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Industrial Keynote

Recent innovations in electron beam technology using point melt

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Colibrium Additive – part of GE Aerospace is a world leader in metal additive design and manufacturing. Colibrium Additive's EB-PBF printers are ideally suited for producing dimensionally accurate parts that need to be created quickly and efficiently. Working in a vacuum using a high-power electron beam for high melting capacity and productivity, the EB-PBF process delivers stress-free parts with better material properties than casting. EB-PBF has developed rapidly over the last years as result of dedicated system development. Significant improvements have been made concerning system productivity, system reliability and part quality of built parts, turning EB-PBF into a mature production technology. Today, EB-PBF is an integral part of several production chains in various applications such as production of aero engine components by several OEM's and Tier 1 suppliers, but also for production of CE-certified, FDA-cleared orthopedic implants, with the common goal to use the EBM technology for series production.

Recent innovations in beam control have led to a revolutionary new melting strategy using point exposures instead of traditional hatched line melt. By controlling the spatial and temporal distribution of the melting points the melting and solidification behavior of the parts can be accurately tuned, resulting in a full decoupling from the specific geometry being built. Colibrium Additives proprietary inhibition control where the optimal conditions can be maintained in how, where and when the points shall be exposed in relation to each other, all regardless of geometry.

As a result, a new journey begins in what can be achieved with EBM concerning surface finish, microstructural control and building without any attached supports, e.g. on articular surfaces, this together with the improved resolution and the usage of controlled porosity structures for bone ingrowth and structural integrity with the component makes it ideal for example for fatigue critical medical devices such as tibia trays, hip stems or femoral components.

AUTHOR'S STATEMENT

Conflict of interest: The Author is employee of Colibrium Additive a GE Aerospace company, Mölnlycke, Sweden. Informed consent: Informed consent has been obtained from all individuals included in this study.

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