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**D4.5 Report on factory tours and technical visits in UA and EU during M19-M36**

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**Dissemination Level**

<b>PU</b>	Public	<b>X</b>
<b>PP</b>	Restricted to other program participants (including the EC Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the EC Services)	
<b>CO</b>	Confidential, only for members of the consortium (including the EC)	

The overall aim of the AERO-UA project is to stimulate aviation research collaboration between the EU and Ukraine through strategic and targeted support. AERO-UA is focused solely on Ukraine, because the country has a huge aerospace potential but a low level of aviation research collaboration with the EU. Ukraine's aerospace sector spans the full spectrum of systems and components development and production with OEMs, Tier 1 and 2 suppliers, aeroengine manufacturers, control systems manufacturers, R&D institutions, aeronautic universities, and SMEs. This is also reflected in the sector's important contribution to the country's economy (e.g. aircraft production of €1,9 billion in 2011).

Ukrainian aerospace organisations possess unique know-how that can help Europe address the challenges identified in the ACARE SRIA / Flightpath 2050 Report. Furthermore, following the signing of the Agreement for the Association of Ukraine to Horizon 2020 in March 2015, Ukrainian organisations are eligible to participate in Clean Sky 2 and H2020 Transport on the same funding terms as those from EU member states. Equally, genuine commercial opportunities exist for European aviation organisations to help modernise Ukraine's aerospace sector.

The AERO-UA project will achieve its overall aim via four high-level objectives:

1. Identifying the barriers to increased EU-UA aviation research collaboration;
2. Providing strategic support to EU-UA aviation research collaboration;
3. Supporting EU-UA aviation research knowledge transfer pilot projects; and
4. Organising awareness-raising and networking between EU-UA stakeholders.

The AERO-UA consortium is comprised of key EU and UA aviation organisations that will implement WPs closely mapped to the high-level objectives. The consortium will be supported by an Advisory Board involving Airbus, DLR, Min. Education and Science of Ukraine, Ukrainian State Air Traffic Services Enterprise and retired Director of EADS Jean-Pierre Barthélemy.

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## 1. Introduction

The tasks relating to the organisation of the factory tours in Ukraine and Europe (Tasks 4.3 and 4.4) were part of the WP4 “Awareness-raising and networking between EU-UA stakeholders”, as agreed under the AERO-UA “Strategic and Targeted Support for Europe-Ukraine Collaboration in Aviation Research” project.

As it was presented in the AERO.UA project proposal, under Task 4.3, “Organise factory tours and technical visits in Ukraine,” European experts were invited to take part in factory tours to Ukrainian aviation manufacturers, as well as technical visits to Ukrainian R&D centres. The main objective of these factory tours and technical visits was to increase EU aeronautics actors’ awareness of the UA aeronautic capabilities and recent developments. These visits were organised by the local Ukrainian project partners and provided opportunities to see their facilities as well as those of other key Ukrainian aviation stakeholders. Under Task 4.4, “Organise factory tours and technical visits in Europe,” Ukrainian project partners and guests from European organisations participated in factory tours and technical visits to European aviation entities and organisations conducting research for the aviation sector. The main objective of these factory tours and technical visits was to help Ukrainian project partners understand EU needs and create a background for further cooperation. These visits were organised by the TECPAR/ITWL, Intelligentsia Consultants and UkrRIAT.

## 2. AERO-UA visit to Toulouse, December 4-7, 2018

In order to increase contact between Ukrainian and European aviation industry, the format of the AERO-UA visit to Toulouse was changed from that originally described in Task 4.4. Instead of organising factory tours and technical visits in the Toulouse region, the consortium partners arranged to have a booth at the [Aeromart Toulouse](#) convention and to hold a meeting between the Ukrainian aerospace cluster “Mechatronics” and Aerospace Valley in Toulouse.

### 2.1 Aeromart Toulouse

The AERO-UA consortium took advantage to showcase the strengths of Ukraine’s aviation industry at the 12th edition of the [Aeromart Toulouse](#) convention for the aviation and space industries.

Aeromart Toulouse is a major international convention hosting business-to-business meetings between manufacturers and suppliers from across the aerospace sector. Held during December 4-6, 2018, the 12th edition attracted over 2500 participants from more than 1300 international companies.

Five Ukrainian aviation companies seized the opportunity to promote themselves and sent representatives to support the AERO-UA booth at the convention: [Antonov](#), [Ivchenko-Progress](#), [FED](#), [UkrRIAT](#) and [Volchansk Aggregate Plant](#). This was the first ever occasion that the Ukrainian aviation industry has been represented at the convention.

With the expert support of Victor Shulepov (UkrRIAT), the Ukrainian aviation industry representatives were able to hold over 30 business-to-business meetings with European companies such as Airbus, CELAB, Jihlavan, MEGGIT and SAFETYIN. It is hoped these meetings will help to initiate new business contracts between European and Ukrainian aviation companies.



***Ukrainian aviation industry representatives on the AERO-UA booth at the [Aeromart Toulouse](#) convention***

## 2.2 Meeting between the aerospace cluster “Mechatronics” and Aerospace Valley

The AERO-UA project organised a meeting between the Ukrainian aerospace cluster “Mechatronics” and Aerospace Valley in Toulouse on December 7, 2018, in order to introduce themselves and to explore mutual areas of interest for cooperation.

Established in 2015, the Ukrainian Aerospace Cluster “Mechatronics” was created to build effective interaction and communication between the Ukrainian aerospace industry and research and academic institutions, in order to generate results meeting social, economic and business needs. The cluster has 22 members involved in aerospace activities at all levels including leading industrial aerospace actors such as [Antonov](#), [FED](#), [Ivchenko-Progress](#) and [Motor-Sich](#).

Created in 2005, [Aerospace Valley](#) is the most significant innovation “pôle de compétitivité” in France in the fields of aeronautics, space and embedded systems, counting over 840 members from both industry and academia. With offices in Toulouse (HQ) and Bordeaux, the innovation cluster covers the two geographically adjacent regions of South-Western France, Occitania and Nouvelle Aquitaine. With 124,000 industrial employees, Aerospace Valley represents around one third of the French aerospace workforce. Similarly, 8,500 researchers and scientists are active within the Aerospace Valley territory.

Amongst the topics discussed during the meeting between the two clusters was possible collaboration for the AERO-UA factory tour and information and networking event held in Zaporizhia, Ukraine, in April 2019.

Besides initiating worthwhile discussions, the meeting represented a productive collaboration between the Horizon 2020 funded AERO-UA project and [RADIAN](#) project, with the Ukrainian aerospace cluster “Mechatronics” being a consortium partner of the former and the Aerospace Valley being a consortium partner of the latter.



***Meeting between the Ukrainian aerospace cluster “Mechatronics” and Aerospace Valley in Toulouse***

### 3. AERO-UA factory tour and technical visit, Zaporizhia, April 24, 2019

In accordance with Task 4.3. (Leader FED), factory tours to SE Ivchenko-Progress and MOTOR SICH JSC, Zaporizhia, Ukraine, were organized for the Consortium members and guests from other European and Ukrainian companies on April 24, 2019.

During the tour the guests were divided into two groups (English-speaking and Russian-speaking) to make their visit more comfortable and meaningful. The participants had an opportunity to familiarise themselves with production facilities, experimental and research processes, final products, and training capabilities of the enterprises that create modern aircraft engines of various types and applications.

The more than 50 participants of the facility tour in Zaporizhia included the following consortium partners:

<b>No.</b>	<b>Name</b>	<b>Organisation</b>
1	Giles Martin BRANDON	Intelligentsia Consultants
2	Kay Christian MATZNER	Fraunhofer Institute for Factory Operation and Automation IFF
3	Sergiy LEV	National Academy of Sciences of Ukraine (NASU)
4	Michal Jaroslaw DZIENDZIKOWSKI	Technology Partners Foundation (TECPAR) / Air Force Institute of Technology (ITWL)
5	Radoslaw PRZYSOWA	Technology Partners Foundation (TECPAR) / Air Force Institute of Technology (ITWL)
6	Valeriy FADEYEV	Public Joint Stock Company FED
7	Vasyl LOGINOV	Public Joint Stock Company FED
8	Igor RYBALCHENKO	National Aerospace University – Kharkiv Aviation Institute (KhAI)
9	Maryna SHEVTSOVA	National Aerospace University – Kharkiv Aviation Institute (KhAI)
10	Neha CHANDARANA	University of Manchester (UoM)
11	Lina SMOVZIUK	National Aerospace University – Kharkiv Aviation Institute (KhAI)
12	Iryna BILAN	National Academy of Sciences of Ukraine (NASU)
13	Vadym KRUTS	National Academy of Sciences of Ukraine (NASU)

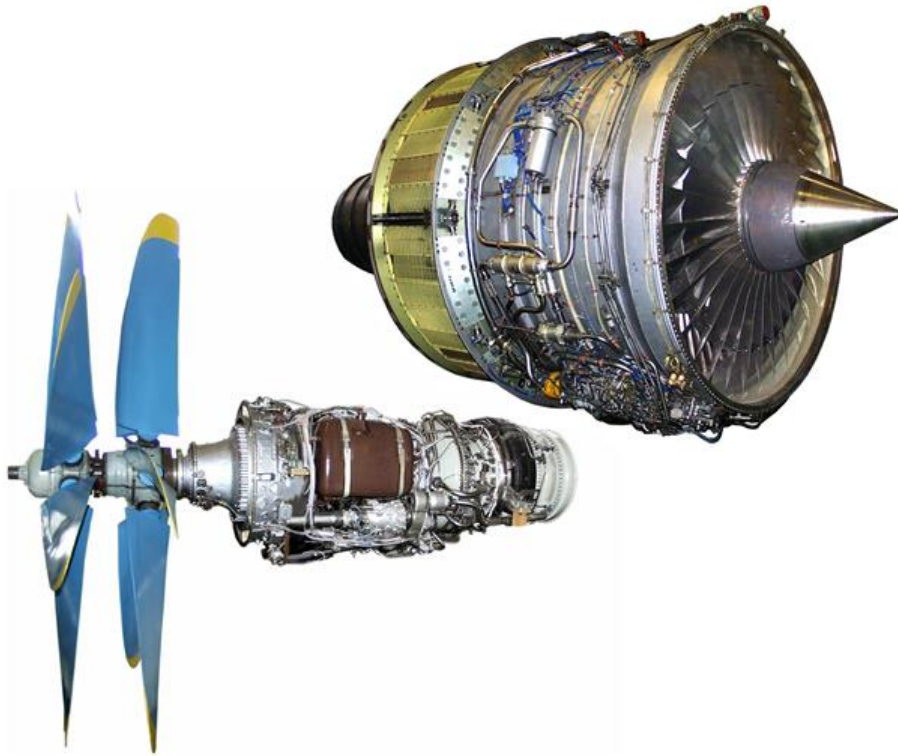
### 3.1 SE Ivchenko-Progress

The Academician A.G. Ivchenko Zaporozhye Machine-Building Design Bureau Progress State Enterprise has made significant contributions to the development of the aviation industry. The company has been involved in the design of engines to power aircraft and helicopters of various types as well as drives and special equipment of industrial application for over 70 years. During this period of time more than 80.000 aviation piston and gas turbine engines, turbine starters and drives of industrial application have been produced by engine manufacturers. The aero engines designed by SE Ivchenko-Progress power 54 types of aircraft in 122 countries of the world. Total operating time of gas turbine engines exceeds 300 million hours. The company is a part of the Ministry of Industrial Policy of Ukraine.



During the facility tour of SE Ivchenko-Progress the participants visited a small exhibition of engines designed by the company, including the D-18T engine, rated at a thrust of 23430 kgf, powering the An-124 Ruslan and An-225 Mriya aircraft, the latter offering the highest cargo-lifting capacity in the world. In total, 52 airplanes and 251 engines were manufactured. 188 units of the D-18T engine are currently in operation. Another outstanding engine that the visitors could see was the D-27, the first in the world turbopropfan engine rated at a maximum power of 14000 ehp and installed in the An-70 medium-range military airlifter. As of 2019, the D-27 is the only contra-rotating propfan engine to enter service.





The facility tour included a visit to the SE Ivchenko-Progress experimental-research complex, which carries out a per-assembly and full-scale development and testing of engines for the purpose of a further improvement of engine design, growth of engine reliability and fuel efficiency, verification of engine parameters and certification. There are 78 test rigs developed for performing various tasks and 17 test benches for full-scale testing, including outside benches, located at three different sites within Zaporizhia.



The guests had an opportunity to see SE Ivchenko-Progress' modern equipment: metal-cutting tools, like FEHLMANN precision-boring machine, milling machines Huron; MAGERLE five-axis profile-grinding center intended for machining of sections of nozzle guide vanes and blades; STARRAG machining centers for speed milling of compressor blades and blisks; WALTER and SCHNEEBERGER GEMINI machines for centralized manufacture and regrinding hard-alloy milling cutters.



Finally, the company demonstrated its casting samples and equipment enabling manufacture of single-crystal and directionally solidified castings offering improved economics compared with conventional methods and enhanced freedom for the manufacture of complex components.

### 3.2 MOTOR SICH JSC

The enterprise was established in 1907. It manufactures more than 100 types of reliable aircraft engines and gas turbine power plants which are considered to be competitive in the world market. The enterprise products operate on airplanes and helicopters of various applications in more than 110 countries worldwide.

Development and commissioning of state-of-the-art technology, based on latest scientific and technical achievements, professional, skilled and unified staff, unique production facilities, resources, effective management strategy are the basis of the enterprise's success and constant development.

During the tour the participants visited an assembly shop, test facilities, helicopter main gearbox facility, training center and technical museum.

MOTOR SICH manufactures the VR-2, VR-8A, VR-14, and VR-24 helicopter main gearboxes for the Mi-2, Mi-8, Mi-17, and Mi-24 type helicopters. The machine-assembly shop with total area of 4500m<sup>2</sup> with up-to-date, comfortable working conditions and controlled environment parameters was established to meet the challenge of main gearbox manufacture and overhaul. The shop is equipped with the newest high-efficiency Gleason CNC machines, which allow for the production of:

- spur and helical cylindrical gears up to 800 mm in diameter,
- bevel and hypoid gears with circular teeth up to 600 mm in diameter.

The visitors could see the areas dedicated to helicopter main gearbox washing, inspection, repair and assembly as well as areas of hydraulic and pneumatic test of gearbox parts and units at intermediate repair stages and assembled gearbox, and mechanical area to manufacture new parts.



The guests also toured the Flight Training Organization (FTO) of MOTOR SICH, founded in 2017 and certified as the FTO meeting European requirements in accordance with the Certification Rules for civil aviation training institutions for flight crews in Ukraine. This organization provides overall training of flight crews: the latest technologies and means of theoretical training, certified simulators, and Mi-2, Mi-8 / SMB / MTB-1 helicopters are used for training.



The participants had an opportunity to visit the Technical Museum of MOTOR SICH where they could see a unique collection of piston and jet aircraft engines manufactured by the company in different periods of its history.



## Annex 1

## Zaporizhia Networking Event and Factory Tours H2020 AERO-UA Project 24-26 April 2019

### Agenda

#### Day 1 – Wednesday, 24 April 2019

##### 9:00-17:00 FACILITY TOUR

8:40 – 9:00	Bus transfer from the city centre (Intourist hotel, 135 Sobornyi Ave., Zaporizhia, Ukraine)
9:00 – 13:00	Visit to State Enterprise Ivchenko-Progress
13:00 – 14:00	Lunch
14:00 – 17:00	Visit to MOTOR SICH JSC and Technical Museum
17:00 – 17:30	Bus transfer to the city centre (Intourist hotel, 135 Sobornyi Ave. , Zaporozhye,Ukraine)

#### Day 2 – Thursday, 25 April 2019

##### 9:30-14:00 AERO-UA INFORMATION AND NETWORKING EVENT

**Venue:** Conference Hall at Intourist Hotel, 135 Sobornyi Ave., 69000 Zaporizhia, Ukraine  
([www.intourist.com.ua](http://www.intourist.com.ua))

\*We also recommend this hotel for accommodation as it will be convenient in terms of logistics

9:00	<b>Start of Registration</b>
9:30-9:35	Welcome - <i>Giles Brandon (AERO-UA Coordinator, Intelligentsia Consultants)</i>
9:35-9:55	AERO-UA Project overview, interim results, opportunities and planned activities – Speaker - <i>Giles Brandon (AERO-UA Coordinator, Intelligentsia Consultants)</i>
9:55-10:05	Welcome – <i>Igor Kravchenko (Director of Enterprise, SE Ivchenko-Progress)</i>
10:05-10:35	Opportunities to Support EU-Ukraine Cooperation (EU speakers) <ul style="list-style-type: none"> <li>• <i>Neha Chandarana (University of Manchester)</i></li> <li>• <i>Krzysztof Szafran (ILOT)</i></li> <li>• <i>Radoslaw Przysowa (ITWL)</i></li> </ul>
10:35-11:05	EU-Ukraine collaboration in aviation research - <i>National Aerospace University “KhAI”</i>
11:05-11:30	<b>Coffee break &amp; Networking</b>
11:30-12:45	Opportunities to Support EU-Ukraine Cooperation (Ukrainian speakers**) <ul style="list-style-type: none"> <li>• <i>Andrii Shevliakov (MOTOR SICH JSC)</i></li> <li>• <i>Vasiliy Loginov (JSC “FED”)</i></li> <li>• <i>Igor Ziakhor (Paton Electric Welding Institute of NAS of Ukraine)</i></li> <li>• <i>Ivan Khyzhniak (Itton Service)</i></li> <li>• <i>Oleksandr Babych (Zaporizhia National University)</i></li> <li>• <i>Eduard Grybkov (Donbass State Engineering Academy)</i></li> <li>• <i>Oleksandr Stelmakh (National Aviation University)</i></li> </ul>
12:45-13:00	Conclusions, Q&A
13:00-14:00	<b>Networking lunch</b>
14:00-14:30	Transfer to SE Ivchenko-Progress premises

##### 14:30-17:30 CLOSED AERO-UA CONSORTIUM MEETING

**Venue:** SE “Ivchenko-Progress”  
2, Ivanova Street  
Zaporizhia, Ukraine

<b>14:30-14:35</b>	Introduction	Intelligentsia
<b>14:35-14:40</b>	WP 1 Barriers to increased EU-UA aviation research collaboration	Intelligentsia
<b>14:40-15:00</b>	WP 2 Strategic support to EU-UA aviation research collaboration	KhAI
<b>15:00-16:00</b>	WP 3 EU-UA aviation research knowledge transfer pilot projects	
(10 min per pilot project)	<ul style="list-style-type: none"> <li>• 3.1a Advanced design of aerospace composite structures</li> <li>• 3.1b Aerospace composite structural health monitoring system</li> <li>• 3.2a Engine health management system</li> <li>• 3.2b Advanced low-cost small turbine</li> <li>• 3.3a Manufacturing joints</li> <li>• 3.3b Manufacturing aerospace composite structures</li> </ul>	UoM ITWL/TECPAR ITWL/TECPAR IVCHENKO Fraunhofer UoM
<b>Coffee break</b>		
<b>16:15-16:25</b>	WP 4 Awareness-raising and networking between EU-UA stakeholders	NASU
<b>16:25-17:45</b>	WP 5 Dissemination and Communication	KhAI
<b>16:45-17:00</b>	WP 6 Project Management	Intelligentsia
<b>17:00-17:20</b>	Advisory Board Feedback	KhAI/ Intelligentsia
<b>17:20-17:30</b>	Discussion / Conclusions	All

17:30-18:00 *Transfer to the restaurant*

**18:30-21:00 Dinner for AERO-UA Consortium and Advisory Board**

**Venue:** Porto Riva restaurant, 15 Lunacharskoho St, Zaporizhia

**Day 3 – Friday, 26 April 2019**

**9:30-11:30 AERO-UA PILOT PROJECTS MEETINGS**

**Venue:** SE “Ivchenko-Progress”  
2, Ivanova St  
Zaporizhia, Ukraine

**9:30 – 10:00** *Bus transfer from the city center  
(Intourist hotel, 135 Sobornyi Ave., Zaporizhia ,Ukraine)*

**10:00 – 11:30** **Pilot Projects – technical discussions in sub-groups**

- **Group 1: PP 3.1a, 3.1b, 3.3b**
- **Group 2: PP 3.2a, 3.2b**
- **Group 3: PP 3.3a**

*Note: Each Group is free to determine the duration for its meeting*

**12:00 – 13:00** **Lunch**

**13:00 – 16:00** ***Sightseeing (optional)***