AVENTICS Pneumobil

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AVENTICS

Keyword: INNOVATION

Farther, faster, safer – the spirit of competition drives the teams to improve their vehicles or experiment with new concepts every year. Therefore, the keyword for the Pneumobile Competition is innovation. The organizers evaluate the event held in 2015.

István Gödri

Managing Director, AVENTICS Hungary Kft:

The Pneumobile Competitions are centred around innovation: the competitive environment inspires the participants to improve the capabilities of their pneumobiles by continuous enhancement and new solutions. University students realize that building a race car is an exciting engineering task, which attracts more and more higher education institutions to the competition, also from outside Hungary. For our company, the Pneumobile Competition also provides an opportunity to maintain continuous relations with universities; many new, young employees entered our company (working in departments such as Sales) through this channel after graduation. I was pleased to see that after eight years of participation, our volunteers are still untiring and determined in their efforts to create a successful event, also supported by the enthusiastic corporate marketing team of AVENTICS. In addition, the event provides us a golden opportunity to meet our customers and business partners in a more personal and less informal setting.

Sabine André

Marketing Director, AVENTICS GmbH:
As a newly promoted marketing executive, I wouldn't have missed this event for the world, and I was not disappointed. The Hungarian commercial region, the company and AVENTICS as a brand all regard Pneumobile as an important event, which attracts an increasing number of participants from East European countries every year. The joyful anticipation preceding the competition and the cheerful atmosphere surrounding the participants, visitors and organizers could be clearly felt all throughout the event.

Wibke Schwarz

Assistant – Sales Europe, AVENTICS GmbH:
After last year's very successful AVENTICS Gala, I was curious to see how many customers, distributors and partners would join our VIP programme. Eventually, about 40 participants showed up and had a great time thanks to the excellent organization provided by Sales, our colleagues from production and the event organizers from Unisport, and last but not least, the bright sunshine. The fact that most of our guests spent the whole race with us on the following day indicated to me that they had a blast. Thank you to every helping hand for your contribution!

Lukasz Stanczak

Head of Automation, AVENTICS Hungary Kft:
Just like every year, in 2015 the Pneumobile Competition involved a lot of work and a lot of fun. This year again saw the teams try diverse engineering solutions to build the fastest and strongest possible race cars. However, the students primarily focused on the engines, and devoted less attention to other subassemblies, which resulted in a few problems for some teams during the competition. Consequently, next year we are going to specify stricter technical requirements for the construction of the vehicles. We have received a ton of positive feedback about the competition, which was well-appreciated since it took a lot of effort from a lot of people to achieve success. On the technical side, we did everything we could to help the competitors solve their technical problems and line up for the races. We are continuously gaining experience in competition organization. However, there are increasingly higher expectations of us from the entrants, many of whom participate in several similar international competitions, so they are able to compare the standards of these events.

Mihály Varga

Development Engineer, AVENTICS Hungary Kft:
Although my tasks did not allow me to see much of the races, I liked the fact that many countries were represented in the competition, further expanding the field of entrants this year again. I saw a lot of clever engineering solutions from the students, which I can even apply in my work. Although I do not have experience from previous years, not even from my college days, I think it was an exciting competition. There were some very close races and new records were set. However, safety must be increased to counterbalance the increasing speed of the pneumobiles, which is a good thing, because it inspires the students to reach even further, but there is also a disadvantage: it also increases the risk of accidents. On the whole, I liked the competition a lot and hope to see more of the races themselves next year.

Enikő Pekk

Project Manager,
AVENTICS Hungary Kft:
We make every effort to offer something new each year as a side-event: this year we organized a classic point-collecting game for the public called "Heted-hét próba", featuring 7+1 stops to collect points that could be exchanged for Aventics gifts. In addition to Aventics' own stall, these stops were located at the booths of some of our partners, such as the Heves County Chamber of Commerce and Industry and the Red Cross. Judging from the rate at which our gift stocks were used up and the feedback received from the participating stalls, the game was a huge success, so we are planning to repeat it again next year with new and perhaps more difficult tasks.

Éva Lehoczki

Organizer and Presenter,
University Sportmarketing Kft:
At the eighth instalment of the Pneumobile Competition, I had the opportunity to experience the excitement of event organization and the competition itself both as organizer and presenter. I am proud of every single moment and I am already looking forward to next year's competition. This event is not just about competing, but also team work, hanging together and making friends during the long road that leads up to the actual competition. Of course, it also involves the challenge of building better and better vehicles every year for the spectators to admire during exciting races and colourful events! Congratulations to all competitors and helpers, and good luck for the next Pneumobile Competition!

Excellent weather and lots of excitement

How did the competitors experience the Pneumobile Competition in 2015? This is what the heads of two winners and one rookie team had to say.

Tandofer, Gábor Kátai-Urbán

This was the third time that team Tandofer entered the Pneumobile competition with unchanged staff. Fine-tuning last year's car was aided this year by our self-designed brake-testing equipment. The success of our preparations already manifested in the design documentation, which was awarded the maximum points. The competition took place in excellent weather conditions, with a flurry of excitement. We managed to defeat the competition in the skill race by a few tenths of a second. As always, organization was flawless. Various interesting side events and the enthusiasm of the fans created a great atmosphere.

Tech-No-Logic, Roman Trochimczuk

This was the first time our technical university team participated in the Pneumobile Competition. Our race car was built by students attending the Production Automation Programme. In addition to design and production tasks, the creation of the car also involved logistics and marketing. Thanks to the reasonable distribution of duties and responsibilities, we managed to build a machine that complied with all specifications announced for the competition. All of us were impressed with the atmosphere of the races and the excellent organization. Each consecutive race gradually boosted our adrenaline level, while providing excellent opportunities to test our engineering ideas. Exchanging ideas and engineering concepts with the other teams was very useful for everyone. We also enjoyed the procession on Friday and the opening ceremony in Dobó Square. The Pneumobile Competition is a great example of the vast opportunities that an international meeting and competition like this can provide for students of engineering!

Műszakik Pneumobile Team, Zsolt Farkas

This year's Pneumobile Competition brought new, useful results, records and unforgettable experiences for the organizers, the competitors, the sponsors and the spectators. While maintaining the standards set during previous years, the organizers made some successful modifications. The newly introduced skill races created exciting racing situations for everyone, just think of the head-to-head race between the finalists of the Senior Category at a speed never seen here before, which the winning team won by a margin of only 0.012 seconds! It was good to see that the sponsors were satisfied again that the competition itself and engineering undergraduates are worthy of their useful support. In addition to the exchange of experience and information between the competitors, work performed according to an accurately defined and kept schedule will result in efficient vehicles capable of breaking previous, even long-standing records. Thank you to the organizers, sponsors, spectators, and last but not least to all competitors for making this unique competition happen!

Pneumobile 2015 – Results

Category	Rank	Team name	Institution
The best Pneumobil of Aventics	Main prize	Műszakik	Budapest University of Technology and Economics
Ingenuity of Design	1.	Tandofer	College of Kecskemét
	2.	Mekk MestAIR	University of Miskolc
	3.	Technics 1	Estonian University Of Life Sciences
Distance	1.	Műszakik	Budapest University of Technology and Economics
	2.	Metálmobil	Universitatea Petru Maior
	3.	4GO Team	SAPIENTIA Hungarian University of Transylvania
Arcade	1.	Tandofer	College of Kecskemét
	2.	Pollroth	University of Pécs
	3.	Mekk MestAIR	University of Miskolc
Acceleration	1.	Műszakik	Budapest University of Technology and Economics
	2.	Pollroth	University of Pécs
	3.	PG Power	Gdańsk University of Technology
SENIOR	1.	Kakukktojás	Budapest University of Technology and Economics
Telemetry	special prize	Tandofer	College of Kecskemét
Smartest construction	special prize	The Kris Kringles	Klaipeda University
Most Innovative Team	special prize	Mekk MestAIR	University of Miskolc
Highest speed	special prize	Műszakik	Budapest University of Technology and Economics
Best landing-gear	special prize	True-AIR	University „Vasile Alecsandri”
"Team worst record" Booby-prize	special prize	BELLE-AIR	Óbuda University Bánki Donát Faculty

“Műszakik”, Budapest University of Technology and Economics
The best Pneumobile of AVENTICS

“Tandofer”, College of Kecskemét
Ingenuity of Design

“Mekk MestAIR”, University of Miskolc
Most Innovative Team

Chariots from 2015

As the knowledge and pneumobile experience of the university students forming the teams grows and expands, more and more sophisticated machines are built with increasing performance of the compressed air engines that drive the vehicles. This year's competition saw several races decided by only tenths of a second, demonstrating the increasing parity of the competitors. Reliability is also becoming more and more important, as the drivers do not shy away from pushing their pneumatic race cars – which required so much time and effort to build – to the limits.
Introducing the pneumobiles taking part in the competition in 2015:

01 Kakukktojás
Budapest University of Technology and Economics

02 Dairp
University of Miskolc

03 AirGO Pneumobil Team
Széchenyi István University

04 SZErlines
Széchenyi István University

06 Diff-Air Szeged
University of Szeged

07 BSTM
University of Miskolc

08 Pepp-Air Team Szeged
University of Szeged

09 Pepp-Air Senior Team
University of Szeged

10 Tandofer
College of Kecskemét

12 4GO Team
SAPIENTIA Hungarian University of Transylvania

13 Airplay
Sapientia EMTE - Marosvásárhely

15 Jok-Air
College of Kecskemét

16 Mekk MestAIR
University of Miskolc

17 Sparrow Racing
Hochschule Ulm

18 Tech No Logic
Bialystok University of Technology

19 SOIMII
University „Vasile Alecsandri"

20 ZegeNYeME Team
University of West Hungary

21 Főnix
University of Debrecen

22 The Kris Kingles
Klaipeda University

23 Műszakik Senior
Budapest University of Technology and Economics

24 Műszakik
Budapest University of Technology and Economics

25 Blowfish Faculity of Mechanical Engineering
Brno University of Technology

26 LEZS-AIR
Óbuda University Bánki Donát Faculty

27 BELLE-AIR
Óbuda University Bánki Donát Faculty

29 AIR-TECH
University of Oradea

31 TechAirGo
Sapientia EMTE - Marosvásárhely

32 True-AIR
University „Vasile Alecsandri"

34 Technics 1
Estonian University Of Life Sciences

35 Hidro+
Politechnika Wroclawska

36 Hidro +P-13
Politechnika Wroclawska

37 Flux-Gate
Óbuda University Bánki Donát Faculty

39 WhirlWind
Brno University of Technology

40 PUFFOGÓK
University of Miskolc

41 UPM-TCM
Universitatea Petru Maior

42 Metálmobil
Universitatea Petru Maior

44 LUFT
Budapest University of Technology and Economics

46 AEROH
University of Oradea

48 PG Power
Gdańsk University of Technology

49 KBM Polska
Military University of Technology

50 Speedx
Technical University of Cluj-Napoca

51 UT Racing Team
Technical University of Cluj-Napoca

52 PiKIOT
Silesian University of Technology

54 Simr Pneumo Team
Warsaw University

55 Pollroth
University of Pécs

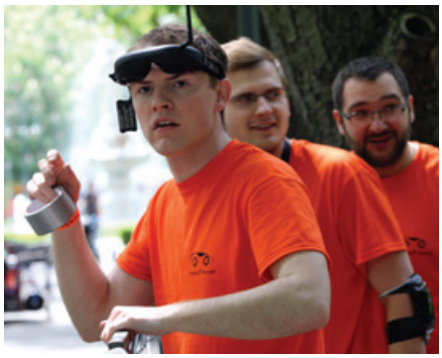
AVENTICS Pneumobil

Friday

Although the races are held on Saturday, there is plenty of excitement on Friday, too. It starts with the question: will the race car pass the strict requirements of the judges? Does it meet the expectations in all parameters? When these hurdles are cleared, new questions arise: how successful the car will be during the qualifying sessions lasting until the evening? What will the first laps be like on the racetrack? Amid all this anxiety, there is also time for a little fiesta during the procession in the centre of Eger and at the official opening ceremony in Dobó Square. It is fun to be sitting around in the heart of the city, anyway, and it is even better if you and your race car are gazed at by hundreds of tourists and locals. All of this is followed by a night of partying, at least for those who do not have to prepare for the start of the races next morning by fixing race cars until dawn...

Saturday

The pre-race excitement can be felt from early morning: almost all teams are busy fixing their cars in the pits; there is always something to be adjusted right until the start of the race. Protocol guests and journalists arrive at the scene, which is now teeming with more and more people. Finally, following the opening ceremony, the pneumobiles line up for the start. They have to show who's got more wind in distance, skill and acceleration races. Between the races, every team is back to fixing their cars, looking for the best settings for the next showdown, while the stage and its front area host side events such as dancing, award ceremonies for the drawing contest and the adventure game, a spectacular scientific show delivered by the physicist of the College of Eger, the introduction of Pál Tamás Kiss, rallycross driver, and a procession of vintage cars. And, of course, there is the VIP race, where company heads, journalists and the representatives of sponsors battle each other. 2015 was the year of team Műszakik and team Tandofer: both teams won gold medals in two categories, respectively. Will they be able to defend their crow in 2016?
We just have to wait and see!



Future emerging, creative solutions

The success of each of the eight competitions held so far is based on thorough preparation. The first event had a relatively "loose" set of rules, and some people only expected "pathetic crawling" from the vehicles.

Most entrants used pneumatic control when trying their wings for the first time, but PLC's and self-developed micro controllers already appeared at the first competition held in 2008. Team Gyalogkakukk from Budapest University of Technology and team GAMF SZPSZ from Kecskemét already spent the breaks between races with programming. Team DEMK from Debrecen used two power sources in their vehicle: one with a "bungee cord" return mechanism for long-distance races and another two-cylinder design for speed races. The majority of the competitors sought to achieve good performance by using cylinders with small displacement volumes. However, team Sziréna TS from Sopron equipped their vehicle with two larger (D80/400) cylinders, and now this technique is widely used by the field. This method involves filling up only a certain part of the cylinder volume with air at 10 bars, closing the supply of air and then allowing the air to expand.

The second competition brought several changes: a new venue, fewer number of cylinders permitted, more specific rules and an international field. In terms of design, team Gyalogkakukk introduced a new trend with their driver sitting in a motorcycle position. This was the first and so far the last time we saw two-seater vehicles: team „Ferrari replika" from Kecskemét had a solid performance. Apart from the six-gear automatic transmission used by team Gyalogkakukk, the fourth competition did not bring any new, ground-breaking engineering solutions; however, it did present a lot of interesting vehicle designs. The swash-plate engine used by team Szélhámosok still remains one of the most spectacular designs ever seen at the competition. With a design featuring cylinders moving one another, team MKLaren from Szeged managed to achieve twice the force with the same volume, while almost doubling the piston speed.

The fourth competition was memorable for reliability and high standards in implementation. It also marked the appearance of the first design that did not use directional control valves to operate the cylinders. With this solution, team Műszakik gave the engine such dynamism that it took two years to have a free wheel that could keep up with it.

The fifth event brought the first and so far last front wheel drive vehicle, and introduced a machine built by team Kakukktojás that had a sound reminiscent of an electric motor. "Enhancement" is the word that best characterizes the sixth competition, which saw the teams modifying and optimizing their previous designs, resulting in extremely stable race performances. The seventh one brought me new challenges, too. In addition to my organization tasks, I tried myself as a presenter and teamed up with Zoltán Szujó to get a peek at the field almost as if I were an outsider.

I think the eight competition was again characterized by seeking new ways and methods. There were too many new solutions, sometimes at the expense of reliability. Nevertheless, long-standing records were broken, showing that some teams managed to find their way, eventually.

Our objective is to direct the competitors on the way that leads to the future, without restricting their engineering creativity. In the future, vehicles will probably not be driven by compressed air, but industrial applications will greatly benefit from the special solutions designed for our Pneumobile Competitions.

Ferenc Bolyki

The way it started...

Looking back on the beginning in 2008, I can recall several questions causing me sleepless nights, to which life itself gave proper answers later on.

These questions included the following: Can engineering students be motivated at all to spend months with such a project on top of their studies, will there be teachers who provide professional assistance? In terms of technical implementation, based on my preliminary calculations, will the "vehicles" be capable of running viable distances at proper speed, and will the "fuel", i.e. 2 cubic metres of air, be enough for the planned time?

Based on the eight competitions so far, we have seen that these complex and challenging tasks do arouse interest, there are creative and proactive university students who are ready to devote their free time, money and energy to preparation and racing. There are teachers who love their job and provide considerable serious professional and personal support to their students. We have to accept the fact that not all Hungarian higher education institutions specialized in engineering participate in each competition continuously and with the same intensity, but foreign participation is continuously increasing. In 2015, in addition to 10 universities from Hungary, there were 16 universities from 6 foreign countries taking part in the 8th International Aventics Pneumobile Competition. This is a huge thing for us because students can only be engaged in preparation for the competition for a few years, because when they graduate, new students take their place. Here, the role of a regular enthusiastic teaching staff is critical; they are the ones who organize the teams again and again and drive them to reach higher and higher standards.

The fast technical improvement of pneumobiles is characterized by the fact that while in 2008 almost all of the engines were pneumatically controlled, in 2010, 50% of the teams were using PLC's. At this year's competition, purely pneumatic control amounted to only 9%, with electro-pneumatic control used by 7% of the entrants. The proportion of PLC's reached 75%, while 9% of the teams used self-designed micro controllers. The explosive development of the frame structure and the exterior appearance is clearly apparent even for outsiders: the original vehicles built from bicycle parts have been replaced by more massive race cars featuring designer covers and multi-functional steering wheels. Two years ago, we started our support for the introduction of telemetry used in Formula 1 by providing the necessary equipment. By now, this support has grown beyond our capacities, and the teams' own individual solutions have taken centre stage, passing with flying colours at this year's competition, too.

Managing the ever-increasing performance and speed of the vehicles – i.e. creating safe racetracks that protect both the competitors and the spectators from any accidents – poses a challenge for the organizers. In the future, we will continue to expect positive cooperation from the teams to improve safety, full compliance with the technical specifications during vehicle construction and adherence to the rules during the races.

Based on previous years, we can proudly say that we have managed to "infect" hundreds of students with the desire to participate in the construction of pneumobiles, many of whom wanted to remain a part of the pneumobile community even after graduation. Four years ago we created the Senior Category for these people, enabling them to continue their participation in the competition. Since the very beginning, our company has been ready to accept participating students as interns and engineering graduates as fellow employees, having already proven their aptitude and professional expertise.

Endre Tamás

Berlin – Through pneumobile eyes

For not the first time in the history of the competition, in 2015 we organized a study tour to Germany for each category winning team, with Berlin as our destination. Just as the competition itself, the trip also had some new features: this year marked the first time that we travelled by air, and instead of an Aventics (or Bosch/Rexroth) plant, this time we visited a Volkswagen factory in Wolfsburg.

Saturday's morning flight was followed by a three-hour sightseeing tour in Berlin, which provided us with a lot of information about the 20th century events of German history. The Reichstag, the Brandenburg Gate, Checkpoint Charlie, Gendarmermarkt and the remnants of the Berlin Wall are only a few examples of the local attractions that we visited. Our party was hit by a sudden summer shower, causing a bit of a shock, which we managed to survive in a restaurant that had its own brewery.

We spent a healthy part of Sunday in nearby Potsdam, where – as a change from the metropolitan bustle of Berlin – we experienced a calm, provincial atmosphere and visited the Sansoucci Palace. Lunch was followed by a free period, which one part of the group spent in Potsdam, while others visited the Berlin TV Tower. Naturally, we finished the day in a „Biergarten".

On Monday, we reached the summit of our excursion: the Volkswagen plant and the Autostadt Museum in Wolfsburg located 200 km from Berlin. The size of the factory rivals that of a city in both area and population. Almost 75 thousand people work in the assembly halls that produce the VW Golf, Golf Plus, Touran and Tiguan models, as well as in the adjacent development centres and administrative areas. During our almost one-hour-long so-called Bahn-Tour (own bus tour) we could see the steps of chassis production, assembly and quality control, and visit certain parts of the storage facility. Almost 4,000 cars roll off the production lines each day, and are transported away by ship, train, etc., although buyers also have the option to receive their new cars in the adjacent Autostadt Customer Centre

Following the visit to the factory, we spent the afternoon in the exhibition halls of the Autostadt, where everybody had an opportunity to inspect the models manufactured by the concern, and follow the development of cars and motorcycles from the beginning of the 20th century to the present, in the Zeithaus. We ended the day

in a traditional German restaurant.

We had only one venue to visit on the last day: the Deutsches Technikmuseum, where – in addition to the various branches of transport (air, ship, rail) – we found exhibitions focusing on computers, telecommunications, jewellery making and machine tools. All of us were tired when it was finally time to head back home, but this year's pneumobile tour was definitely a success rich with experiences (and beer).

Enikő Pekk

About us in the media

We took the differential gear from a Zaporozec

I am sitting in the pit box of team Műszakik and my eyes come upon a set of used BMX tyres. Here, a set means three tyres; it seems most of the pneumobiles are tricycles. For a good reason: lower weight, lower driving loss due to the absence of the differential gear, and also simpler to implement. The team from Budapest University of Technology managed to achieve a pace causing their barely 70 kilogram machine to shred through a full set of tyres.
http://totalcar.hu/magazin/kozelet/2015/05/11/a_diffit_egy_zaporozsecbol_vettuk/

Victory for Budapest University of Technology at the Pneumobile Competition in Eger

„We are very pleased to see more and more teams competing with each other every year at the Pneumobile Competition, and to see how much the race cars have improved in the previous seven years of the competition," said Enikő Pekk, chief organizer of the 8th International AVENTICS Pneumobile Competition, following the announcement of the results. „In addition to the experience, the practical part of the event also has significance for the labour market: we have observed that a good portion of the students participating in the event are embraced by production companies working in the automotive industry," she added.
http://www.autoszektor.hu/hu/content/bme-gyozott-az-egri-pneumobil-versenyen

This is how engineering students saw the Pneumobile Competition

Ádám Himes and his team Kakukktojás arrived in Eger from Budapest, representing Budapest University of Technology. "The vehicle has to be improved all the time, but this year we couldn't spare any energy to make improvements, so we basically wiped the dust off last year's model," Ádám said, and added that this year they did not have time because they started their own business. "Now we can fully experience the intellectual challenges and the joy of creation that we went through during the construction of our pneumobile within our small but busy company. Founded in 2008, our engineering firm is primarily engaged in mechanical engineering, electronics and software design and implementation."
http://www.autopro.hu/techtogether/Ilyen-volt-a-Pneumobil-a-mernokhallgatok-szerint/14974/

Good results by PTE MIK

Team Pollroth from the Faculty of Engineering and Information Technology of the University of Pécs (PTE MIK) won two silver medals in three races at the 8th International AVENTICS Pneumobile Competition, held over the weekend in Eger. In the competition of vehicles driven by compressed air, the university students from Pécs surpassed 46 teams from seven countries in the acceleration and skill race. In the latter, PTE was only eight tenths of a second away from victory.
http://www.pecsiujsag.hu/pecs/hir/egyetem/igen-jol-szerepelt-a-pte-mik-csapata-a-pneumobil-versenyen

VIP event

This year it was the second time that we invited our business partners as guests at the Pneumobile Competition. In addition to professional meetings, the programme organized for our customers arriving from the Eastern and Central European Region also included watching the competition itself, and visiting the sights of Eger and the Bükk Mountains. Those who brought their driving licences with them had the opportunity to take pure electric BMW i3 cars for a test drive in the streets of Eger. On Friday night, our guests and the employees of our corporate marketing team and the Hungarian sales division had a business dinner at the Excalibur restaurant.

Contact

Are you excited about the news from the pneumobile world? Want to enter the competition? Do you have any questions? You can find and visit us at **http://www.pneumobil.hu/** Competition rules, competition announcements, organization and technical information, list of results, pictures and videos of all competitions held so far. **https://www.facebook.com/Pneumobil?fref=ts** Latest news, current events, deadlines, photos of university life, information about pneumatics.

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