric - is always the topic for research and development. But at the same time, the thickness of the dielectric medium has a crucial influence on its voltage strength.



From 2004 onwards, it was possible to serve even the most challenging requirements completely with MKP capacitors. The 2004 brochure did not contain any more MPP types.



Smaller, lighter, often very different: From 2003, the entire scope of power capacitors underwent a sea change.

right: Converters and filters for traction and regenerative energies – the main markets for the AC-filter and DC capacitors.



The "light-bulb moment": In the "Semikube" converter stack (above) by innovative semi-conductor specialist Semikron, ELECTRONICON's new PK16™ was used to replace electrolytic capacitors (below) of the same volume. The Semikube revolutionized the entire converter business.



A distinct increase in the capacitance density may therefore be accompanied by a higher risk of failure. As early as since the end of the nineties, the developers of ELECTRONICON had concentrated on solving this task. They had to ensure that the dielectric breakdowns that occur increasingly with rising voltage stress would always end up self-healing, i. e. without causing the capacitor to break down. Of course, this had always been one of the basic questions in the technology of metallised capacitor films; however, with further exhaustion of the load limits of the available dielectric materials, this would provoke further increase in the statistic failure risk. Thanks to the fundamental knowledge gathered in the field of metallisation technology, the develo-

pers had already around 1999-2000 been able to re-answer the decisive question - how to reliably confine the energy that discharges during a dielectric breakdown to a safe level - in a new way through optimization of consistency and thickness of the metal coating. By creating the special SecuMET™ metallisation, it was now possible to achieve a much higher utilization of the polypropylene film without compromising on long-term stability and failure-proofness. Thus at once, the new highly compact range of AC and DC capacitors was much more competitive and enabled, among other things, access to the railway business.

But actually, it was a basically new market that would facilitate the company's foray to the top of the chart of power capacitor manufacturers: so far for the interim energy storage of frequency converters, electrolytic capacitors ("Elkos") had been considered the only acceptable choice. Though film capacitors were recognized to be superior in current and voltage strength, they were deemed too large and costly to serve as a really suitable alternative. The generators of the booming wind and solar energy industries increasingly demanded converters that worked with DC-link voltages beyond the 450 V of normal Elkos.

These can manage such applications only with the help of voltage-sharing series connections. However, this brings in its wake other electrical disadvantages. Further, the limited life of Elkos poses another problem for long-term, to-be-maintenance-free applications such as wind power and solar installations. This was exactly where ELECTRONICON's strategy came into the picture. The new DC capacitors with SecuMET™ coating could easily manage the required DC link voltage, generating much lower thermal power losses and facilitating an unprecedented minimization of self-inductance thanks to parallel switching. True that despite their high capacitance density they never came anywhere close to the Elkos in terms of Microfarad. However, thanks to their almost fivefold current capability, they allowed for a drastic reduction of the DC link capacitance. Hence the replacement: in the same space as before, nearly free of maintenance, with just a fraction of the power losses and enhanced electrical characteristics. The new

capacitor was also an optical highlight - different from the shape known so far: on top of the aluminum can, there is a plastic head with two robust screw terminals. The first series with 116 mm diameter was spontaneously given the name PK16™ - an abbreviation for "Plastkopf 116". Quickly the name gained currency and, as time went on, established itself as the first brand name for an ELECTRONICON product series. No one even had an inkling then that PK16™ would not only become one of the most successful products in the company's history but also rise to be a world-wide trend-setter. Too modest in their role as forward thinkers, nobody at ELECTRONICON thought of protecting the design by patent. Over the years, the PK16™ design turned into a proper industry standard across the world; today it belongs to the mandatory repertoire of almost every large producer of film capacitors. However baffling and forthright the external design may look in its lookalikes - comparative type tests often reveal considerable differences in the life span and fail-safety of the plagiarisms which are mostly rooted in the know-how of SecuMET™ metallisation. It was mainly the sales of this PK16™ as well as the single and three-phase filter capacitors targeted towards the same market segment that ensured consistent growth from 2005 onwards.



Trend-setter PK16™ 420µF 1100V. There's no competitor who hasn't copied exactly the same type in his program.



The new metallisation system from Leybold Optics has been in use since autumn 2009.



Sixteen Metar winding automatons have been newly procured since the late nineties. And it's getting more and more cramped in the winding department...



2012 –the resolution: The winding department shifts to the new, nearly threefold sized clean room on the fourth floor.

Large projects: A totally new challenge

Not only the rapid growth of 2010/2011 including an all-time record turnover of more than 59 million EURO, but also the considerable slow-down in 2012 were mainly driven by the ups and downs in the European and Asian markets for regenerative energies. The boom in regenerative energy production was not the exclusive reason for the fact that, in the years between 2009 and 2012, ELECTRONICON invested considerable sums in the modernization of the production facilities in Gera-Pforten (a new metallisation system from Leybold Optics was commissioned here and the capacities of the cutting machines were expanded) and the expansion of "Gross-Ko" (large capacitor production) in Keplerstrasse: amongst other things, the area of the winding unit did almost triple in a new cleanroom there, four

additional highly-productive winding machines were commissioned, the assembly of AC and DC capacitors was enhanced and the testing processes got automated. For many decades, there have been solutions for low-loss energy transmission over long distances using direct current. ELECTRONICON had already been involved in such high voltage direct current transmission systems (HVDC) since the late nineties providing special damping capacitors and regularly supplying capacitors for such projects. Around 2007/2008, market leading multinationals such as SIEMENS, ABB and AREVA started conceptualizing a new type of HVDC transmission systems that worked on the basis of so-called voltage-sourced converters and were particularly suited for connecting offshore wind farms. As specialist for long-



The current strength of the winding is increased further using ELECTRONICON's SineCUT wave cutting technology.



The new location in Gera-Hermsdorf



Full house. One single HVDC project often consumes thousands of large capacitors, each weighing about 100 kgs and more.



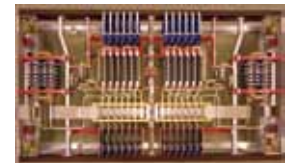
In the voltage-sourced converters of the new HVDC generation, the capacitor accounts for almost half of the weight of the module. One single project may consume up to 600 tons of film. Here, in a module of the Franco-British company ALSTOM GRID.

life, highly reliable capacitors, ELECTRONICON was involved as development partner right from the start.

Very soon, it was clear that the new HVDC generation would require exorbitantly higher volumes of film capacitors as compared to any previous solution. In the existing production sites, the production of thousands of large capacitors, each weighing approx. 100 kilos, was hardly imaginable. The initial and most natural idea - a re-acquisition of so-called PG1, the neighboring five-storied building from the VEB Elektronik era - was soon discarded for both productional and commercial reasons. After a brief, intensive search, the company bought a factory workshop from a packaging manufacturer in Gera-Hermsdorf in November 2010 where a complete assembling and testing line for lar-

ge box-type capacitors was installed from scratch. "Plant III" was officially commissioned on 2nd May 2011, right on time to facilitate ELECTRONICON's participation in the first bids for projects of the new HVDC generation.

Like SIEMENS&THALSKE, the K-W-G and VEB Elektronik in the past, today's ELECTRONICON is closely associated with the city of Gera as one of the largest employers in the manufacturing sector. Whilst the historic locations in Parkstrasse and surrounding areas are no longer recognizable after having been pulled down and rearranged, the company continues to grow in its modern facilities. The 75th year of capacitor production in Gera finds ELECTRONICON in the midst of planning for another expansion of its most



HVDC module by ALSTOM grid in classical design. At the top one can see the frames with the blue ELECTRONICON capacitors, nicknamed "wine racks" due to their characteristic shape.

ELECTRONICON[®]
always in charge

With a new livery since 2009: after 22 years, the logo and colors of ELECTRONICON were modified. The "E" embodies the switching symbol of the capacitor.

The slogan "always in charge" plays with the word "charge".

Capacitors are "charged".

"To be in charge" also means to be responsible, to be competent for something, to be the right contact.



In February 2012, Ursula von der Leyen, Federal Minister for Labor and Social Affairs, and Gera's future Mayor Viola Hahn are the first to visit the new winding department. Here, in conversation with CEO Walter Bauer.

important strategic asset: The metallisation and the cutting departments are expected to undergo a fundamental reorganization and expansion.

Work is also in progress for upgrading the contacting capacity by about 40 percent. The developers are working on new ideas for power capacitors and the biggest "problem" in production is to keep pace with the growing demand within and outside the country. Moreover, for the first time the company crossed in this jubilee year the 67 million Euro mark.

An old-time engineer once remarked impishly: "Whatever they try, no one has ever been able to replace the



In 2013, more investments are made in the expansion of the production facilities. In autumn, ELECTRONICON received a new robot-driven contact-spray line.

capacitor by an alternative component. Probably, they'll always need it..."

In the 75 years of her existence, the "old lady" has experienced many upheavals. She has risen twice like a Phoenix from the ashes and mastered a new beginning. From a subsidiary company in the times of a war economy to a giant in a government-owned conglomerate, to the versatile medium-sized enterprise in the open world market: Gera has developed its capacitors and is doing it until now - more successfully than ever before.









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Stefan Hochsattel and Steffen Jacob

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