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State of the Art and Practical Aspects of the Development of Power Converters and Control for Electrical Drives

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Abstract: The tutorial will give the historic overview of the development of 3 phase power converters and present state of art of Si based power converters in industrial drives. The most common converter architectures (standard nonregenerative, regenerative with common dc link, matrix converter, current source, multi- level) will be introduces and compared. Comparative analysis will show the advantages and gaps of particular topologies. The figure of merits and metrics for power converters for industrial and aerospace applications will be discussed leading to the role and place of Wide Band Gap (SiC land GaN) device technology in the future development of power converters. Power structure converter analysis will be followed by the challenges in the control aspect of the drive/converter development. Control part will encompass practical hardware considerations including microprocessor selection, current feedback issues related to offset and bias, sampling rate, tuning process and achievable bandwidth of the drives.