FLASH newsletter content

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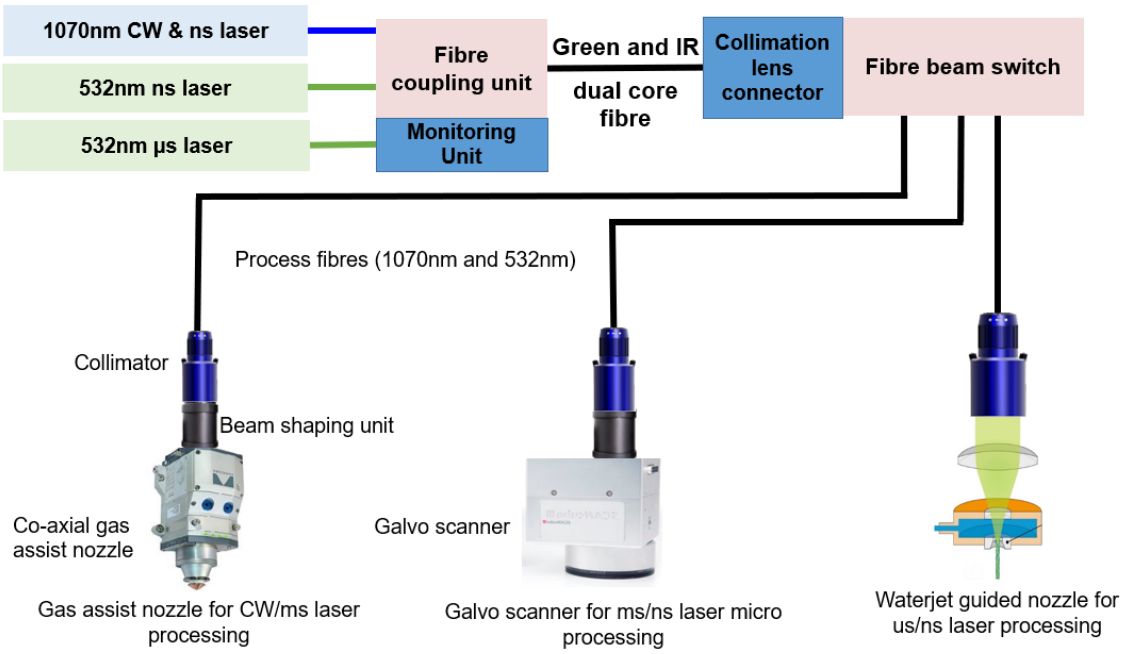
FLASH system specifications

FLASH will bring together four laser processing technologies into one flexible machine system. This will be achieved by combining various cutting-edge technologies from companies across Europe and combining their capabilities to create an innovative system based on the PRIMA IANUS robotic machining center chassis.



Figure,ÿ",Laser,integration,concept[3]

The FLASH system will use three distinct laser sources to achieve several outcomes to satisfy the industrial use cases. The various laser systems will offer a wide range of capabilities that include multi-wavelength, short pulse to continuous wave, and high-power processing. These systems will allow the project partners to deliver tailored solutions in welding, drilling, cutting, and surface treatment in a single setup as well as the possibility of simultaneous dual-beam processing and the selection of the right laser to address material-specific challenges.

Combining laser sources will require a fibre coupling unit to be developed by Synova, who are world leaders in WJGL processing, to address the challenges of delivering differing wavelengths, polarisation, and coherencies of light along a two-core fiber. There will also be developments on dual-beam delivery to extend the existing processing capabilities to address challenges in working on thicker sections of up to 20mm. There will also be the development of a fibre beam switch by Cailabs to enable

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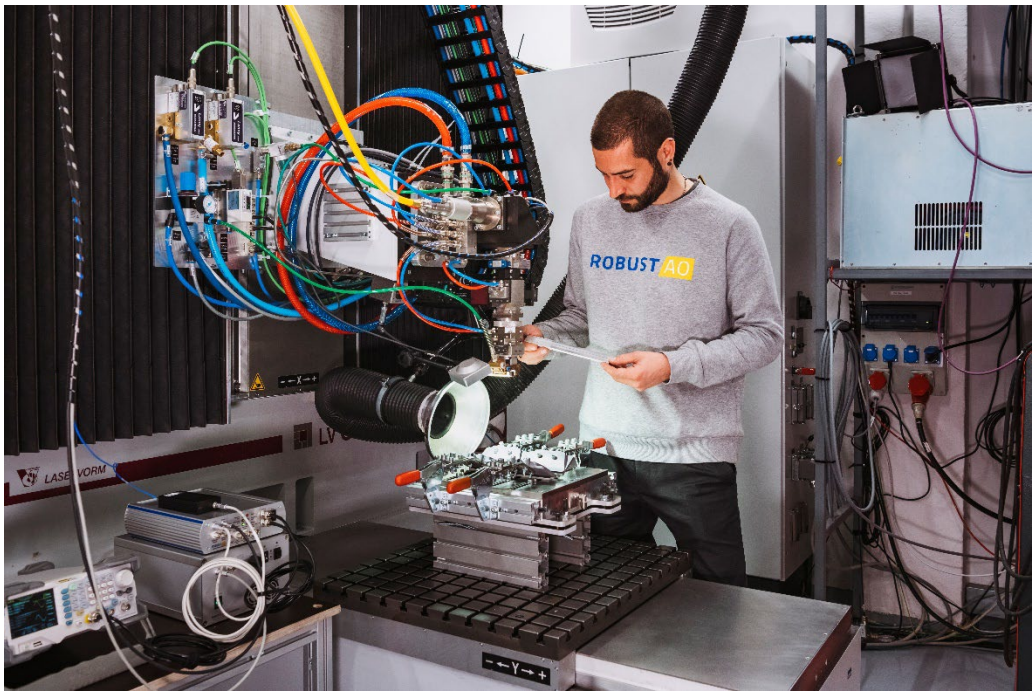
the full flexibility of the three differing beam combinations to be delivered to the workpiece.

Beam shaping enables the lasers to be focused in the most effective way on the workpiece, the unique challenge that FLASH is having to contend with is creating a beam shaping system that can deal with the different wavelengths of the system simultaneously. There will also be supplementary challenges of shaping the beam in dynamic response to process monitoring. To address this ROBUST AO GmbH will adapt their Zwobbel system, capable of shaping a beam in the Z axis, key to maintaining ideal beam parameters in deeper laser operations, this will integrate with Cailabs X and Y axis beam manipulators which will need to examine each FLASH process to determine the ideal beam dimensions.



Figure, ь, ", Zwobbel, beam, shaper, installed, on, a, machine[3]

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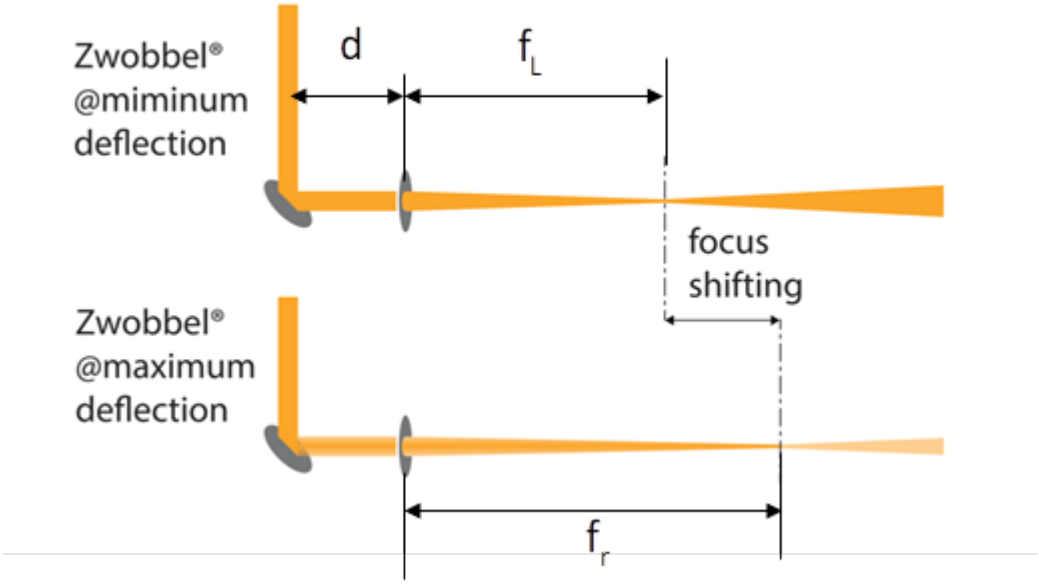

Figure, ъ, ", Demonstration, of, the, focal, range, of, the, Z, beam, shaper[3]

The outcome of this collaboration as part of the FLASH project will be a unique multi-wavelength beam shaper, this will also address another challenge on top of those addressed here. It is planned to have the beam shaper interact with process monitoring components of the system, which will be developed by Synova and AIMEN to provide another novel capability to the FLASH system.

Process monitoring will be a key dimension for the successful execution of the FLASH system. Monitoring of the process health will enable feedback into the system to maintain output quality. This is based in part on some of the technology currently implemented by Synova, in combination with acoustic technology from AIMEN will enable a uniquely sensitive combination to monitor the health of the process and ensure that it produces repeatable and consistent results for industrial end users.

The final area is that of process design and linkages to Life Cycle Assessment, the novelty of a lot of the FLASH project will produce data and capabilities that will need to be understood and developed. This will be conducted by ATS based on their current Atlass Edge system. The principle of this will be taking the data produced by the preceding three areas, and linking it through various simulation models to outputs which can be linked with a machine learning algorithm to desired outcomes. This advanced digital decision architecture, delivered by Cosmos Thrace and ATS, will identify the necessary process steps and best parameters to achieve the desired outcome, reduce the need for extensive optimisation processes, and providing the

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ability for “Right-First Time” manufacturing. This requires the precise specification of the system and all the data it will produce, simulation of the FLASH system, validation of those models experimentally, and subsequently an open LCA tool that can be integrated with common design tools.