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Ensuring well defined quality of vacuum components –a combined user and manufacturer perspective

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While planning vacuum experiments in particle accelerators and other research facilities, many technical conditions have to be considered. Especially to achieve vacuum in the UHV/XHV range, components like vacuum chambers need to fulfill well defined, vacuum-specific requirements. For that reason, it is important to specify grantable and binding quality characteristics when vacuum components are manufactured by a vacuum industry company. “Leak rate”, “residual outgassing rates”, “cleanliness”, “suitable for UHV applications”- these are just technical buzzwords when not everybody means the same whilst using them. A general technical language is necessary for the accurate definition of Quality and according acceptance inspection rules.
The present talk will give suggestions from a manufacturers point of view for the unmistakable declaration of quantified and verifiable, vacuum-specific characteristics for vacuum chambers and components. Systematic investigations in several manufacturing steps and their impact, especially on outgassing characteristics, are presented. From the research results, engineering and manufacturing principles are derived for the production of UHV/XHV-components with residual outgassing rates down to the measuring limit of commonly used analyzing equipment. Elaborated measurement and test methods for verifying the correlation between required specifications and the real component characteristics will be reviewed.
Framed in an overview of the complete planning, construction and manufacturing chain of vacuum chambers and components in an industrial scale, the talk will contribute into an improved cooperative work between vacuum component manufacturers and particle accelerator users. Finally it is shown: tough requirements in UHV/XHV-components can be guaranteed and achieved on an economically reasonable way.

Author: Mr BAUER, René (VACOM Vakuum Komponenten & Messtechnik GmbH)

Co-authors: Dr BERGNER, Ute (VACOM Vakuum Komponenten & Messtechnik GmbH); Dr FLÄMMICH, Michael (VACOM Vakuum Komponenten & Messtechnik GmbH)

Presenter: Mr BAUER, René (VACOM Vakuum Komponenten & Messtechnik GmbH)

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