

SAMMIE - Research L-PBF system for the development of in-situ monitoring methods

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By allowing economic on-demand manufacturing of highly customized and complex workpieces, metal based additive manufacturing (AM) has the prospect to revolutionize many industrial areas. Since AM is prone to the formation of defects during the building process, a fundamental requirement for AM is to find ways to assure the safety and reliability of the additively manufactured parts to become applicable in most fields. A possible solution for this problem lies in the deployment of various in-situ monitoring techniques. However, only a few of these techniques are commercially available and are not researched to an extent that allows to guarantee the adherence to strict quality and safety standards. Since commercial AM machines are not designed for research applications, they do not provide many options of access to the build chamber during the process and they do not offer full control over the exact timing and parameters of the process. Therefore, we built for our research at BAM a laser powder bed fusion system (PBF-LB/M), called SAMMIE, with a fully open system architecture with flexible accesses to the build chamber and full control of the complete process. In this contribution, we show first results using thermographic cameras and optical tomography. The flexibility of SAMMIE allows us to use the multiple cameras either fixed relatively to the build plate or coaxially to the process laser.