



Wrocław University
of Science and Technology



X INTERNATIONAL

CONGRESS ON COMBUSTION ENGINES

POWERTRAINS TECHNOLOGIES AND ALTERNATIVE FUELS

POLISH SCIENTIFIC SOCIETY
OF COMBUSTION ENGINES

19th-21st June 2023

HONORARY PATRONAGE



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FINAL PROGRAMME

Wrocław University of Science and Technology

Faculty of Mechanical Engineering

Wyb. St. Wyspianskiego 27, 50-370 Wrocław, Poland

19th June 2023

Dear Friends and Colleagues,



On behalf of Polish Scientific Society of Combustion Engines (PTNSS) it is my pleasure to welcome you to the 10th INTERNATIONAL CONGRESS ON COMBUSTION ENGINES which takes place in Wroclaw, Poland on the 19th–21st of June 2023.

I have the honor to offer you an exceptional technical programme including almost 120 papers presented by top international experts. The Congress covers a wide range of topics in research fields such as design, manufacture, operation and ecological effects of internal combustion engines in the opinion of specialists from all over the world. All of them, through their research and the results obtained, provide an answer to the question "Quo Vadis Combustion Engine?", which is the motto of the Congress. To get a wide view of the future of the internal combustion engine, the subject of this year's Congress is extended to alternative solutions in the field of powertrain technologies and fuels.

This is a great meeting, with expert engineers and researchers sharing their new ideas, inventions, and experience.

The Congress is a good way not only to broaden your knowledge, but also to spend a nice time with old as well as new friends in hospitable Wroclaw, whose history and cosmopolitanism clearly indicate that this city deserves to be called a "Meeting Place".

I hope you enjoy the Congress.

Yours sincerely,

Prof. Jerzy Merkisz

A handwritten signature in blue ink, appearing to be 'J. Merkisz'.

*President of PTNSS
President of 2023 PTNSS Congress*

ORGANISING COMMITTEE

Jerzy Merkisz	Congress Chairman
Ireneusz Pielecha	Congress Vice-Chairman
Zbigniew Sroka	Congress Vice-Chairman
Anna Janicka	Congress Vice-Chairman
Piotr Bielaczyc	Congress Vice-Chairman for Foreign Participants
Andrzej Kaźmierczak	Congress Vice-Chairman for Scientific Affairs
Lech Sitnik	Congress Vice-Chairman for Scientific Affairs
Radosław Wróbel	Congress Vice-Chairman for Industry Exhibition
Maria Skrętowicz	Congress Vice-Chairman for Industrial Sessions
Zdzisław Stelmasiak	Scientific Secretary
Dariusz Pietras	Scientific Secretary
Jędrzej Matla	Secretary for Industrial Exhibition
Andrzej Sucheck	Secretary for Industrial Sessions and Exhibition
Angelika Józefczak	Organizational Secretary (PL)
Monika Andrych-Zalewska	Organizational Secretary (PL)
Monika Magdziak-Tokłowicz	Organizational Secretary (PL, ENG)
Adriana Włóka	Organizational Secretary (PL, ENG, DE)
Maciej Zawiślak	Member
Wanda Górniak	Member
Aleksander Górniak	Member
Aleksandra Kęska	Member
Radosław Włostowski	Member
Agnieszka Szulak	Member

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SESSIONS SCHEDULE

Tuesday – 20th June 2023

10.00 – 10.30 **Opening**

10.30 – 13.00 **Plenary Session I:
Light and heavy duty vehicles development in light of Euro 7**

Chairmen: Piotr Bielaczyc (BOSMAL, Poland) & Andrzej Teodorczyk (WUT, Poland)

10.30-11.00	<i>Dario Manara – Scientific Administrator and ISC Technical Manager, European Commission Joint Research Centre (JRC), Italy</i>	TWO YEARS OF MARKET SURVEILLANCE ON VEHICLE EMISSIONS AT JRC RESULTS AND LESSONS LEARNT
11.00-11.30	<i>Kurt Engeljehringler – AVL, Austria</i>	DEVELOPMENT TRENDS OF VEHICLE EMISSIONS TEST METHODS IN LIGHT OF EURO 7 REGULATIONS
11.30-12.00	<i>Les Hill – Technical Expert at HORIBA, UK</i>	PROPOSED EU 7 : IMPLICATIONS ON TESTING AND MEASUREMENT
12.00-12.30	<i>Piotr Bielaczyc – Global Powertrain Expert BOSMAL/PTNSS,</i>	GREEN DEAL, FIT FOR 55, EURO 7 IMPACT ON ENERGY SECURITY, GHG EMISSIONS REDUCTION AND VEHICULAR PROPULSION TECHNOLOGY DEVELOPMENT IN EU AND GLOBALLY
12.30-13.00	<i>Barouch Giechaskiel – European Commission Joint Research Centre, Italy</i>	OVERVIEW OF THE EURO 7 PROPOSAL ON EXHAUST AND NON-EXHAUST PARTICULATE EMISSIONS

13.00 – 14.30 **Lunch**

14.30 – 16.30 **Plenary Session II: New propulsion technologies in EU and USA**

Chairman: Piotr Bielaczyc (BOSMAL, Poland)

14.30 – 15.00	<i>Harald Scholz – European Commission Joint Research Centre, Italy</i>	DEVELOPMENT TRENDS OF VEHICULAR BATTERIES AND EVS PROPULSION
15.00 – 15.30	<i>Ameya Joshi – Director new technologies – CORNING Inc., USA</i>	US LIGHT-DUTY REGULATIONS AND IMPLICATIONS FOR POWERTRAIN AND EMISSION CONTROL TECHNOLOGIES
15.30 – 16.00	<i>Tadashige Kawakami , Faculty of Engineering Hosei University, Japan</i>	EFFECT OF DMC BLEND RATIO ON EMISSION CHARACTERISTICS FOR DIESEL ENGINE GENERATOR FUELED WITH DMC/DIESEL BLEND FUEL
16.00 – 16.30	<i>Christopher Kolodziej, Argonne National Laboratory, USA</i>	DEVELOPMENT TRENDS OF PROPULSION TECHNOLOGY IN USA IN LIGHT OF NEW EMISSIONS REGULATIONS AND LCA ANALYSIS

16.30– 17.00 **Coffee break**

17.00 – 18.30 Plenary Session III: Propulsion technology development

Chairman: Krzysztof Wisłocki (PUT, Poland)

17.00 – 17.30	<i>Maciej Mikulski, Vaasa University, Finland – Chair of Clean Propulsion Technology project in Finland</i>	DEVELOPMENT TRENDS OF NRMM AND MARINE PROPULSION IN LIGHT OF THE CPT ACHIEVEMENTS
17.30 – 18.00	<i>Kohei Nakashima, Meijo University, Japan</i>	DEVELOPMENT OF MEASUREMENT APPARATUS OF PISTON ASSEMBLY FRICTION IN A SMALL MOTORCYCLE ENGINE
18.00 – 18.30	<i>Ezio Mancaruso, Istituto di Scienze e Tecnologie per l'Energia e la Mobilità Sostenibili (STEMS) del Consiglio Nazionale delle Ricerche (CNR), Napoli, Italy</i>	RESEARCH ON HYDROGEN COMBUSTION WITHIN CI OPTICAL ENGINE FOR SUSTAINABLE MOBILITY

Wednesday – 21th June 2023

9.00 – 10.00 Technical session I - A

Chairman: Jacek Hunicz (LUT, Poland)

9.00 – 9.15	<i>Michał RAWECKI, Wojciech CIEŚLIK, Dawid MIELCARZEWICZ</i>	MODERN METHODS OF TEST BED MODERNIZATION - REVERSE ENGINEERING
9.15 – 9.30	<i>Jan MONIETA, Magdalena SZMUKAŁA, Florian ADAMCZYK</i>	THE EFFECT OF NATURAL DETERIORATION ON SELECTED PROPERTIES OF RAPESEED OIL METHYL ESTERS
9.30 – 9.45	<i>Maciej SIDOROWICZ</i>	AN EXAMPLE OF ADOPTION OF THE MODEL-BASED DESIGN (MBD) METHODOLOGY IN THE DEVELOPMENT PROCESS OF AN LPG FUELLING SYSTEM
9.45 – 10.00	<i>Zbigniew KNEBA</i>	FUEL SYSTEMS OF HIGH POWER STATIONARY ENGINES

9.00 – 10.00 Technical session I - B

Chairman: Jarosław Mamala (OUT, Poland)

9.00 – 9.15	<i>Łukasz Jan KAPUSTA, Bartosz KAŻMIERSKI, Rohit THOKALA, Łukasz BORUC, Jakub BACHANEK, Rafał ROGÓŻ, Andrzej TEODORCZYK, Sebastian JAROSIŃSKI</i>	DEVELOPMENT OF A MULTI-PLATFORM SCR AFTERTREATMENT SYSTEM FOR LARGE-SCALE SERIES PRODUCTION
9.15 – 9.30	<i>Anna BORUCKA, Edward KOZŁOWSKI</i>	MODELLING THE DYNAMICS OF CHANGES IN CO₂ EMISSIONS FROM POLISH ROAD TRANSPORT AND THE REQUIREMENTS FOR DECARBONISATION
9.30 – 9.45	<i>Wojciech TASIOR, Marcin REIMAN, Tomasz ZAJDEL, Michał ZATEK</i>	DEVELOPMENT OF A NEW GENERATION OF TURBOCHARGERS FOR LARGE ENGINES THAT MEET MARKET REQUIREMENTS AND THE LATEST EMISSION STANDARDS

9.45 – 10.00	<i>Piotr JAKLIŃSKI, Jacek CZARNIGOWSKI, Karol ŚCISŁOWSKI</i>	STUDY OF THE EFFECT OF IGNITION ADVANCE ANGLE AND MIXTURE COMPOSITION ON THE PERFORMANCE OF A SPARK-IGNITION ENGINE FUELED WITH ETHANOL
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9.00 – 10.00 Technical session I - C

Chairman: Łukasz Rymaniak (PUT, Poland)

9.00 – 9.15	<i>Adam KAMIŃSKI, Konrad KRAKOWIAN, Mateusz KUPSKI, Maria SKRĘTOWICZ</i>	EFFICIENCY OPTIMIZATION OF A VEHICLE COMBUSTION ENGINE BY THE ADJUSTMENT OF THE SPARK ADVANCE ANGLE
9.15 – 9.30	<i>Rafał KRAKOWSKI, Tomasz MARUT</i>	THE EFFECT OF ECOLOGICAL AGENTS ADDED TO LUBRICATING OIL ON OPERATING PARAMETERS OF AN INTERNAL COMBUSTION ENGINE
9.30 – 9.45	<i>Wojciech GOŁĘBIEWSKI, Grzegorz ZAJĄC, Marie SEJKOROVÁ, Artur WOLAK</i>	ASSESSMENT OF OIL CHANGE INTERVALS IN URBAN BUSES BASED ON THE SELECTED PHYSICOCHEMICAL PROPERTIES OF USED ENGINE OIL
9.45 – 10.00	<i>Rafał SALA, Kamil WĘGLARZ, Andrzej SUCHECKI</i>	ANALYSIS OF LUBRICATING OIL DEGRADATION AND ITS INFLUENCE ON BRAKE SPECIFIC FUEL CONSUMPTION OF A LIGHT-DUTY COMPRESSION-IGNITION ENGINE RUNNING A DURABILITY CYCLE ON A TEST STAND

10.00 – 10.30 SAE & IASTEC Session

Chairman: Piotr Bielaczyc (BOSMAL, Poland)

10.00 – 10.30	<i>John Tintinalli – President SAE Europe</i>	INFORMATION ABOUT SAE EUROPE AND OPPORTUNITIES TO ORGANIZE SAE SECTION IN POLAND
10.30 – 10.40	<i>Thomas Koch – Chairman of IASTEC</i>	IASTEC ACTIVITIES TO PROMOTE SCIENCE AND RESEARCH IN THE FIELD OF VEHICLE AND DRIVETRAIN TECHNOLOGY

10.40 – 11.40 Sponsorship session

Chairman: Zbigniew Sroka (WUST, Poland)

10.40 – 10.50	<i>Bosmal</i>
10.50 – 11.00	<i>Flaris</i>
11.00 – 11.10	<i>BorgWarner</i>
11.10 – 11.20	<i>Radwag</i>
11.20 – 11.30	<i>EC TEST Systems</i>
11.30 – 11.40	<i>Polaris</i>

11.40– 12.00 Coffee break

12.00 – 13.30 Debate “Quo Vadis Combustion Engine”

Host: Andrzej Kaźmierczak (WUST, Poland)

12.00 – 13.30	<i>Jerzy MERKISZ</i>	President of Polish Scientific Society of Combustion Engines
	<i>Piotr BIELACZYC</i>	Global Powertrain Expert at BOSMAL
	<i>Andrzej SZALEK</i>	Advisor to the Board in Toyota Central Europe
	<i>Tomoho UMEDA</i>	CEO of Hynfra
	<i>Aleksander SOBOLEWSKI</i>	Director of Institute of Energy and Fuel Processing Technology
	<i>Szymon PŁOŃSKI</i>	Industrial Development Agency JSC
	<i>Tomasz ROLEDER</i>	Regional Specialized Hospital in Wrocław

13.30– 15.00 Lunch

15.00 – 16.00 Technical session II - A

Chairman: Stanisław Szwaja (CzUT, Poland)

15.00 – 15.15	<i>Grzegorz KUBICA</i>	COMBUSTION OF LPG / DME GAS MIXTURES IN AN SI ENGINE WITH CORRECTION OF THE IGNITION ADVANCE ANGLE
15.15 – 15.30	<i>Michalina KAMIŃSKA, Natalia SZYMLET, Piotr LIJEWSKI, Paweł FUĆ, Łukasz RYMANIAK, Rafał GRZESZCZYK</i>	ANALYSIS OF HARMFUL COMPOUNDS CONCENTRATIONS IN THE EXHAUST BEHIND A VEHICLE WITH COMPRESSION IGNITION ENGINE
15.30 – 15.45	<i>Tomasz OSIPOWICZ, Karol ABRAMEK</i>	ANALYSIS OF THE INFLUENCE OF FUEL CONTAMINANTS ON THE OPERATION OF THE INJECTION SYSTEM IN MODERN CI ENGINES
15.45 – 16.00	<i>Dmytro SAMOILENKO, Anatolij SAVCHENKO, Serhii KRAVCHENKO</i>	IMPROVING THE PERFORMANCE OF DIESEL ENGINE FUELLED WITH WATER-FUEL EMULSION

15.00 – 16.15 Technical session II - B

Chairman: Marek Brzeżański (CUT, Poland)

15.00 – 15.15	<i>Marcin NOGA, Tomasz MOSKAL</i>	EVALUATION OF A PRESSURE SENSING GLOW PLUG IN TERMS OF ITS APPLICATION POSSIBILITY TO CONTROL THE COMBUSTION PROCESS OF A HYDROGEN-POWERED SPARK-IGNITION ENGINE
15.15 – 15.30	<i>Mateusz WESOŁOWSKI, Mohamad HAMID, Piotr MOŃKA, Anna JANICKA</i>	ANALYSIS OF THE POTENTIAL OF ELECTRO-WASTE AS A SOURCE OF HYDROGEN TO POWER LOW-EMISSION VEHICLE POWERTRAINS
15.30 – 15.45	<i>Rafał LONGWIC, Dawid TATARYNOW, Gracjana WOŹNIAK-BORAWSKA, Michał KUSZNERUK</i>	PRELIMINARY TESTS OF A DIESEL ENGINE POWERED BY DIESEL AND HYDROGEN
15.45 – 16.00	<i>Marek SUTKOWSKI, Michał MARECZEK</i>	OPERATIONAL EXPERIENCE AND NEW DEVELOPMENTS FOR INDUSTRIAL GAS ENGINES FUELLED WITH HYDROGEN FUELS
16.00 – 16.15	<i>Paweł MAGRYTA, Konrad PIETRYKOWSKI</i>	CRANKSHAFT GEOMETRY MODIFICATION AND STRENGTH SIMULATIONS FOR A NEW DESIGN OF DIESEL OPPOSED-PISTON ENGINE

15.00 – 16.15 Technical session II - C

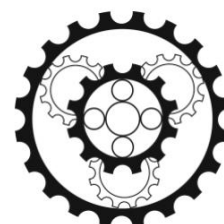
Chairman: Zbigniew Korczewski (GUT, Poland)

15.00 – 15.15	<i>Mariusz GRABA, Jarosław MAMALA, Krzysztof PRAŻNOWSKI, Patryk STASIAK, Jovan MITROVIC</i>	ANALYSIS OF SPEED LIMIT AND ENERGY CONSUMPTION IN ELECTRIC VEHICLES
15.15 – 15.30	<i>Wojciech CIEŚLIK, Natalia SZYMLET, Weronika ANTCZAK, Mateusz NOWAK</i>	EVALUATION OF THE ENERGY CONSUMPTION OF CONVENTIONAL (CI) AND ALTERNATIVE (EV) DELIVERY VEHICLES IN REAL TRAFFIC CONDITIONS
15.30 – 15.45	<i>Rafał KLIZA, Ksenia SIADKOWSKA, Karol ŚCISŁOWSKI</i>	ANALYSIS OF VIBRATION IN THE RESEARCH ELECTRIC PROPULSION SYSTEM FOR AIRCRAFT ROTORS
15.45 – 16.00	<i>Jędrzej MATLA, Andrzej KAŻMIERCZAK, Piotr HALLER, Marcin TROCKI</i>	PROSPECTS OF REPLACING HYDROCARBON FUELS WITH HYDROGEN BY MEANS OF A NEW COMBUSTION SYSTEM IN A SPARK IGNITION ENGINE REGARDING TO POLISH MARKET
16.00 – 16.15	<i>Patrycja PUZDROWSKA</i>	APPLICATION OF THE F-STATISTIC OF THE FISHER-SNEDECOR DISTRIBUTION TO ANALYZE THE SIGNIFICANCE OF THE EFFECT OF CHANGES IN THE INJECTOR OPENING PRESSURE OF A DIESEL ENGINE ON THE SPECIFIC ENTHALPY VALUE OF THE EXHAUST GAS FLOW

16.15 – 16.45 Conference closing



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19th-21st June 2023

CONGRESS LOCATION AND TRAVEL DETAILS

The Congress will be held on the campus
of the Wrocław University of Science and Technology

Addresses location:

19.06.2023, Monday

Registration and Welcome reception

– GEO 3EM (L-2), Na Grobli 13 Str., 50-421 Wrocław, Poland

20.06.2023 Tuesday and 21.06.2023 Wednesday

Registration and main proceedings

– Congress Centre (D-20), Janiszewskiego 8 Str., 50-372 Wrocław, Poland

Lunches and Gala Dinner

– Student Culture Zone (C-18), Hoene-Wrońskiego 10 Str., 50-376 Wrocław, Poland

Congress Centre (D-20) is located in main campus of Wrocław University of Science and Technology at a distance of about 3 km from the railway station – **Fig. 1.**

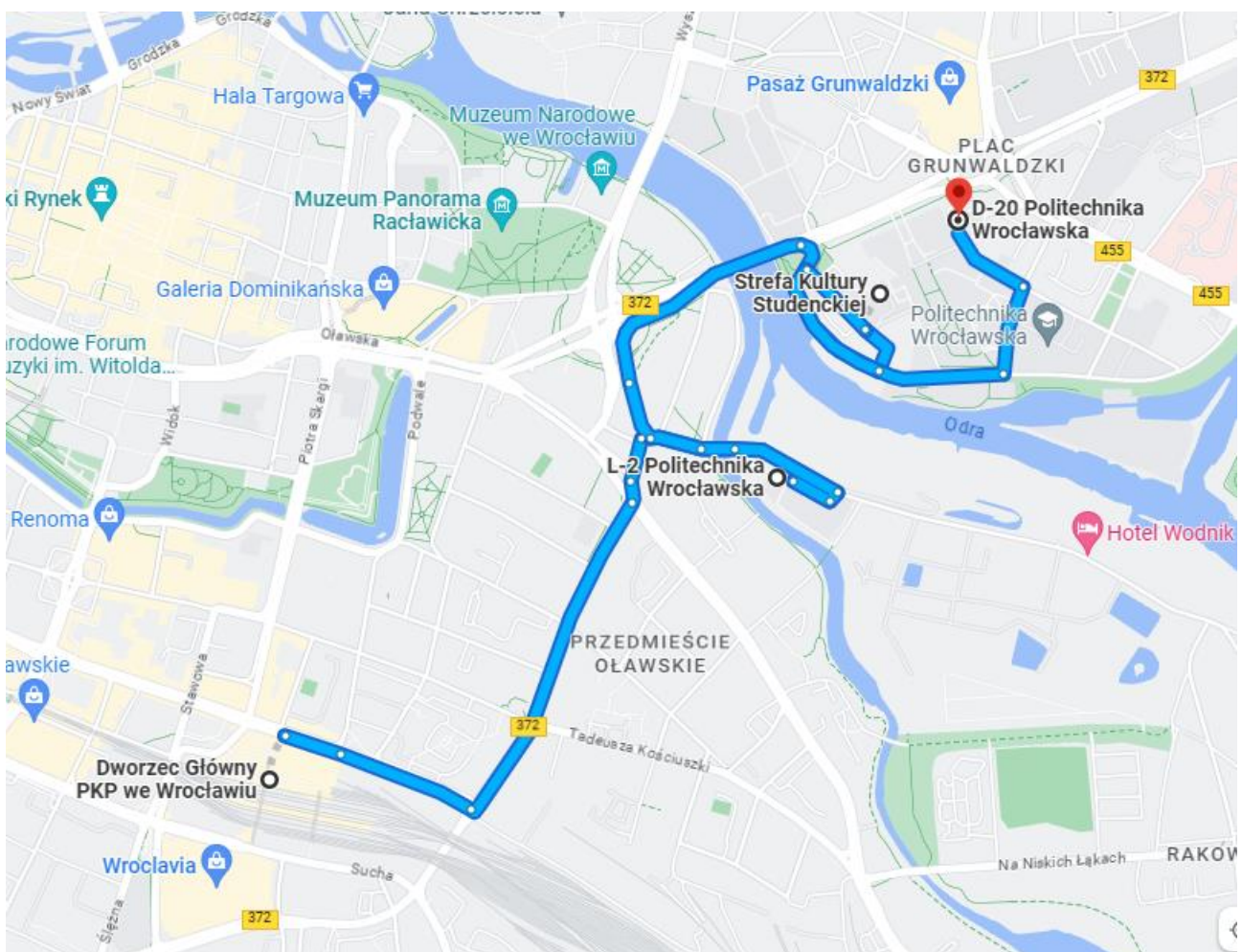


Fig. 1. Route to the Congress Centre (D-20) from the railway station

Details of the travel:

- **Train communication to Wrocław:**
 - direct links are available from various cities of Poland,
 - for more detailed information on train connection please visit: <http://www.pkp.com.pl>.
- **Taxi in Wrocław:**
 - Ryba Taxi, +48 713 067 067
 - Royal Taxi, +48 530 303 020
 - iTaxi, +48 737 737 737
- **How to get to the Congress Center (D-20)?**
 - From the railway station (from Piłsudskiego Str.) to Congress Centre (D-20):
 - bus lines 145, 146 (bus stop: Pl. Grunwaldzki)
 - tram line 70 (tram stop: Pl. Grunwaldzki).

From Wrocław Airport to Congress Centre (D-20):

- bus line 106 (bus stop: Dworzec Główny - Dworcowa), next bus 146 (bus stop: Pl. Grunwaldzki)

From the selected hotels:

- Hotel The Bridge MGallery: on foot (1 km distance)
- Double Tree Hilton Wrocław: tram lines 4, 33 (tram stop: Pl. Grunwaldzki)
- Hotel Mercure Wrocław Centrum: tram lines 4, 33 (tram stop: Pl. Grunwaldzki)
- HP Park Plaza: tram line 19 (tram stop: Pl. Grunwaldzki)
- Hotel Ibis Styles Wrocław Centrum (like from the railway station)
- Guest rooms of Wrocław University of Science and Technology

Student Culture Zone (C-18) is located at main campus of Wrocław University of Science and Technology at a distance of about 280 m from the Congress Centre (D-20) – **Fig. 2**.



Fig. 2. Part of the Wrocław University of Science and Technology main campus

GEO 3EM is located in other part of the Wrocław University of Science and Technology campus. You can get there by cable car “Polinka” from the main campus from the station located at the C-13 building.– **Fig 3.**



Fig. 3. “Polinka” cable car station