The story of Think, Norway's largest car factory

BY ØYSTEIN ASPHJELL

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TRANSLATED FROM NORWEGIAN BY KRISTIN ÅRSKAUG

A yellow Norwegian-built Think was presented like this at the international Electric Vehicle Symposium in Stavanger in May 2009. Electric transport was going to ensure that cities had clean air. The Think community is in many ways a pioneer for the Norwegian EV policy. (Photo: Håkon Aurlien)

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In 1960, the rationing system for car ownership was ended, and private cars in time became commonplace in Norway. The early 1970s saw the coining of the terms "rush-hour traffic" and "lunch-box drivers". But in 1973 came the oil crisis and petrol rationing. Among those who became familiar with queues both to buy petrol and to commute to work was the inventor Lars Ringdal. One day he decided to develop a Norwegian electric vehicle, and 20 years later his son Jan-Otto decided to build a car factory in Norway. This was opened at Aurskog in December 1999. Unfortunately, the last car was made there in September 2009, but production continued in Finland until it was all eventually over in 2011. Some of the employees then formed Think Bilsamlinger (literally "Think Car Collections") and stored important prototypes, development models and documentations, in the hope that these at some point could be displayed somewhere. We are delighted that the Norwegian Road Museum has taken over this collection, and from 2019 is displaying Think history at the new Museum of Vehicle History at Hunderfossen.

The industrialisation of the Norwegian electric vehicle venture started as a development project in the pioneering company Bakelittfabrikken AS (hereafter referred to in translation as "the Bakelite Factory") at Aurskog, an hour's drive east of Oslo.

The Bakelite Factory was established in 1946, and made products from bakelite, a precursor to plastic. In 1954, the Bakelite Factory patented plastic training ammunition for the Norwegian Armed Forces. The first Pioner dinghy was made in 1959, and it revolutionized the leisure boat market in Norway. In 1964, a double-hull variant was introduced, and since then almost 400,000 Pioneer boats have been manufactured by the Bakelite Factory. The company thus had many solid "plastic feet" to stand on.

The combination of a sluggish market and an ever-present need for innovation meant that in the mid-1980s they focused on product development and were actively looking for new ways to use plastic technology. The two partners Jan-Otto Ringdal (founder's son and chairman of the board) and Svein Kallum (general manager) had a lot of balls in the air and worked purposefully to include new business areas. Several of these project received government support through grants from the National Industries and District Development Fund (SND).

Øystein Asphjell is 46 years old and for 8 years he was part of the engineering team that developed Think from idea to manufacturable vehicle. This text is an excerpt from an article about Think in the book "Elbil på norsk" (Electric vehicles the Norwegian way), published by Transnova/the Norwegian Public Road Administration in 2013.

The two prototypes from 1973 were covered in dust when they arrived at the Norwegian Road Museum. (Photo: Håkon Aurlien)

In 1988, the factory filed a world patent for its "rock-and-roll oven" for rotational moulding of plastic products, a technology that up to the year 2002 was central to the production of electric cars from Pivco and Think. In 1989, the Bakelite Factory applied to the SND for funding for a preliminary project to look at the possibility of developing an all-Norwegian city car, by combining the Bakelite Factory's rotationally moulded plastic products with an aluminium frame produced by Norsk Hydro.

The city car was to be small so as not to occupy unnecessary space when queuing or parking, and it was to be lightweight to be energy efficient. The main thing was to define a whole new niche in the transport sector, and this was actually more essential than for propulsion to be electric.

IT STARTED WITH MAYONNAISE TUBE CAPS

The idea of a small plastic car with an electric motor was not new to the Ringdal family. Jan-Otto's father, Lars Ringdal, was an inventor and industrialist, and can take credit for the existence of the Bakelite Factory and the company's many patents and business areas.

Lars Ringdal came up with new ideas incessantly and was not really that concerned with the day-to-day running of the Bakelite Factory. For Lars, the most exciting idea was always the next one. He travelled extensively and kept coming home to the workshop at Aurskog with new ideas and concepts. There are still inventions and tools in the basement of the Bakelite Factory that bear witness to early experiments.

Lars started his professional career during the war, when he got a job at Tubefabrikken AS ("the Tube Factory") in Oslo. Here he was told to monitor the machine that produced caps for the mayonnaise tubes, and thus he made close contact with the oil-based wonder product of bakelite – an early form of plastic. The entrepreneur in Lars did not hesitate, and already in 1946 he established his own company, the Bakelite Factory, on Stanseveien at Kalbakken in Oslo.

OIL CRISIS AND THE FIRST ELECTRIC CAR PROTOTYPES

As a result of the global oil crisis in 1973, Lars Ringdal experimented with a city car concept. He built two prototypes with conventional lead batteries and an electric motor from a washing machine. The bodies of these pioneer cars (Pioneer was actually proposed as a name) were in fibreglass. The so-called lunch-box drivers in their large cars with only themselves and their briefcases were some kind of anti-role models for Lars when he developed the first concepts for a city car.

The oil crisis and concerns about air quality in urban areas led to proposals for a ban on petrol cars in city centres already in the early 1970s. During the oil crisis, people in Norway held some kind of idea that "we have little oil, but an abundance of electricity." Therefore, the basic concept from the start was small, light and electric. The prototypes were built by hand in the basement of the office building at Kalbakken.

The two prototypes built in 1973 can still be found in the Think collection and show the underlying philosophy of city car size, electric drive and plastic bodywork. The frames are simple steel structures and the bodywork is fibreglass – prototype construction in every way.

Lars Ringdal was involved in research and development in the company until his death in the mid-1990s.

FEASIBILITY STUDY «NORWEGIAN CITY CAR»

Jan-Otto Ringdal focused on finance and business operations while he was manager of the Bakelite Factory. In his search for new business opportunities, he would often look back in time and consider previous projects. The feasibility study for the production of a Norwegian city car in 1988 was initiated as one of several projects. At the very first meeting with the Royal Norwegian Council for Scientific and Industrial Research (NTNF), the predecessor of the Research Council of Norway, Jan-Otto Ringdal and Svein Kallum from the Bakelite Factory and Svein Hestevik from Sigma Elektroteknisk AS met with Bjørn Henriksen and Rolf Skår from the NTNF. From the first minute, the NTNF representatives were positive and encouraging.

A preliminary study was initiated, and the experience made with the prototypes from 1973 was collected from the Bakelite Factory archives. Norsk Hydro got involved at the very beginning, while establishing their own department for automotive components, which has subsequently produced "space frames" in aluminium for a number of major car manufacturers. Posten and Televerket were hired as potential users of the new car. The recently established Statoil company joined as a partner to look into infrastructure, especially for battery swap stations, which were an idea at an early stage.

The building concept for the electric vehicle was intended to be simple, efficient - and Norwegian. From the Bakelite Factory, a rotationally moulded plastic body in one large piece; a simple and complete aluminium frame structure from Norsk Hydro; and an electric drive system from Sigma Elektroteknisk AS of Ås.

PERSONAL INDEPENDENT VEHICLE COMPANY; PIVCO AS

Early in 1990, the results from the feasibility study and the response from the partners were so positive that the Pivco company was drafted in the autumn of 1990 and finally entered in the Brønnøysund Register in January 1991. The family business Ringdal Patenter AS, Norsk Hydro, Statoil and the German power company RWE were the first major shareholders. Later, the Møller family and some private individuals joined on the ownership side.

The Personal Independent Vehicle, or "PIV", which later became the abbreviation that gave the vehicle its name, was initially an idea for a brand new transport concept.

The remaining PIV1 prototype is no longer driveable. Through the years, parts were removed and used for other prototype projects. But it is rollable and now displayed in the new Museum of Vehicle History. (Photo: Håkon Aurlien)

The car itself was just a part of it. The words and the name dropped into Ringdal's head on a flight home from Australia, on his way to meet with the Research Council.

When Pivco was established, Ringdal became the company's first general manager, and Kallum assumed the main responsibility for the operation of the Bakelite Factory. The task was crystal clear: They were to build a first prototype to demonstrate the concept, and then collect further funding to start manufacturing electric vehicles in Norway. And time was of the essence.

The guidelines for the very first PIV were precise; a rotationally moulded body in one large part, a «Space frame» in aluminium, two doors, two seats and a large boot, small and light, a city car but still a real car.

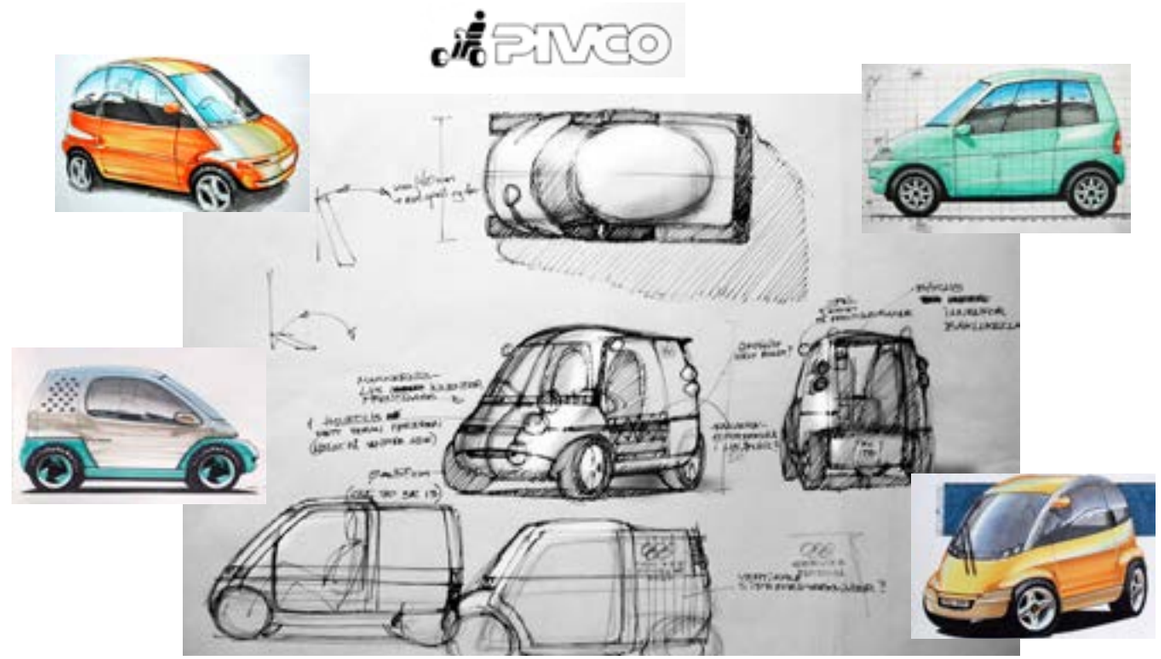
The city car idea, the vision of a new transport concept, was absolutely central – hence the name "Personal Independent Vehicle". Ringdal consistently used the word "vehicle" and not "car".

PIV1 – BUILT IN THE BASEMENT AT KALBAKKEN

The designing and engineering work on the first Pivco car started even before the feasibility study was completed, and took off for real when the company was established and initial capital was available.

In the autumn of 1991, Civil Engineer Jan Reimers became the company's first employee, and together with car and engine engineer Svend Ole Ørken, the development work started for real around Christmas time in 1991. In a large office in the building on Stanseveien at Kalbakken, these bright minds sat down together and made a sketch of what was to become the first Norwegian production car.

The first car design sketches were made by designer Svein Erling Lode of the company Design Kontoret. A big book on car technology - Teknologisk Forlags Store Bilbok - was diligently studied, and Reimers drew the aluminium frame in cooperation with representatives from Norsk Hydro. Lars Ringdal took part behind the scenes and looked at various technical solutions, especially for the design of the bodywork. The Bakelite Factory was of course given the task of developing the moulds for the new car. Orders for parts and components were soon issued, and then began



The first car design sketches were made by designer Svein Erling Lode of the company Design Kontoret in 1989. He also designed several model sketches from 1992, and designed the first company logo.

the work to put together a new car, genius-inventor style, in the basement on Stanseveien. There, the very first concept frame was welded in steel.

Soon afterwards, the first version of the aluminium frames arrived from Hydro. Three of these were manufactured for the PIV1, but only one of them was used to build a car. In the autumn of 1992, the team had made a green foam model of the PIV1.

In early 1993, the team at Kalbakken was reinforced with mechanical engineer David Brown, industrial designer Stig Olav Skeie and a little later electrical engineer Mårten Aurbakken. Common to everyone in the team was that they were involved in both designing and building. The distance between the drawing board and the workshop was short.

The moulds for the one-piece vehicle body was produced in Italy. On the Bakelite Factory's premises at Aurskog they then cast a handful of bodies that were used for various testing. The concept solution of casting a large bubble, cutting holes for doors and windows and then inserting an aluminium frame proved to be difficult. The PIV1 never had doors developed, nor a furnished interior. It was a concept study, intended to demonstrate the PIV concept, the car's expression, structure and bodywork. The matte and rough plastic body and the bare, visible aluminium profiles were innovative and revolutionary. It was Norwegian, and it was different.

In the winter of 1992/1993 lights were on almost around the clock in the basement windows on Stanseveien. In the autumn of 1993, it was time for a top-secret test drive of the very first prototype: A red PIV1 with an electric motor from Siemens, a propulsion system from BRUSA in Switzerland and NiCd batteries from France. The first test drive was to take place at night. To excited

A full-scale model of the PIV2 was built to look into detail design. It was somewhat dusty when it was retrieved from a storage facility at Bjørkelangen this year, and is now preserved at the Norwegian Road Museum. (Photo: Håkon Aurlien)

cheers from the entire team and a few select supporters, the world's first PIV rolled up and down the track under its own steam, thus proving that Pivco was a success. With this, financing and support was obtained for the next stage and the next goal: The Olympic Winter Games at Lillehammer in February 1994.

PIV2 - THE ELECTRIC CAR FOR THE WINTER OLYMPICS AT LILLEHAMMER

Work was already well underway on what was to become the PIV2. The PIV2 was to demonstrate a complete car that would be used by selected customers and that would work in a cold climate. PIV was going to meet the world at the Lillehammer Olympics.

The project room at Kalbakken was moved up to the ground floor. First, the design team started to work on a wood and foam model, to look into the detailed design of the exterior. The main design of the PIV2 was to a large extent based on the lines from the PIV1, and the first sketches were designed by Espen Thorup with assistance from both Stig Olav Skeie and Bård Eker. Important changes were that the internal height of the boot had to be adapted to Posten's letterboxes and a concept more suitable for mass production.

During the Olympics, a small fleet of cars would partly serve as internal transport for their three main customers, while demonstrating the cars in use under quite extreme conditions. Posten's cars were red, Statoil's were blue and Televerket's green – the plan was three for each and three for Pivco.

Altogether 13 cars were manufactured of the PIV2 model. The first one was actually a non-drivable prototype that was later upgraded to a drivable car to be a back-up for the twelve to be used at Lillehammer. The development team at Kalbakken worked day and night. All parts were ordered in a quantity of 20. In late summer 1993, the lower part of the Bakelite Factory at Aurskog was cleared and prepared for car manufacture.

Not to make it to the opening ceremony at Lillehammer – it was simply not an option. There was hectic work until the last minute. The team's efforts were formidable all the way up to the time when Lillehammer city centre was to be closed to regular traffic. Some Volvo buses, a few VIP cars and twelve PIV cars were the only motor vehicles permitted in Lillehammer city centre during the Olympics. It is not just an urban myth that electric engineer Mårten Aurbakken travelled in the cargo room of the one truck transporting the cars from Aurskog to Lillehammer, to complete the final details on a couple of them.

The brand name CityBee was launched, and a yellow and black bee was used as a symbol in brochures, posters and on the steering wheel and front of the PIV2 cars, characterised by their double lamps and tall roofs. Promotional pictures were taken, and sales efforts were of course in focus throughout the Olympic project. The demonstration was successful, and more or

Two of the 13 PIV2 cars photographed at Lillehammer in 1994. The original photo shows the vehicles and the car enthusiast Ole Birger Gjevre from Valdres. Gjevre later added the Santa drawing and sent the picture as a Christmas card to friends. It was then reused as shown here. (The origin is unfortunately incorrectly referenced in the printed yearbook.)

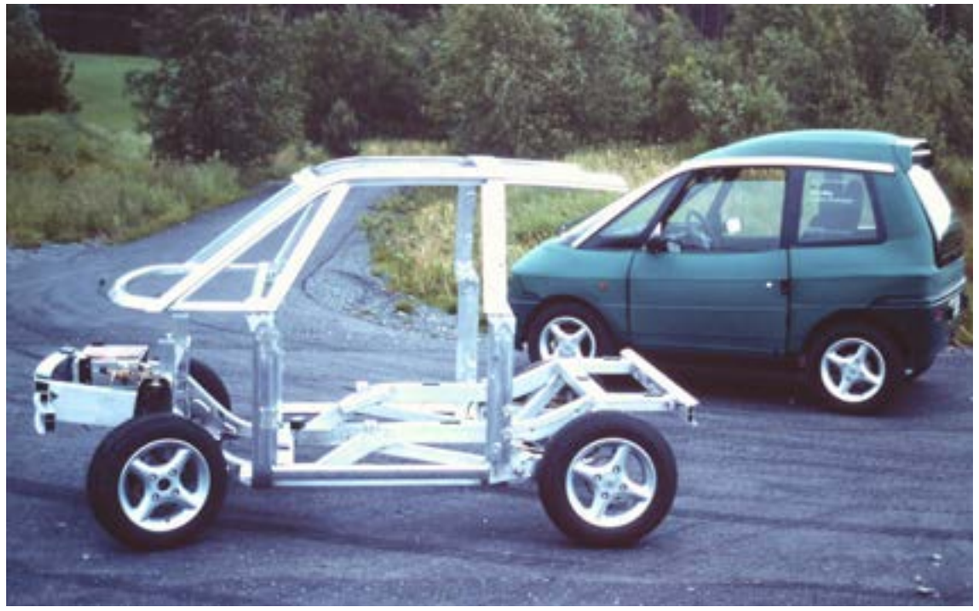
less all the cars worked surprisingly well, especially considering the cold weather during these February days.

MARKETS OPEN UP: THE PIV3 IS LAUNCHED

The Norwegian power companies Oslo Energi, Østfold Energi and Stavanger Energi early signed up as customers of a next-generation EV from Aurskog. Ringdal & Co were thinking about product improvements and production adaptations for a 100 series (first test series) of cars to be named PIV3.

In parallel and in connection with the Olympics, events were taking place in a completely different part of the world, which would prove to have a decisive impact on the realisation of the PIV3 model. The mayor of San Francisco was a driving force within urban transport. As one of the few cities in the United States, San Francisco had a well-developed subway and train network known as BART (Bay Area Rapid Transportation System). The traditional hippie trends in downtown districts of the big city, combined with the tech nerds of Silicon Valley, made San Francisco likely to become a pioneer of "clean urban transportation". The cars from Pivco fit the scheme perfectly.

The demonstration of Pivco cars at the Lillehammer Olympics was a confirmation that something big and interesting was underway in Norway. During the winter of 1994/1995, the BART system initially ordered ten, then 40 cars for its "Station Car Program". The small development team at Kalbakken had plenty of ideas and improvements that they wanted to include in the new 100-series. The development of the car and tools was in full swing.



The aluminium frame of an early PIV3 (the car shown on the next page) together with one of the Winter Olympics cars at Aurskog in April 1994. Only a few of the first cars remained in Norway. (Photo: Håkon Aurlien)

PIV3 BUILT FROM 1995

In the spring of 1995, production was going to start. In April Pivco had a total of 13 employees. In connection with production start, the workforce was increased to 20. In hindsight it is almost difficult to understand how financing, sales, development and production could be handled by such a small workforce. But everyone had the feeling of being part of something big, and efforts invested would in many cases exceed the profits made for many of the pioneer workers. The summer of 1995 represented a change of pace in the Norwegian EV development. The trade association Norstart was being formed, and the Scandinavian Electric Car Rally became a successful event.

At Aurskog, the production of electric cars was running at full speed. San Francisco's cars were given the model name "Citi", an acronym for "Clean Intelligent Transport Inc" which was the company in the United States that received the cars and operated them. In October 1995, the first consignment of Pivco Citi cars was officially handed over to Mayor Frank Jordan, and on the occasion of this event Ringdal and his team were assisted by the Norwegian King and Queen. This was the start of what was envisioned to be a magnificent success story of Norwegian industry and export.

The first PIV3 cars were continuously delivered to San Francisco. Only in the spring of 1996 was Pivco able to start delivering cars to their sponsors/owners/pioneer companies in Norway. Stavanger Energi, Østfold Energi and Oslo Energi each received a handful of cars, and in addition a rental car programme was established in Oslo. Six cars were stationed at Oslo Airport Gardermoen, and 13 hotels near the city centre in Oslo organised charging spaces with charging sockets. In addition, six of the capital's Statoil petrol stations were equipped with charging points. At Statoil Storo, a fast-swap station for battery replacement was established. The PIV3 had a drawer system for installation of the battery pack, and at the fastest, the entire propulsion battery could be changed in 2.5 minutes. Despite limited volume, however, this testing at Storo proved that battery replacement was not a suitable way to extend the range for electric vehicles.

The Scandinavian Electric Car Rally from Gothenburg to Oslo in June 1995 was a successful event. Three Pivco cars took part, including this one, purchased by Østfold Road Office, with Terje Carlsen and Håkon Aurlien as drivers. (Photo: Bjarte Skaugset)

Production of PIV3 amounted to 120 cars, including ten prototypes in advance, 45 Citi models in San Francisco and 65 CityBee models on the roads in Norway.

The testing during the Lillehammer Olympics in many ways confirmed the technical function of the Pivco cars. But for the PIV3, the number of cars was first of all much higher, and most importantly – they were tested and used by inexperienced customers. The latter fact was new to Pivco. The cars proved to be unstable in operation, but it could often be traced to improper use. Pivco established an organisation in the United States that could handle the day-to-day operation of the cars. While the BART users were asleep, the team worked on the maintenance and operation of the small American EV fleet. Some had an energy-draining air-conditioning system installed, and many suffered from leak problems when it rained.

At home in Norway, the small Pivco team was supported by a handful of mechanics from Oslo Energi who helped keep the fleet on the road. With PIV3, the company gained operational experience from two different and important markets, and new, big plans were made for the next phase for Pivco.

The PIV3 was exempted from type approval in Norway and in the United States, and it was clear that if they were actually going to build cars, a model would have to be developed from scratch for full classification as a passenger car. This was, and is, a big challenge for any automobile manufacturer. In San Francisco, they were granted a temporary permit through 1998, and 27 cars were in operation until they were returned to Norway in 1999.

The 45 Pivco cars attracted a lot of attention in San Francisco. (Photo: Henning Sjølie)

As the distance was short from the customer to development department to production, the company gave in to the temptation to continuously improve their product. The workers at Aurskog worked as much or more on modification of vehicles and tools as they did on the construction of new cars. Now they were to concentrate on the development of a brand new and real car. In the autumn of 1996, all suppliers were ordered to stop production. Just before the Christmas dinner in 1996, the new general manager Rolf Gulbrandsen notified every single one of the workers at Aurskog: You are dismissed!

Gulbrandsen raised new capital, and the entire team focused their efforts on the plans for what was to be Pivco's first real sales model, the PIV4. Early in the development, two main requirements were set: type approval and cost reduction. In addition, they had plenty to do when it came to user friendliness and detailed finish – especially with regard to improvements to the furnished interior and prevention of water leaks.

On 11 September 1996, production car no. 100 was completed at Aurskog. Before the Christmas dinner, all employees were given notice of lay-off; all efforts were now going into the successor, the PIV4. (Photo: unknown)

ALLIANCE WITH LOTUS

To ensure that Pivco met all type approval requirements in Europe and the United States, it was decided to partner up with an established car design agency. Lotus Engineering in England and Porsche Engineering in Germany both submitted offers to assist in the development programme.

In March 1996, Østfold Energi purchased five Pivco cars to be used by themselves and by the home care services and the parking authorities in Moss. This meant that the cars were tested realistically, which provided important feedback to the car developers. Here is Mayor Gretha Kant in Moss together with General Manager Egil G. Arntsen and Regional Manager Øystein Gåserud when the cars were put into use. (Photo: Roger Prang)

Technical Manager Jan Reimers decided that the development of the PIV4 should be assigned to Lotus in Norwich, with the assistance of the small Norwegian team. Hydro Automotive was gearing up to become a supplier to the global automotive industry, and also assisted Pivco with its expertise. The core team from Pivco travelled over to Lotus in mid-August 1996, and this is where the PIV4 team was established. A key to lower component costs was to pick as many components as possible from established car manufacturers. Most of the small cars from European manufacturers were scrutinised, and it soon became clear that wheel suspension and chassis components from the French PSA (Peugeot/Citroën) were preferable. Especially the low and compact rear suspension with torsion springs from the Peugeot 106 was a good fit in the small electric car. Later that year, the Norwegian team was reinforced with Egil Mollestad (later Technical Director) and Ole Fretheim (later Factory Manager), among others.

The wheel suspension, brakes and steering from Peugeot, combined with an improved integrated battery pack, were the main changes from the PIV4's predecessors. The need for deformation zones and crash safety also constituted a major change.

Senior Engineer Peter Rawlinson of Lotus had designed the frame and structure. When the new aluminium frame collapsed during testing in Denmark,

Lyse Energi helped make Stavanger an EV city at an early point in time. One of their PIV3s is preserved at Rogaland bilmuseum (Car Museum) at Klepp. (Photo: Håkon Aurlien)

he offered to design a steel frame. More recently, Rawlinson has become a bit of a hero in the EV industry after several years as Chief Engineer at Tesla Motors – but that's another story. In the autumn of 1997, the first steel frame prototype was produced at TH Kristiansen in Moss. Thus, the PIV4 ended up with a lower frame in steel and an upper frame in aluminium as the basic principle.

In early 1997, the development of the car was moved back to Norway, at the same time as the first plans were made for a new and modern factory. Manufacturing within or outside the EU was an important issue. For a long time there were plans to establish the factory just beyond the Swedish border, to ensure tax-free access to what was considered the most important first market. Ringdal's grand old idea about joint parts manufacture and satellite factories for assembly remained a strategic main line for Pivco.

When the factory was established at Aurskog, the idea was that the annual volume would be 5000 vehicles and that they would mainly serve the Norwegian and Scandinavian markets. Their vision was to establish a new production unit with capacity for 5000 cars where new markets would develop.

Due to proximity to and faith in the Norwegian market, combined with a welcoming attitude from Aurskog-Høland municipality where employment opportunities were few and far between, it was decided to build the first factory next door to the Bakelite Factory on a plot that was owned by the municipality. To support the start of production, offices were established in an office building at Aurskog that previously belonged to the Bakelite Factory. In total, about 40 people were involved in development and prototype building.

THE FIRST PIV4 PROTOTYPES

In the spring of 1998, the first 20 prototypes were built with NiCd batteries from SAFT in France and drive systems from Siemens in Germany. The vehicle body was divided into seven parts, cast separately in five moulds in the ovens at Aurskog.

In October 1998 came the Electric Vehicle Symposium and Exhibition (EVS), which gathers EV enthusiasts from all over the world every year and a half. This time it was taking place in Brussels, and this turned out to be the venue for the world launch of the first real car from Aurskog. The Oslo-based advertising agency Virtual Garden was commissioned to assist in finding a name for the car (...). Pivco's profile and stand at the EVS15 was to attract attention and be convincing.

The team at Aurskog already had experience from working around the clock to get cars ready for major launches. But this time it wasn't just the technical team that sweated a little extra during the run-up to the world premiere.

It cost a lot of money to build both the factory and the car, and Ringdal & Co had emptied the goodwill account of many of their investors. Funds were about to run out. It wasn't easy to convince anyone to invest even more before Pivco had proved that the company could make a car that would meet the strict type approval requirements and was cheap enough for people to want to buy it.

Ringdal and Lilleng had had preliminary talks with a couple of the major car manufacturers, and were convinced that it would be best to partner up with one of these. The road towards the EVS15 in Brussels became a "sink or swim" exercise.

They decided to invest the company's last resources on a grand launch there to get to the finish line. A handful of perfect

The new PIV4 attracted a lot of attention during the EV Symposium in Brussels in October 1998. The presentation here resulted in Ford's choice to take over the company and to put the car into production. The exhibited car, with the special "sand" colour, can now be seen at the new Museum of Vehicle History at Hunderfossen. (Photo: Håkon Aurlien)

prototypes were completed, and Pivco's stand at the fair was the largest and most impressive one. Just about all their employees, around 50 in all, were made to wear green company jackets and sent down to create an impression of the company being a big business. The Think brand was launched, and the car was very well received.

However, the bank account at home in Norway was completely empty. On the Monday after they returned to Norway, Pivco was declared bankrupt with large accounts payable and all employees were laid off.

FORD TAKES OVER

During the EVS, Ringdal had close conversations with a number of potential partners for Pivco. The most serious conversations were those he had with Ford Motor Company and Honda Motor Company. In the period after the bankruptcy in October 1998, the key team worked almost as if involved in voluntary community work. Ringdal and a handful of employees succeeded in buying the bankruptcy estate. They resumed their dialogue with Ford in Detroit. California had a system with ZEV-Credits, which in oversimplified terms meant that sellers of polluting fossil fuel cars had to earn a certain number of "credits" from the sale of zero-emission vehicles, in order to be allowed to sell their regular cars. The price tag for achieving saleable electric cars in California through an acquisition of Think was considerably lower than establishing production of their own electric cars.

During the Christmas holidays in 1998, a Think City was hastily prepared for send-off to the CEO of the Ford Motor Company, Mr Jacques Nasser. Nasser wanted to test the car himself, and later told the story of when he met the employees at Aurskog: "My wife and I decided to take this little, weird car to church one day, and as we were heading down the highway we felt very small and tiny in comparison to the enormous American trucks and SUVs....but I knew that the car I was driving had been engineered by vikings in the cold north, so it was tough and strong – despite its size."

Early in January 1999, the Ford Motor Company entered an agreement with Ring-

The story of the name Think

– We understood that this was a historically important mission, and that it would mean a lot to Pivco that we came up with a good name," says Petter Nordskar. He was the head of the Virtual Garden advertising agency, who was commissioned in 1988 to find a new name for the company. In his book "Tusen og enda en natt" ("One thousand and one more night") he tells the story:

The creative process was really taken seriously. We were a number of minds involved in the project, and the list of names became longer and longer. This was an incredibly inspiring case - after all, we were creating Norwegian car history.

One day there was a very different new name on the list. I've always liked to believe that I was the one who came up with it, but that is not the case. It was our consultant and project adviser, Elisabeth Mannsverk, who can take credit.

Think. It's simply one of the best brand names I know of, to this day. It was born in a creative team that was passionate about the project's success. We would do everything possible to sell it to the board of Pivco AS, but it could be nothing but success. What a name!

We were wrong. The presentation was a total flop, and crestfallen we returned to our colleagues, who were stunned. One comment I'll never forget from the presentation, I think it was the representative from Posten (Norwegian Post) who made it: «Think? Silly! That's just a word from the English dictionary. Anyone can pick out a word froma dictionary!». We had failed completely, and with this incredible comment, the meeting was over. "Besides, people won't be able to pronounce it", said another board member as we were leaving the room.

The atmosphere was strained. The board were furious. It was urgent to establish a new name. The entire board had to be summoned for a new meeting, in the middle of the precious general staff holiday season, to find time in the calendar. Talk about messing it up. We had been at it for a long time, and felt as tired as Bjørn Dæhlie on the day after winning an Olympic gold medal. And now we were supposed to start another 50K race.

The day came. Elisabeth Mannsverk took the floor. She was well prepared. "This is not a new car, the way we are used to thinking about cars. This is an idea, a concept, a new way of thinking."

It can hardly be expressed more clearly. That is exactly what this is, a whole new way of thinking.

Slowly but surely it dawned on Jan Møller, a highly respected Nestor in the automotive industry and an investor through Møller-Gruppen AS, what was about to happen. This audacious little advertising agency were putting all their money on one horse. They were not proposing a new name the way he had expected. He looked at Elisabeth Mannsverk, who was almost finished, interrupted her and banged his fist on the table. "Damned right this car shall be called Think! It's actually brilliant!"

I met with Jan Møller a while later. He didn't hold anything back. "That presentation was goddammit the best sales pitch I have ever seen", he said, and left.

When the name was being designed as a logo, the i was turned upside down. This was the inspiration to write the name with an exclamation mark instead of an "i". "The name is written «Think» in running text. But there were a lot of committed people in the company, and we chose to turn a blind eye to this usage," says Kathinka von der Lippe, who was brand manager of the company at the time.

The CEO of Ford Motor Company, Jacques Nasser, cheered at the opening of the Think factory in October 1999. In the background (from the left), founder Jan-Otto Ringdal, Prime Minister Kjell Magne Bondevik, Minister of Trade and Industry Lars Sponheim, Director of Think Per Lilleng, and HRM King Harald. (Photo: Tor Richardsen / NTB scanpix)

dal & Co where they bought 51 % of the shares in the newly established Think Nordic AS, with an option to buy the remaining 49 % within one year.

The PIV4, or Think City as it was now called, was designed to meet all European type approval requirements and was almost fully certified. Ford always realised that a next-generation EV needed to be developed to meet U.S. requirements, but their first priority was to start the production of Think City.

In September 1999, the serial number of Norway's first series-produced car was stamped into the frame, and the small assembly line at Aurskog began to move. But it took time to organise the official production start.

Prime Minister Kjell Magne Bondevik was ready and so was King Harald, but it turned out to be more difficult for the busy Ford CEO to find time. Finally, in October 1999, it was time for the official ribbon cutting ceremony, or rather, the attaching of the wheel centre caps.

Five a day was for a long time the target for the production of Think City, a target they reached with great difficulty. The City model proved to be robust and worked well with the first customers. Ford wished to prepare the market for a U.S. model that could be sold in California, and about 250 Think City (referred to as A266 by Ford) were exported to the United States on a three-year temporary import license. A total of about 1200 PIV4s were produced by the spring of 2002, of which about half were sold to the Norwegian market.

US REQUIREMENTS

At the beginning of the year 2000, Ford stepped up their efforts to develop a brand new Think City to be certified for the US market.

Jan-Otto Ringdal was personally presented with a blue Think PIV4 with production number 1000 by Ford as a reward for his efforts. This car was passed on to the Norwegian Road Museum at the opening of the new Museum of Vehicle History on 9 June 2019. Here he is being interviewed by Erlend Moe and Lars Erik Skrefsrud of the NRK, a few days earlier. (Photo: Håkon Aurlien)

Type approval requirements in the United States are stricter than in Europe, especially when it comes to crash tests. Increased safety was the primary goal of the new model, but in addition, the U.S. marketing department had some comfort requirements that would make the cars more marketable. They would have cup holders, electric windows, wider and softer seats, air conditioning and a shiny exterior. Furthermore, it was important to use Ford components.

The first prototype of the new model (code-named A306) was based on a shortened and downsized Ford Ka. Think designer Stig Olav Skeie was not all happy, and the first crash simulations showed that it would be close to impossible to satisfy the most recent American safety requirements.

The Norwegian team was quick to suggest instead developing the previous Think model further. The combination of high-strength steel in the bottom frame, the aesthetics and weight of the upper aluminium frame, and the compact Peugeot suspension was ideal for a small EV. And they got what they wanted. The project was moved back home to Oslo. And everyone's efforts were focused on designing a new Think model.

They initially experimented with Ford's own lead batteries, but after unsuccessful tests and much debate, the choice eventually fell on the nickel-sodium-chloride battery "Zebra". Everything else that could be sourced from Ford's suppliers was integrated into the new model.

Discussions around the surface of the plastic bodywork were at times tense between Ford's marketing department in Detroit and the Norwegian design team. The Americans wanted a shiny car, as similar to a conventional car as possible, whereas the Norwegian team felt and believed that much of Think's "DNA" consisted in having a rough and coarse surface that would be perceived as different, robust and recyclable. In this battle, too, the Norwegian arguments prevailed. In questions about the luxury of cup holders, electric windows and power steering, the Americans won.

ADVANCED CRASH TESTS

In the period from the autumn of 2000 to the autumn of 2002, the A306 was developed into a complete car, and the first prototypes were to be built at Aurskog. Many were sent for testing in the United States, England, Sweden and Germany.

The two show cars made for the Detroit Motor Show in 2002. Both are now preserved in the Norwegian Road Museum's storage facility. (Photo: Håkon Aurlien)

Among the many challenges involved in adapting a car to the US requirements were a series of new crash tests. A total of 50 prototypes with advanced instrumentation were crash-tested in test laboratories at Volvo and in Germany.

In the spring of 2002, the very last PIV4 was manufactured. The factory closed to be rebuilt for the start-up of manufacturing the brand new American model Think A306/City, which was launched with great fanfare at the Detroit Auto Show in January 2002.

One yellow and one red show car were built by hand with high precision, and were later used for the press photos of the A306.

But on 21 July 2002, in a courtroom in Sacramento, California, the state of California was sentenced to pause its system with ZEV Credits. Only a few days later, Ford Motor Company announced that they would sell Think Global. Around NOK one billion had been spent on production of the A266 and development of the A306.

In the middle of Christmas Week 2002, the owner of Kamkorp, Kamal Siddiqi, signed a letter of intent with Ford Motor Company. On 1 February 2003, the deal was sealed, and a new phase for Think would begin. Ford cared about their reputation and would not turn their backs on something that might collapse immediately. And so Kamkorp was given a solid lunchbox on its way as part of the deal, a strictly regulated bank account that would secure the

Two of the crash test cars are preserved in the Think collection at the Norwegian Road Museum. (Photo: Håkon Aurlien)

The red Think Open, a convertible version of the A306, was a jewel in the estate of Think. In the background, Svein Kallum. (Photo: Håkon Aurlien)

company's existence for at least 18 months after Ford packed up and left.

Siddiqi's right-hand man, Bernd Winkler, became the new head of Think Nordic AS. Winkler felt like putting extra pressure on Ford since they were also considering the option of closing down instead of selling Think. During a tour of the factory, he was shown the prototype of the Think Open, the A306 convertible version, built at the very end of the Ford era. In the most secret part of the prototype workshop at Aurskog, the red convertible stood out as a jewel in the estate that Winkler was about to take over.

On a corkboard on the wall, the mechanics had posted a picture of the same car. While everyone else was looking away, Winkler snatched the picture from the corkboard and put it in his pocket. Neither Think nor Ford had communicated the idea of a convertible. But a few days later, the picture from the corkboard appeared on the reputable website "EV World", under the sensational headline "Think to launch convertible!" This to Ford's great dismay. Of course they could not close down the company after such a launch.

THINK PUBLIC

Kamal Siddiqi was a great believer in two main principles for electric vehicles: the wheel motor and the CANbus-controlled electrical system. These he wanted to use in the Think A306. After a couple of prototypes, the concept was abandoned. Despite the fact that the car was 95 percent fully developed, the factory 100 percent ready and type approval 75 percent completed, Kamkorp did not find it sensible to put the car into production.

From early 2003 on, a new focus was therefore to develop a brand new city vehicle concept, the Think Public/T6. Think's development department was tasked with

One of the five Think Public vehicles that were built - 15 years ago and strikingly similar to the autonomous electric minibuses that are now being tested several places in Norway. (Photo: Ole Fretheim)

In 2008 and up to September 2009, 425 Think A306 cars were made at Aurskog. (Photo: Ole Fretheim)

designing the Think Public. The product specification was, in short, a public mobile concept to be used by everyone and able to withstand graffiti and rough handling.

In the spring of 2004, the first two out of a total of five Public prototypes were ready for testing. But the costs of putting either the Public or the A306 into production were far higher than what Kamkorp could manage. In February 2006, Think filed for bankruptcy. In the years that Think was owned by Kamkorp, they never made production EVs.

Jan-Otto Ringdal had gradually moved away from Think and in the Kamkorp period he was completely absent from the company. When a trustee was appointed in February 2006 and the company was to be sold again, Factory Manager Ole Fretheim and Purchasing Manager Erik Skaarnæs together with Ringdal mobilised forces to ensure that Think would remain in Norway, and to ensure that the company was not split up and destroyed.

FINAL PRODUCTION

A new phase was about to begin. Jan-Olaf Willums took the job as the new General Manager, and Alf Bjørseth became Chairman of the Board. Their focus from day one was to get the Ford A306 model on the road. At the beginning of 2007, plans were made for production start. Willums and the management team prepared a share issue to raise enough money for production.

The pure cost of type approval and production start-up would be more than NOK 100 million, so the total sum was set at NOK 200 million.

The share issue was oversubscribed! To re-establish itself on the global car industry map, Think decided to bang the big drum on the automotive industry's main stage: Geneva Auto Show in February 2008. The purpose was to show that Think was back, and to show where Think was headed. Think needed something grander. A four-seat version was on their wish list. The Think Ox four-seater was developed together with Porsche Design.

In April 2008, the assembly line was finally moving again in the car factory at Aurskog. But then came the financial crisis. New issues were needed. New owners signed up. Then it was decided to move production to Finland.

In early September 2009, the last Think, bearing chassis number J005198, rolled out of the factory at Aurskog. This was the last of a total of 425 cars produced, and marked the end of an era for Norwegian automotive industry.

In Finland, an additional 1876 cars were manufactured until the last of a total of 2336 Think A306 cars was assembled on 20 January 2011.