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## S3L-Inverter from the Konstanz University Offers Increased Efficiency

In September 2013, Professor Manfred Gekeler presented his novel so-called Soft Switching Three Level (S3L) Inverter at the European Conference on Power Electronics and Applications (EPE 2013) in Lille, France. The inventor from the University of Constance demonstrated on the basis of concrete data the advantages of the S3L-Inverter compared with the current state of the art technology, namely the hard switching NPC 3-level inverter. The innovative electronic circuit developed at the Laboratory for Power Electronics at the HTWG Konstanz University of Applied Sciences makes inverter technology even more economic and environmentally friendly. The marketing and commercialization of the invention of the Soft Switching Three Level (S3L)-Inverters is carried out by the Technologie-Lizenz-Büro (TLB) GmbH in Karlsruhe, Germany. The agency for innovation and patent management acts on behalf of the Konstanz University of Applied Sciences and has already signed up an exclusive license in the field of photo voltaic. Licenses in other fields of use are now available. The inverter solves in a simple manner the problem of energy losses in conventional DC to AC converters. Using "soft switching" allows the inverter to function largely without any energy losses resulting in outstanding efficiency while at the same time exhibiting a high switching frequency. The inverter can be used in a multitude of fields and consequently has a huge market potential. The TLB targeted in its initial commercialization activities the photo voltaic market and was successful in identifying a suitable licensee. Engineer Emmerich Somlo, who manages the project as its innovation manager, negotiated and successfully concluded the license agreement. The broad range of fields of use represents a challenge in terms of the patent strategy as well as the commercialization strategy. "We have developed a strategy which includes the possibility of part-exclusive licensing in specific fields. In the area of photo voltaic, we have already entered into an exclusive use license. The licensee has therefore secured the exclusive rights to the commercialization of the invention as it applies to this sector", explains Emmerich Somlo. Marcus Lehen, Chief Executive of TLB: „This is of benefit to both parties. The manufacturer in the photo voltaic industry can gain a technological advantage without the risks associated with in-house research and development. The university benefits from the income, which is also shared with the inventor who has a right to 30 percent of the income generated by the license.“ The TLB is now seeking to enter into license agreements with manufacturers covering other sectors. Of interest is the inverter in particular for manufacturers of wind power equipment, uninterruptible power supplies, electricity supply systems and motor control. In particular for three phase current drives which are driven by frequency inverters is the invention of great interest, given the planned introduction of efficiency categories. The technology is equally applicable to traction inverters for locomotives, ultra-light high-rpm power units in the aerospace industry and electric cars. To ensure that potential licensees are provided with good

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protection of their markets, the TLB has applied for patent protection in the most important industrialized nations, with the German and US patents already granted. Professor Manfred Gekeler, who teaches and carries out research in the field of power electronics and drive technology at the Konstanz University of Applied Sciences, assesses the invention from the technical point of view as follows: "Our inverter is trend-setting because it improves the efficiency of electrical drives very significantly using only low-cost semiconductors". The innovative inverter consists of the well-known three level pulse width modulation inverter of type T combined with a novel snubber circuit. The circuit uses only a few simple components and prevents the switching losses of the power transistors of the pulse width modulation inverter. The switching topology combines two existing approaches, the multi-level inverter and the soft switching technology, in a uniquely simple way. For interested industry parties, prototypes are available for inspection at the Laboratory. Currently, further work has been carried out both on the hardware as well as the software aiming for even greater efficiency gains. Your contact for any queries regarding commercialization and licensing is Emmerich Somlo of TLB, [esomlo@tlb.de](mailto:esomlo@tlb.de) . Further technical details can be found in the relevant exposé on our website ([www.tlb.de](http://www.tlb.de), Technology Offers, Energy Technology).