Scholarship report of the short-term research collaboration with Gdańsk University of Technology

26/1/2022 - 4/2/2022

Due to the successful application for short-term research cooperation with Gdańsk University of Technology, I spent ten days at the Faculty of Mechanical Engineering and Ship Technology. The scholarship was funded by NAWA and Tempus Közalapítvány. My hosts were dr hab. inż. Dariusz Fydrych and dr inż. Aleksandra Świerczyńska, who has also managed to finish a short-term research job at Budapest University of Technology in October 2021. With prof. Fydrych and his colleagues we successfully accomplished the proposed research plan.

During the first days, I focused on getting to know the institute colleagues and the researchers. prof. Fydrych and his colleagues guided me through the university buildings and their laboratories. I managed to meet with colleagues with whom we have online relationships due to our shared research field. I was very interested in the university's administration system (Moja PG, https://moja.pg.edu.pl/), which I have found very impressive, and I hope some of the experiences gained with this system can be later applied to my university's administration processes.

Visiting the Faculty of Mechanical Engineering and Ship Technology laboratories, we have found a lot of cooperation possibilities for the future. prof. Fydrych and his team are highly interested in the effects of diffusible hydrogen during welding, which is also a research area of my group as we are currently running a two years project on the field of hydrogen embrittlement. Equipment like implant testing and slow strain rate tensile machines with corrosion cells can be later used in future research cooperation. I also managed to hold a presentation on my university and my research area in front of the faculty members.

The proposed research plan was realized by the fiber laser welding machine of the institute with the guide of dr inż. Michał Landowski. We performed autogenous welding on different stainless steel grades. Modern lean duplex stainless steel base materials were used for welding, shipped from Budapest University of Technology and Economics. The laser beam welding of these grades is still a highly researched area, as the fast cooling rate (due to the low heat input) results in detrimental phase formation in the heat affected zone and weld metal. These modern duplex stainless steel grades are often joined together with conventional austenitic grades due to their corrosion resistance, mechanical properties, and price. Thus, besides homogeneous/similar joints, we also performed heterogenous/dissimilar joints. The constant parameter was the fiber laser welding heat input, and the variable parameters were the welding speed, laser power, and laser beam focal point distance. Altogether 24 welded joints were made on stainless steel grades 2101, 2202, 2120, 2304, and 304. The welds will be examined by metallographic techniques and corrosion testing in Budapest. The future obtained results will make it possible to publish a joint research paper. Some extra sheets of duplex stainless steel grades were left at Gdańsk for additional measurements.

During the last days of my visit, we also performed underwater welding, which is the main field of interest of prof. Fydrych and his group. Austenitic stainless steel grade 304 was welded underwater using stainless steel wet electrodes, which is still a challenge for industrial applications. The welds could be characterized by corrosion resistance at Budapest in the future.

In my opinion, my short-term research visit was very successful. The hospitality of my colleagues at the Gdańsk University of Technology is great. We could also highlight common research areas and already performed samples for evaluation. I expect long-term research cooperation with prof. Fydrych and his team and we also think about university student exchange for more extended periods, such as thesis writing and research.

Budapest, 22/2/2022 …….

Dr. Balázs Varbai

Gdańsk, 22/2/2022 …….

Prof. Dariusz Fydrych

Appendix

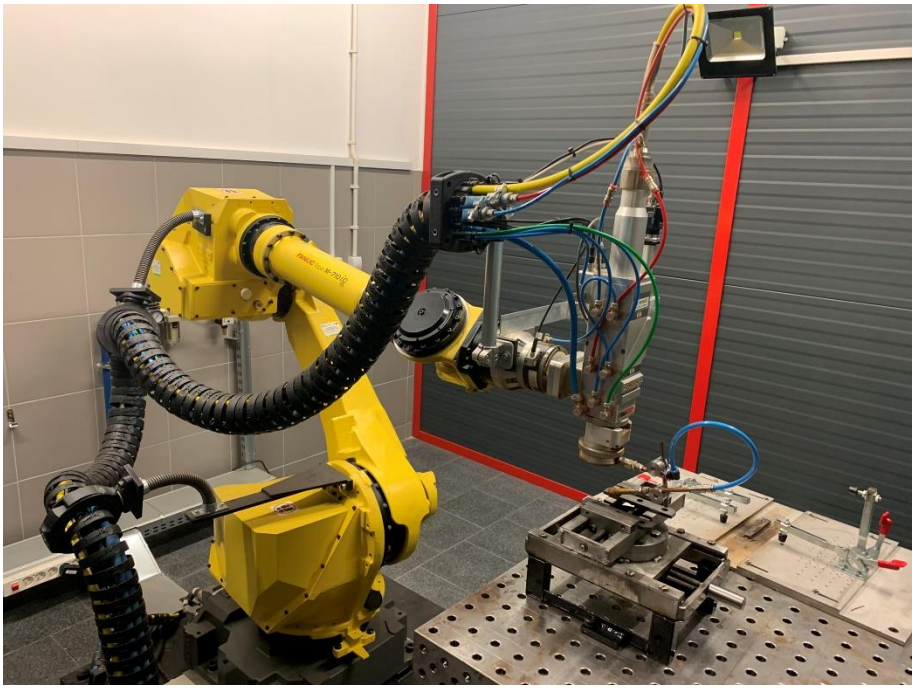

Fig 1. Laser welding robot at Gdańsk University of Technology

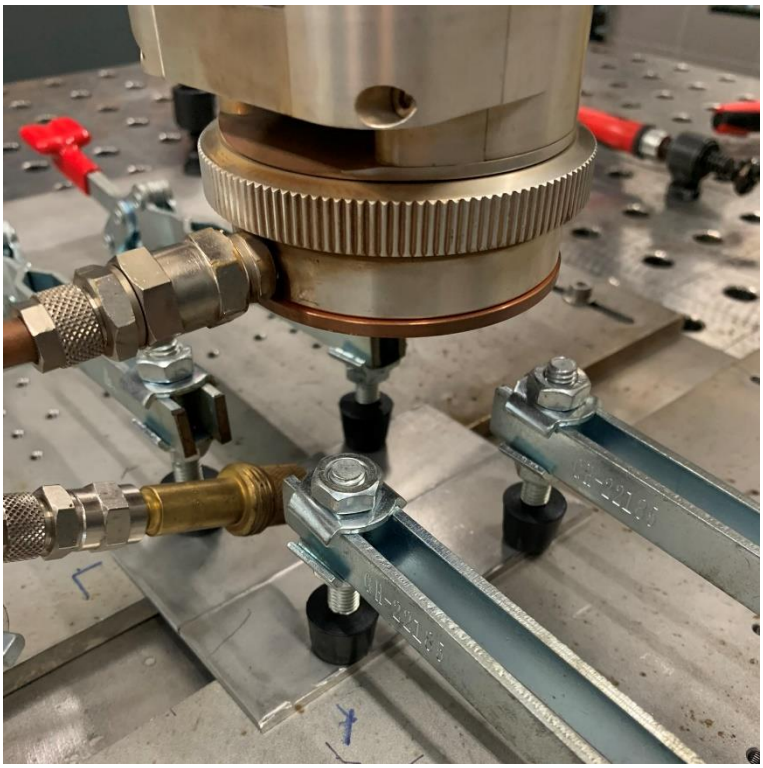

Fig 2. Laser beam welded butt welds of 2202 lean duplex stainless steels

Aktualności

Data dodania: 2022-02-24

Złącza spawane laserowo z nowoczesnych stali. Dr Balazs Varbai odbył staż naukowy na WIMiO

Dr Balazs Varbai z Budapest University of Technology and Economics (największa uczelnia techniczna na Węgrzech) odbywał na Wydziale Inżynierii Mechanicznej i Okrętownictwa staż naukowy finansowany przez NAWA. Głównym celem badawczym było wykonanie złączy spawanych laserowo z nowoczesnych gatunków stali wysokostopowych, które zostaną zbadane na uniwersytecie w Budapeszcie.

Projekt pt. „Beam laser welding of lean duplex stainless steels” został pozyskany przez stażystę oraz pełniącego rolę opiekuna dr. hab. inż. Dariusza Fydrycha. W ramach pobytu na naszym wydziale dr Varbai zapoznał się z działalnością naukową, dydaktyczną i organizacyjną Zakładu Technologii Materiałów Konstrukcyjnych i Spajania. Głównym celem badawczym było wykonanie złączy spawanych laserowo z nowoczesnych gatunków stali wysokostopowych, które następnie zostaną poddane badaniom na Budapest University of Technology and Economics. Dodatkowo przeprowadzono próby spawania podwodnego unikalnych w skali światowej złączy różnorodnych.

Dr Varbai jest specjalistą w dziedzinie metalurgii spawania, zwłaszcza spawalności dwufazowych stali odpornych na korozję, ma szerokie doświadczenie w pracy laboratoryjnej, dydaktyce (również na studiach podyplomowych IWE-International Welding Engineer) i jest autorem wielu publikacji w renomowanych czasopismach międzynarodowych oraz ekspertyz z zakresu awarii konstrukcji petrochemicznych i urządzeń przemysłowych.

34 wyświetleń

2022-02-24

New career opportunities at Harbin Institute of Technology

2022-02-22

Ponad 6,5 mln zł na realizację projektów w programach Aurum i Argentum – wyniki konkursów