HISTORIC MOTOR SPORTS

MIDNATTSOLS RALLY 2022

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Study

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1 Introduction

The main principle of Historic racing is to retain the cultural heritage of old cars, both history and sports. Historic cars can be enjoyed and competed in many different sports, the most common of which are rally, circuit racing, rally sprint and hill climb. Historic rally sports do not appear as glamorous to the average consumer as, for example, the World Rally Championship run by WRC factory teams.

This thesis mainly focuses on rally competition. Observations made during the Midnattssolsrally 2022 competition have been used for the analysis and comparison, which have been compared to the corresponding domestic event, the Lahti Historic Rally which is part of European Historic Rally Championship.

Jorma Pekkanen, Pasi Kahelin and Jari Saikko from Kouvola Vocational College and Jarmo Kujanpää from Southeast Finland University of Applied Sciences participated in the Midnattsolsrallyt 2022 competition trip that took place in June 2022. In addition to track driving, Pasi Kahelin has worked as a co-driver in more than 50 historic rallies at SM and EC level. Jorma Pekkanen has been involved in motor sports as a competitor since 1965, of which 37 years as a rally driver. Thanks to Ralf Pettersson, Midnattssols rally Chief Scrutineer Hans Lindvall and race secretary Kerstin Linden for the material of the thesis. In addition, the source of information has been Ralf Pettersson, the Finnish technical observer of the FIA of the International Motor Sports Federation, who has more than 50 years of experience in rally car racing in the EU region, which is also complemented by his work in the technical group of the FIA's historic sports since 2007. The FIA is the international central organization of motor sports, the Fédération Internationale de l'Automobile .

As our destination Midnattssolsrally 2022 showed, it is a well-organized and co-produced historic rally event, good entertainment not only for the participating rally drivers, but also for the spectators following the race.

In accordance with the latest FIA rules, environmental issues and recycling are also present in rally events. The historic competition that we were familiar with used a certified environmental program with responsible persons. The systematicity of this activity was clearly visible throughout the competition.

2 Background

Historic cars are raced in different eras from the 1930s to the early 1990s. Historic cars can be enjoyed and competed in many different sports. The most common sports are rally, circuit racing and rally sprint -type races, as well as hill climbs, which are very popular especially in Central Europe. In Europe, especially among the drivers of the oldest and most valuable cars, regularity rallies are popular, the popularity of which is slowly growing in Finland as well.

The biggest difference between historic rallying and rallying with modern equipment is that the goal in historic racing is not to build a professional career for the competitor and rise to the top of motorsport, but to compete purely as a hobby out of an interest in the sport. However, that does not mean that the athletic level of the competitions is modest, and success is easy. Some of the competitors are serious about winning, and the rally cars are developed within the framework of the rules all the time. Especially for certain of the most popular car models, you can find professional builders from England, for example, who invest a lot in the production of replacement parts and product development - just like in any other motor sport.

Technically, building and maintaining historic cars is more challenging than modern cars, which will be explained more below. The rules, as they were once drawn up in the FIA, are very complex. In the sport, as a general rule, the rules that were in force at the age in question must be followed, which have been supplemented in certain parts according to modern requirements, for example with rules related to safety. In terms of safety equipment, the latest historic cars are almost at the same level as modern rally cars. However, the time the car was built has a big impact on this as well. In addition, a car-specific FIA Historic Technical Passport, HTP document has been created to facilitate monitoring of the car's compliance with the rules.
The technical details used are recorded in the HTP document, which is based on the so-called classification certificate, where the manufacturer states what kind of parts is allowed to be used in the car model. The classification certificate and historic passport also contain photographs, from which the correctness of things can be verified. In the

competitions under the National Central Association of Autosport (AKK-Motorsport), only cars complying with FIA historic rules and FIA HTP passports are competed.

In our country, there are two brand-new, completely national motorsport organizations independent of FIA regulations: the Finnish Association of Hobby Motor Sports, HaMu ry and the Finnish Motor Sports Federation. The principle of these organizations is to maintain an inexpensive hobby, and the regulations of both organizations have been drawn up from a national point of departure in compliance with the Finnish Road Traffic Act. Both organizations have their own classic classes, the rules of which are slightly different from each other, but both of them have modified the FIA rules to be more suitable for national hobbyist use, with the main purpose of making the hobby more affordable and getting the historic equipment standing in the garage, with expired passports, into competitive use again.

Midnattssolsrally competition has a long history and is one of Scandinavia's first large, challenging rallies. The first competition was organized in 1950. At that time, the rallies were reliability competitions: there were starting places to choose from all over the country, and you had to get to the rally headquarter in a certain time using a certain route. Roads in the post-war world were like plowed fields, and reaching the ideal time was a distant dream. The move towards the current special stage rally was made in 1955, when the competition had five completely closed road special stages and one track special stage with the current principle, i.e. the fastest wins.

Competition pair Bo Rönnbäck – Gerth Svensson and Ford Starliner V8 from year 1961 preparing for the competition. This car has been driven in the Midnattssols rally in 1962. Not exactly following the rules, because the splash flap material is certainly not from the 1960s.

In 2006, the competition turned into a historic rally when the currently valid FIA regulations came into force. This rally competition has a good international reputation as a three-day event with demanding gravel roads. In addition, the competitors have appreciated the good arrangements, the large number of spectators and several side events. The central organization of Swedish motorsport, Kungliga Automobile Klubben follows FIA rules, so the race scheduling is very similar to what is used in domestic races.

Midnattssolsrally 2022 schedule was as follows:

Sunday 24 April 2022	*The regulations of the competition will be published on the websites of the competition and results service*
Monday 2 May 2022	*Opening date for entries at 12:00.* *www.midnattsolsrallyt.com*
Monday 23 May 2022	*Closing date for entries at 18:00*
Monday 30 May 2022	*Entry list will be published.*
Tuesday, June 7, 2022	*Closing date for entry fee payment*
Thursday 23 June 2022	*The final competitor instructions with attachments will be published.*
Tuesday 5 July 2022	*Service area, camping, competition office open from 17:00 to 21:00*
Wednesday 6 July 2022	*The service area and offices open at 8:00 am. Scrutineering starts at 12:00. At 16:00 the final starting list will be published. At 16:30 the first special exam starts. At 9:00 p.m., the starting list for the next rally day will be published.*
Thursday 7 July 2022	*At 7.30 the competition office opens. At 8:00 a.m. the second day of competition begins. At 21:00 the following day's departure list is published.*
Friday 8 July 2022	*at At 8.00 the first car starts on the route. At 22:30 the official results of this race day will be published, and the starting list for the next day will be published.*
Saturday 9 July 2022	*At 8:00 the first car starts on the route. At 15:45 the first car at the finish line. At 18:00, the official final results will be published. At 19:00, Park Ferme opens, and cars can drive to the service area. At 8:00 p.m. prize distribution. Park Ferme is a closed area where racing vehicles are parked for technical inspections before moving to the service area.*

All competition documents have moved to electronic processing. The FIA's very detailed instructions have now been copied into the format of national competitions as well. Transactions are quick and easy. The competitor can download the documents to a mobile device, from which they can be printed as hard copies. In this competition as well, the model of the regulations and additional regulations is the same as, for example, in the local Lahti Historic Rally. In auto racing, in addition to the national language, all documents always use the English version, so Swedish language skills are not required to drive the rally. The Covid-19 pandemic accelerated the transition of all event documents to fully electronic transactions throughout the EU.

For this competition and its practices, Finnish practices how to organize historic rally events have been taken as a point of comparison, but also the competitions of the EC-historic rally series in Estonia, Latvia, Germany and Italy, where Pasi Kahelin has worked as a co-driver, as well as the competitions that Jorma Pekkanen has driven in England. However, the closest point of comparison is Finland's largest historic rally event, the Lahti Historic Rally, which has been a part of the European Championship for several years.

The essential difference can be found in the schedules and related programming, as well as in the number of viewers who participated in the programs. The Lahti Historic Rally is, in accordance with EC rules, a reconnaissance, i.e. a so-called space noted rally. The event is in the area of the Lahti Exhibition Center, the sports park and the harbor in the center of the city of 120,000 inhabitants. Service areas and race offices are opened two days before the start, but there are no events of any kind in the area, not even the sale of "rally sausage". There are no spectators. Competitors come to present their driver's license and competition license. When the reconnaissance car has been inspected and the tracking devices have been installed, the competitors also disappear onto the route to make space notes. Any kind of "mood" is missing. Similarly, the camping area of the Midnattssolsrally was full of motorhomes, and most of the rally teams had already set up their camp the day before the start of the rally. Numerous exhibitors' stands and restaurants were ready for operation. When the gates of the Gelleråsen Arena were

opened to the public on Wednesday, thousands of spectators came to the pit area in no time to watch numerous side events and enjoy refreshments during the breaks between performances and exhibitions. All this in the small town of Karlskoga with 30,000 inhabitants, and almost all the spectators were still present when the last competitor arrived to the finish line of the first special stage.

There is no exact information on the number of participants in the evening events, but according to Ralf Pettersson, there were many people. Based on previous years, the competition organizer estimates the number of spectators to be around 70,000.

Anders Carlsson and Audi S E2 preparing for a demonstration drive.

There were a considerable number of whole families in the audience, including grandkids and grandmas, and this is also different from a similar event in Finland. And you can't escape the thought that this is exactly why the atmosphere during the event was very relaxed. Good manners came to the fore when the provincial anthem was sung

after the Show performances. Everyone stood up, and most sang along. We have not experienced anything similar in Finnish rally events.

Considering the quality of the event, the cost level was more affordable than domestic equivalents. The entrance fee of about €20 included parking for the whole day, and the prices of the food and drink offerings were also below the level of Finnish gas station bars. In similar Finnish competitions, the viewer buys either the so-called a rally pass, which serves as an admission ticket for all special stages, or buy a special test-specific admission ticket. The Lahti Historic Rally pass costs €20, or alternatively, each special test separately costs 10 €; in addition, you have to pay for parking. There was free access to all other events of the Midnatssols rally, such as special tests, service parks, etc. Parking fee in the parking lots cleared in the fields was voluntary in the nature of support in favor of the club that organized the special stage. From this we can conclude that the financing of the Midnattsolsrallyt event has been managed through more than the expense of the spectators of the special stages. For example, we counted 84 official partners. Competitors' participation fee in proportion to the number of special stages is at roughly the same level in the Midnattssolsrally and Lahti Historic competitions, but the facilities in the Swedish competition were significantly better.

FIA of the International Federation of Motor Sports, where international participation is allowed, the driver pair needs an international competition license, which is issued by the confederation of their own country. In addition, this rally had a practice that we have not seen before in historic rallies. The driver was required to be at least forty years old. The reason for the Swedes' practice is not fully clear, but we guess the reason is that since most historic car owners and rally drivers belong to the older, so-called senior group of competitors, the organisator want to hold on to them so that the number of participants remains high enough. In this way, the young drivers who are building a competitive career do not occupy the top of the competition result list, but get their spurs in national classes or the Swedish Championship series with more modern rally cars.

3 Technical regulations

The technical regulations of the Historic rally car can easily feel confusing, even though the basic principle is simple. The car competition classes are divided according to the year of manufacture, car type and tuning level, and engine cubic volume. In practice, however, correctly understanding the rules has always caused problems. The car must have an HTP before the first race. This document must be included in all competitions, as the scrutineering organization checks from it and the homologation certificate drawn up by the car factory, whether the car complies with the rules. Since already in the 1970s the technical development of racing cars was at a rapid pace, the FIA corrected and supplemented the rules every year. That is why, for example, the Ford Escort RS 2000 Year model 1976 complies with the technical regulations that were valid until 31 December 1981. The FIA has divided the Historic racing cars into different classes, so that within each age period the rules and, the performance of rally cars are at the same level, and the competition becomes more equal.

The Midnattssolsrally followed the same age period as all Finnish historic rally competitions. First category: cars manufactured before 31.12.1961 and engine cubic capacity free; only one vehicle in this class. The next category for cars 1.1.1962 - 31.12.1969, and in addition 5 different categories according to the cubic capacity of the engine. There was a total of 32 cars in this class, and especially the Swedish brands, Saab and Volvo, were strongly represented.

The next age group is 1.1.1970 – 31.12.1975, which has three cubic volume classes. There were Volvo 142, Saab V4, and Opel's Ascona and Kadett GTE models. The fastest cars in the competition were found from the following age period, 1.1.1976 - 31.12.1981, because four-wheel drive historic rally cars were not accepted for the competition, contrary to Finnish practice. Multi-valve engines are already associated with this age, an example of which is the Ford Escort RS 1800, whose engine has 250–270 horsepower, depending on the version. As a newcomer, Volvo's 242/244 models,

which proved to be even faster than Ford in this rally. The newest age group, which was accepted in the most recent revision of the rules, is cars manufactured between January 1, 1982 and December 31, 1990.

In the Midnattsols rally, among Historic rally enthusiasts only 7% of the 129 rally starters were cars of the latest category. In the Finnish historic championship series, there are about 15–20% of the latest age period cars. According to the chief scrutineer, the low share of new cars in the Midnattssols rally was explained by the fact that the participation of four-wheel drive cars was prohibited. The reason for this was said to be that the roads remain in better condition, which directly affects road maintenance costs. Another reason was mentioned that when the same driver of a four-wheel drive car does not always win, the number of participants in the 2-wheel drive classes is much higher, because more people have a chance to win the overall competition. In Finland, the rally historic rally championship series has exactly the same situation that the same, former World Championship driver, wins all races with his four-wheel drive car. According to Ralf Pettersson, in addition to the increase in the cost level, one possible reason is that over the past few years, the number of participants in the Lahti Historic Rally has dropped to an average of 50 participants in the EC classes and 35 participants in the national historic classes, which has led to the fact that without other national classes, the competition should not be organized for financial reasons.

A rally competition always starts with a scrutineering. Fifty years ago, the scrutineering ceremony checked, among other things, the conformity of cars. Inspection schedules got really long, and that's why decades ago the rules of the scrutineering session were changed, and it started to be called a preliminary inspection. Nowadays, the inspection before the competition focuses only on the roadworthiness of the racing car, the drivers' personal safety equipments and the car's statutory safety equipment. The FIA's historic rules also have specific regulations regarding advertisements in cars, so the correct placement of advertising is checked during the scrutineering. Everything is crowned by a mandatory sound test, which must be passed before the start permit. In this competition, the limit was 103 db at 3500 rpm. Only the drivers of each car were allowed to participate in the scrutineering. During the inspection, HTP-passes and a

homologation certificate are collected from each rally car for use by the scrutineering organization. This material is used by the scrutineering organization in checking compliance with the rules during the rally route and after the finish of the rally, so-called in the final inspection. The documents will be returned to the competitors after the competition. The technical inspections of Midnattssolsrally were conducted the same style as, for instance, in Finnish historic rallies. Along the route, an intermediate scrutineering examined the existence of the spare wheel housing from the Volvo 142 and 242/244 models, and any changes made to it. In nine cars, the spare wheel housing had been completely removed, contrary to the rules. Since this failure does not directly affect the car's performance, the inspectors made a note and a repair order on the inspection card of the cars in question. The repair required by the error will be checked during the scrutineering of the next competition, and if the matter has been handled correctly, the chief scrutineer will confirm on the card that the matter is in order. A competitor who has received a card entry can continue his performance normally until the end. The procedure is the same in all competitions under FIA rules here and elsewhere.

For the final inspection after the finish line of the competition in the Midnattssolsrally, the 1st, 2nd, and 5th place cars from the top of the competition were chosen by lot. The theme of the final inspection is always compliance with vehicle regulations. The inspected cars were Porsche 911, Opel Ascona 400 and Opel Kadett GSI. The correctness of the brakes was checked on all of them based on the information on the HTP passport and classification certificate. There are several different options available for these cars in historic-classified and non-classified brake parts, so the inspection was based on performance and compliance with the rules. The inspection found no illegal parts, but the Ascona 400 HTP passport was expired and the Kadett GSI's passport was missing the owner's signature. However, these errors did not affect the result of the competition.

In historic rallies, the checks for technical compliance with the rules and the era are regular and thus keep fraud attempts to a minimum. Scrutineering organizations in competitions operate on a hobby basis, but often, as in the Midnattssols rally, they have worked together for years, which makes the operation smooth. Only in the South of England's Tarmac Adam Rally Championship have we met chief scrutineers who were paid by the Motor Sports Association. Professionalism of scrutineers are maintained at

training days, and a long career as a marshal has brought knowledge of rules and technology.

In this rally, the competitor who retired the rally by accident had to bring the damaged rally car to the rally headquarter for inspection. The inspection focused on checking the condition of the vehicle's various safety devices, and the damaged safety devices were marked on the car's inspection card. The subject of inspection was e.g. safety cage, safety belts, seats, seat fasteners, and extinguishing equipment. During the competition, 6 "accident inspections" were carried out. One case ended up being discussed by the race jury, when the driver who was driving a course car drove with too much risk throughout the rally, and finally fell into a crash that destroyed the car. The course car or 0-car task is an official task in the rally, with the purpose of testing the operation of the time control stations and the official organization of the rally before the arrival of the first competitor. In Finnish rallies, an accident of the 0-car as a result of a crash always leads to a temporary ban from competition, the length of which is usually 6–12 months, depending on the case. According to the information we received, the local "star" who worked as a course car driver survived with a tough talk.

The course car mission ended in a disastrous exit. Fortunately, the race organization had a spare car that could continue the tasks of this crew almost immediately.

A few notes regarding the service area practices of the competition. In Finland, in the rally service area, there must be a liquid-impermeable cover under both the racing car and the service car in case of possible harmful liquid leaks. In this Swedish competition, the rules were interpreted so that only under the racing car was placed the cover. Our second consideration is related to the practice of refueling rally cars. In Finland, it has been a rule for 10 years that refueling is done only at gas stations along the route, because the fuel quality allowed for these historic cars is 98E, i.e. gas station quality gasoline. With this arrangement, refueling is always carried out in an area with surface materials in accordance with the Environmental Act and collection pits for fuel spilled in the meter field. Also in this Swedish rally, the rules of the competition required refueling at gas stations, but an additional regulation allowed refueling from one's own containers in the service area connected to the lunch break on the second day of the rally. The reason was the fear that there would not be enough fuel at the gas station in the small population community of Askersund . Our attention was drawn to the fact that

a few teams refueled their cars from racing fuel drums. We couldn't tell for sure whether the containers contained 98 E gasoline, or illegal 102 octane racing gasoline, even though these fuels have quite a clear difference in smell.

4 Observations along the competition route

In a rally competition, you don't use a map to follow the correct route, but a table-like road book, which contains orientation points, signposts and road number markings, speed limit markings, distances from one point to another and given driving times from one time control station to another. Using the road book is simple and clear, and no map information is needed. In Europe, all road rally races use a road book model. The appearance, size, and graphics of the drawings may differ slightly, but otherwise the practice is the same everywhere. You don't even need language skills. The co-driver monitors the distance between orientation destinations from the car's trip meter and gives the driver instructions on where to go. Another important document during the competition is the competitor pair's time-card, on which the registration times for the time control point are marked. In this historic rally competition, these documents were exactly the same as, for example, we have in Finland.

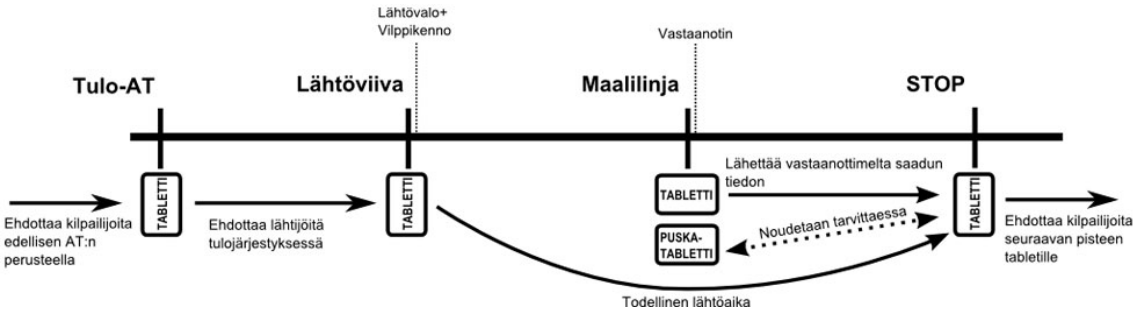
There was a slight difference in scheduling. In Finland, according to the instructions of AKK-Motorsport, the average speed requirement for the journey between special tests is 40.0 km/h. The obtained driving time is rounded to the nearest full minute, and in most cases exactly 5 minutes are added to the obtained driving time. If there is an opportunity to refuel in between, 10 minutes will be added to the travel time. This is all because rally organisations are trying to avoid any needs to drive at excessive speed in the midst of general traffic. The average speeds of the Midnattssolsrally varied between 38 and 53 km/h in each section. Why exactly the same scheduling formula was not used for each road section was not clear to us. Between special stages, maintenance was only allowed at certain service/break points, and the competitors' traveling speed on the main

roads seemed to be a moderate approx. 70 km/h, just as it is customary in Finnish competitions.

If we compare the route of the competition with the Finnish practice, we can observe the following differences. The number of special stages was clearly higher than what we are used to in our home country. The average length of special stages was slightly shorter, but all special stages was driven only once. In Finland, the common practice is that there are 4–6 special stages in the rally, most of which are run twice. In both countries, the underlying motive is the same. The number of roads available for special stage use is decreasing all the time due to environmental pressure. The organization of the Midnattssols rally solves the problem by running each special stage with a gravel surface only once, and stretches the length of the road sections, to have the special stages in a wider area. At the same time, the race will have the atmosphere of an endurance race from the past, when the length of the route is more than 1000 km. Next time, new roads will be found in the same areas, and this year's special stages will remain unused for a while. All this also leads to the fact that if you drive only two-wheel drive cars just one time, the roads will not break down badly, and the renovation of the roads will be much cheaper. Road closure time due to the competition will also be much shorter, which is a positive thing for the people and activities living along the road. According to the chief scrutineer, getting private roads into competition use has not yet been a big problem for Midnattssolsrally, in contrast to Finland. We, especially in the southern parts of Finland, have to use a lot of roads owned by the state, where the average speed easily becomes far too high. Then the risk of more serious accidents increases. The high continuous speeds also cause a lot of technical problems for the older historic cars, and often lead to a large number of retirements.

In our opinion, the competition's timing and data transmission equipment was old-fashioned. Of course, the writing system based on TAG Heuer timekeeping devices is reliable, it is used a lot, e.g. in alpine sports competitions. However, in a rally competition, it requires the work of several officials due to the use of timing equipment and fill the minutes. In a race of this size, it is necessary to make the necessary cabling for the data transfer between the timing devices and the photocell equipment of the start

and finish lines. Race Timing Sweden equipment for this competition included e.g. 50 TAG Heuer timing devices, 18 photocell devices, 16 computers and 3000 meters of Photocell cable. 6 people were needed to move and install this equipment during the competition, in addition to the time station employees. In Finland, the timing and results service of the historic rally series is managed by Ajaksi Oy, whose timing is based on competitor-specific transponders, as well as on a tablet computer at each route point, which is used by the person or staff at the timing station to transfer the time information to the system in real time. Only 5 tablet computers are needed for the operation per special stage. The only trailing cable (5 – 10 meters) is needed for the start line light system. One person can deliver the entire equipment to the required locations and guide the staff in use. We can say from our own user experience that the correct use of this kind of equipment is really simple and easy, and the possibility of errors is minimized. Another thing that makes the work of the official easier is that in Ajaksi's system, the receiver at the finish line automatically recognizes the transponder of the passing rally car, and there are no false ghost times due to, for example, spectators passing by on the road or a cloud of dust, as happens in the photocell system used by the Swedes. Here, we are one step ahead of our neighbors.



You can apply for a simpler, more affordable and reliable timekeeping system. All data transfer takes place with the help of a network connection, the tablet program automatically retrieves both the data of the previous point and continuously sends its own data to the database.

5 Environmental certifications

The Swedish central organization of motor sports, Svensk Bilsport requires that all associations, facilities, and events must be certified in environmental matters in accordance with the method approved by the Swedish Motorsports Association and the environmental authorities. An environmental advisor has been trained and appointed for each motor racing club, who works as a partner with the environmental manager of competition events. The Midnattssols rally also had an environmental officer appointed to the management team, whose responsibility was to organize and supervise that all activities took place ecologically and responsibly. At least in the service areas we visited, the recycling bins for all collected materials were prominently displayed, and they were clearly used by both teams and spectators in their own waste management. The service areas and their social facilities were visibly clean, cleaner than their counterparts in Finland, and for example, there were more toilets and showers than standard Finnish practice in connection with the service areas. After the competition, the environmental manager and his subordinates also ensured that the road sections used as special stages were systematically checked, and any debris that was still left on them was collected away from nature. In Finland, we are still learning about environmental responsibility in national competitions, in international competitions things are already well under control.

6 Economic value of Historic rally operations

Total amount of entry fee of the competitors participating in the Historic rally was €232,000. The box office revenue of the Wednesday show event and the first special stage with the announced number of 7,000 spectators accumulated €140,000. In addition to this, this rally competition had very many partners, whose advertising income we can only guess at, several tens of thousands of euros in any case. In Finland, organizing a normal one-day rally costs, according to our experience, €35,000–50,000, depending on the status of the competition, and the maintenance costs of the roads used as special stages. The Midnattssolsrally was about three times longer, so we end up with a settlement amount of approx. €150,000. With this simple calculation model alone,

organizing this historic rally was financially profitable for the clubs responsible for the arrangements, and provides funds for running the clubs' operations. Some of the facilities related to the activity were probably obtained for free through sponsorship, because the competition brought a lot of rally tourists, especially since the holiday season had just started and the weather for the rally week was powdery and beautiful.

The competition was also economically important for the cities of Karlskoga, and Karlstad and their business life. If all the spectators spent the same amount of money on food and beverage services in the Gelleråsen Race Arena as our group, the local cafe/burger entrepreneurs received €140,000 in cash flow in one afternoon. There are sometimes quite optimistic estimates about how much money is left for the competition location, but the fact is that all accommodation in both competition cities was completely booked. Our travel group had to spend the night further along the route, about a 40-minute drive from Gelleråsen Race Arena. These cities have at least 2,400 beds. The average price seemed to be €100/person/day. From this, we get more than €500,000 for two nights' accommodation and dinner alone. In addition to that, the food and fuel bought for watching the rally, etc. From the three-day rally, there will certainly be more than 1 million euros left for these towns during one weekend. The Historic rally is therefore a nice summer boost for the economic life of these cities.

At the top of the pyramid of the FIA rally world is the second highest, very popular category, the so-called WRC2 car, i.e. R5 class rally car, manufactured by seven different car manufacturers. By the end of last year, the total production volume was 1150 units. FIA rules set the maximum price of a finished car at €198,840 without VAT. If we calculate with the average amount of tax, the new value of these top products is a total of about 280,000,000 euros without VAT and the necessary spare parts package.

Ralf Pettersson has been an observer in the FIA technical commission since the historic rule change in 2007 until 2018. During this period, when the HTP passport search came into effect, more than 17,000 new historic racing car passport applications came in. If we forget the latest and most expensive four-wheel drive historic rally cars, and focus on those cars that are actively competed in, and lower the average purchase price of the value of the racing car fleet down to €40,000/piece, then the purchase value of the fleet today would be €680 million. Historic cars are also used in a lot of track races, especially in the countries of central Europe. If 50% of the fleet are rally cars, the value of the fleet

would be the same, around 300 million euros, as with R5 cars. Certain information was not available, but according to experts, the number of rally cars having HTP passport is higher than racing cars. It is difficult to find out the number of older cars having HTP passport before 2007, but there are a lot of them, according to Ralf Pettersson, almost as many as newer ones. Several hundred in Finland as well. We can only guess at the monetary value of this fleet of vehicles. Today, one of the favorite cars among historic rally enthusiasts is the Ford Escort RS 1800 Grp 4, for the age period 1976–1981. The tax-free purchase price of a new, ready-made car is on average £100,000, i.e. around 120,000 euros. In England and Ireland alone, 50 units of this one car model are produced annually.

Wales Motorsport Fabrication Ltd manufactures 6 – 10 brand new Ford Escort RS1800 historic rally cars every year. The best quality available. The main export countries of this company are Belgium and New Zealand.
The photo shows the owner's personal rally car for historic competitions.

There are 800 registered historic rally cars in Finland. England has the most registered rally cars, in addition to that, large numbers of so-called club versions, which do not fully meet the FIA historic rules, but can be used to compete in the national classic series. Belgium has a strong historic rally car base with a lot of new production cars. The French have mostly focused on the national classic class. The Italians have a lot of small FIA eligible cars, for instance Autobianchi, Fiat, and Peugeot. According to Ralf Pettersson, those who compete in these are not very willing to travel far, but mainly compete in their own country. There are a lot of drivers focused on track racing in Germany, but there is also a stock of historic rally cars. Today's hit is the newly produced Audi Quattros of the B group, which are bought by elderly but wealthy enthusiasts, or manufactured for themselves. Here in the Nordic countries, the historic rally fleet is strictly in accordance with FIA rules, but the oldest rally cars are unfortunately mostly parked in the garage, when the spark for the active hobby has faded as the fleet ages.

7 Aftermarket and new production

Due to very loose rules, suitable parts for rally cars built in national competition classes can be chosen completely freely according to opinion and wallet. In this way, the enthusiast can also change the price of the finished car to a more suitable one for his own budget. The Historic rally car is a different implementation target. It is necessary to use those precisely specified parts, permitted by the classification certificate, or their exact copies. In Finland as well as in other parts of Europe, new drivers who are slightly older, but who have accumulated enough wealth that a new rally car can be built by a professional, have entered the scope of the historic rally. Since one's own enthusiasm for building and maintaining the car has decreased, often also the maintenance responsibility of the car between competitions is given to a professional who invoices for his work. For example, in hometown of Kouvola Vocational Institute, Eduko, there are three companies that build, maintain and rent rally cars. One of these companies also conducts international operations.

Building a 1970–1981 historic rally car from scratch requires 600–1000 working hours, depending on the chosen car, its technology, and how many components are bought ready-made from subcontractors. More than half of the time used is spent on body work with safety equipment and painting. As an example of a rally car bought from a professional, the Midnattssols rally had two Escort RS 1800 cars made by the English company Viking Motorsport Ltd. These cars are fitted with a complete engine built from remanufactured parts by Sherwood Engines Ltd. The new gearbox was supplied by Martin Jones Transmissions Ltd, and the complete rear axle assembly with brakes by GRP4 Fabrication Ltd from Ireland, to name just a few of the parts suppliers for these cars. These cars are generally better quality and faster than the cars made by the 1976 Ford Racing department for Finnish rally stars. The reason is the change in the quality of raw materials, and the improvement of machining and welding techniques. In Finland, we estimate that 3 to 4 historic rally cars will be annually produced, which have been made by a professional from the beginning. There are companies in every country dedicated to this activity only, and most of the companies are focused on working with their own country's car production brands.

Merely building, repairing or maintaining historic rally cars is only a part of the economic activity. Building and maintaining a rally car, including a historic racing car, requires a large number of spare parts. The increase in demand has created a whole new industry around this motorsport. In competitive stress, the service life of car parts is very short, so the need for new spare parts is constant. Our sample car, the pair of final drive wheels of the Escort RS 1800 model lasts the entire life of the car in average street traffic, but in rally use, the need for replacement comes after six, at the latest, 10 races. For all the most popular historic rally car models, all the most demanded parts are manufactured as new production, but the aforementioned Ford model is the best example of what a large hobby car stock can lead to. The Escort Mk2 model lives a new heyday in both historic and national competition series, and the number of cars is so large that now every single part of the car is available as a copied new production, even though the production of the model was stopped in 1981. Escort 's previous body model MK1 is also today complete in new production. Its windshield and side glasses are manufactured at the Pilkington factory in Tampere.

Ford Cosworth BDG cylinder block cast by Grainger & Worrall . The part is modeled after the original, and matches it perfectly. This engine has not been in production by Ford for 35 years. A typical remanufactured part made with 2020 technology.

New modeling and production methods make it possible to manufacture even small production series at a reasonable price. The aluminum used in the example cylinder block is qualitatively better than what was available in 1976, and with modern heat treatment, the strength of the part can be advantageously strengthened. Sand casting technology is much faster than before, and the properties of the sand of the cores that describe the inner parts used in casting have changed. In this way, the inner parts of the casting are considerably smoother, which improves not only the strength but also the cooling of the part. The perfectly programmable 5-axis CNC machining center also machine the parts with an accuracy of a thousandth of a millimeter quickly without a

man touching the part. The improvement over past times is remarkable. Due to high demand, there are also many imitation parts on the market, which do not completely correspond to the original part which is allowed for historic use. One of the big entrants into this market is China, which offers the most sought-after parts at really affordable prices. These parts have a lot of dimensional differences compared to the original, and as a rule the raw materials used do not meet the requirements of competition use. These "cheap copies" also cause problems for the scrutineering organizations of historic competitions. The most obvious differences in larger parts can be distinguished by the appearance or the absence of manufacturing stamps, but most cases require disassembling the part and measuring it in detail, and comparing the dimensions with the corresponding dimensions in the classification certificate or workshop manual. Thus, competition scrutineering organizations need even more technical factual information, which is accumulated based on years of experience, but which nowadays also needs to be studied, so that decisions rejecting a competitor's performance are not made on the wrong arguments. For example, our FIA observer Ralf Pettersson has had a career of more than 50 years working with rally cars, and especially with the rules and technology of historic rally cars. He says that years ago the FIA's technical commission made an interpretation of the rules according to which the production of new spare parts is allowed because there are no FIA eligible spare parts for 40-50 years old cars. However, the condition for new production is that the new spare part must be exactly the same down to the manufacturing stamps, as the original used to be.

In technical post-inspections, when cars are dismantled, new engine parts have been found, for example, which do not match the dimensions or materials according to the rules. With these parts, a power advantage has been sought compared to engines according to the rules. The HTP pass was previously valid for 5 years, but when the rules were renewed, the validity period increased to 10 years. Still, according to Pettersson, when renewing passports, car inspections often find solutions that are a violation of the rules. There have also been positive experiences in his career as an FIA observer. Gartrac Ltd, which manufactures e.g. Ford Escort racing car bodies also for historic use asked technical inspectors from the FIA to their factory to show what kind of body parts and manufacturing solutions definitely meet the FIA historic rules.

8 Comparisons of Historic rally activities

In Finland and Sweden, most of historic 's rally and track races are run based on international FIA rules. Because of this, almost all functions are the same regardless of country. Precisely specified rules determine how different things must be implemented. In the larger EU countries, even on the historic side, there are a lot of so-called national FIA rules deviating from classic competition activities, in which case the execution of the competitions and the technical structure of the vehicles deviate from the FIA rules. The racing car market is international, and anyone buying a historic car from abroad should be well informed about the rules of the age period of the car and the classification certificate so that you don't end up buying an expensive car that you can't compete in Finland.

Practices between Sweden and Finland were mainly compared. In Sweden, the minimum driver age required is 40 years, while in Finland there is no age limit for historic rally drivers. The Swedes' justification for age restrictions is to make the competition more equal. The physical characteristics of a 35-year-old and a 65-year-old driver are different in favor of the younger one.

As a general observation, it can be stated that, at least visually, it seemed as if the average age of Swedish historic rally enthusiasts was higher than ours in Finland. Of course, historic car sports are a hobby of the older generation all over Europe. In Midnattssols rally one could not escape the thought that the mutual relations between the competitors were in order, that's how easy it was to be and speak. In our opinion, the appearance of the competition equipment was clearly neater and more carefully built than in Finland.

Another restriction that surprised our group concerned the denial of participation from 4-wheel drive historic cars. The justification was the problem we mentioned earlier about the superiority of a four-wheel drive car, especially when driving on a gravel surface. Even though historic rallies are contested by category and age group, many

competitors still want to be the fastest in the whole race. Due to this limitation, after two closed years caused by the Pandemic, the number of participants was much higher than in similar competitions in Finland.

Sweden's history as a car manufacturing country stood out when looking at the starting list. There were twice as many cars of the oldest age gategory compared to the Finnish competition, and 60% of them were Saab and Volvo brands. Taking into account of all departures, the share of Swedish brands was no less than 48%. The Swedish competitors' appreciation for their own country's products is clearly visible.

If you compare the average speed of the special stages between the Midnattssols rally and the Lahti Historic rally, the average speeds on the Lahti route were about 15% higher. The related difference is also evident in the fact that when the FIA plans to officially include the new age period 1991–1996 in the historic races in a few years' time, Finland will be the first to include that age group as a competition category already next year. These cars are from the season before the WRC rally cars, powerful four-wheel drive cars, either former factory team cars or their copies. There are currently only a few of these cars in Finland.

Midnattssols rally were extensive and entertaining. Event center Gelleråsen Racing Arena with its campsites was an excellent place for this event. In Finland, only our own WRC rally, Rally Secto Finland, can reach this level.

The structure and behavior of the audience at the Midnattssols rally are different from the Finnish one. At the Midnattssols rally there were many more families and older spectators. Beer didn't seem to be starring in the stands. In Finland, the biggest part of the viewers are young men.

In terms of certified environmental issues, Swedish rallies are much further along, and it was also visible in the practical arrangements. A Swedish motorsport club cannot

organize a rally competition before its environmental program is certified in accordance with the requirements of the Swedish Motorsport Confederation and the environmental authorities.

Historic rallies are often thought of as an old man's hobby, preferably a hobby rather than a serious competitive activity. Therefore, it is often not understood that this form of motorsport also has a significant financial impact. According to statistics, a Finnish historic rally driver drives an average of 4 rallies in a year. An experienced competitor spends 2000–2200 €/competition in these rallies. In a one-day competition, the enthusiast spends money e.g. for entry fees, tire purchases, fuel, and food. Possible accommodation costs increase the necessary budget. Finland's own historic rally series leaves at least 5,000,000 euros to various localities. Quite a significant group of consumers. An additional effect comes in the form of value included tax received by the state.

The production of necessary spare parts has been steadily increasing in recent years, despite the Covid-19 pandemic. It is difficult to make a monetary assessment of new historic racing cars and their spare parts, because statistics focusing only on this sport do not exist. In addition, it can be concluded that the value of the production in historic parts is in any case hundreds of millions of euros. In its annual review, the English MIA (Motorsport Industry Association) has given the key figures in the motorsport industry to be 4,500 companies in England alone, in which 41,000 active employees and a combined turnover in 2021 of around £9,000,000,000. Due to the scale of manufacturing and trading, the Department For International Trade (DIT) under the administration of England has its own department that solely assists the country's motorsport industry in all export efforts. We can conclude that this is also why the share of English manufacturers in the part production and sale of historic racing cars is so large. About 70% of all motorsport-related production is exported.

The hobby of rallying is steadily declining in terms of performance and number of competitors. The situation is the same in Sweden as well as in Finland. Every time the

FIA creates a new racing car class in cooperation with car manufacturers, the costs of the hobby will rise. Of course, in recent years, economic recessions and activity and travel bans caused by the Covid-19 epidemic have had an impact on the matter. For decades, Ralf Pettersson has been making complete annual statistics of rally performances driven in Finland. In the 2000 competition season, 6026 individual rally performances were driven by 1766 drivers. Of these, 620 were driven by historic rally cars using 158 different cars. In 2020, there were only a total of 2,281 performances, 849 drivers in these. The gratifying thing is that the historic rally hobby has remained largely unchanged, with 617 race performances using 167 different historic rally cars. The 2020 statistics do not include racing performances under national motorsport associations HaMu Ry or the Finnish Autosport Federation. We estimate their total number to be around 2,000 performances. There have only been about 20 historic rally cars in the rallies under these associations, so the main focus of the historic rallies is in the rally series under the AKK Motorsport. We can conclude that from this, that if a competitor in historic rally series stops competing, the same number of new drivers will take their place every year.

Historic competition activities have a strong financial impact on the organizing clubs and competition locations. Racing also has a significant financial impact on the motorsport industry and its development, as well as on the teams that compete professionally around the world. In addition, historic car racing has a social order as a hobby for people interested in motor sports.