Reconditioning of Aluminium Engine Blocks
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The products of Kolbenschnidt Pierburg Group comply with the high demands and quality standards of the automotive industry. Low emissions, reduced fuel consumption, reliability, quality and safety – there are the forces that drive innovation at Kolbenschnidt Pierburg.

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**Preface**

**Aluminium engine blocks – the trend**

Since they were first introduced, engines with aluminium engine blocks have continued to enjoy increasing popularity. The potential in the field of engine construction for passenger cars offered by the reduction in weight has by no means been exhausted. Especially in the case of diesel engines, because of their heavy, robust construction, there is still much potential for saving weight. Therefore the substitution of aluminium for grey cast iron in passenger car engine blocks will continue in the future with greater impetus. The developments in the field of new sliding surface designs are in a state of constant competition between that which is technically feasible, that which is technically necessary and that which is economical. With the worldwide distribution of vehicles equipped with aluminium engine blocks and the ever increasing vehicle mileage, the need for competent engine reconditioning continues to increase.

**On the subject**

The need for information with respect to engine technology and reconditioning for aluminium engine blocks is enormous. Daily enquiries from customers on this subject bear witness to this. The present brochure was produced as a compendium of information that deals extensively and in a concentrated form with the production, design, reconditioning and repair of aluminium engine blocks for engine reconditioners, workshops and other professionals.

In addition to the normal machining procedures for aluminium cylinder bores, solutions for special problems are also handled as they occur during the repair and reconditioning of the aluminium engine blocks. For example, alternative repair solutions are given for all those aluminium engine blocks of which the cylinder sliding surfaces are coated in a complicated process after casting or also after finishing in order to obtain the desired sliding surface properties.

Due to increasing requirements in the machining of sliding surfaces, it was also necessary to update the existing range of MSI tools for finishing aluminium silicon sliding surfaces to the current standard of series production. In co-operation with KS Aluminium Technologie AG, the market leader in western Europe in the production of aluminium engine blocks in the high-end market and numerous additional specialists and acknowledged professionals, the machining processes currently employed for cylinder finishing in series production have been recorded, adapted and developed further for professional engine reconditioners.
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NOTES

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Please understand that, due to the variety of already existing and future engine block constructions, we are not able to give information referring to specific manufacturers, nor give specific repair recommendations. Constructions vary from engine to engine, some substantially. It is left to the discretion and experience of the engine reconditioner to check and decide whether, and to what extent, a repair procedure described in this brochure can be used in a specific case. Therefore, the information given shall be used, and the repair procedures described shall be applied solely at the risk and responsibility of the engine reconditioner. Likewise, we shall not be liable for damages arising because the engine reconditioner does not have the necessary technical expertise, the required knowledge of, or experience in repairs.

The extent to which the technical procedures and repair instructions described here will be able to be applied to future generations of engines cannot be predicted and must be checked by the engine reconditioner in each specific case.

Trademarks used

Patents
This information is published without reference to any possible patents or third party rights. We draw express attention to the fact that some machining procedures described in this brochure, in particular sliding surface honing and certain silicon exposing procedures, affect existing patents of KS Aluminium Technologie AG. Therefore the written consent of all owners of patents and licenses must be obtained before using the described procedures in series production, and license fees must be paid.

Safety Instructions
All jobs described in this brochure must be performed only by properly trained specialist personnel with the appropriate equipment (protective clothing, goggles, gloves, ear protection, etc.). Each of the relative safety conditions and accident prevention regulations must be determined, and in each case complied with, by the engine reconditioner himself. Special caution and responsible handling are advised, particularly when dealing with hot components, when using liquid nitrogen and dry ice, and when machining to remove chips.
3.2.2 Installing cylinder liners in aluminium engine blocks

Compared to the aluminium material of the engine block, grey cast iron liners have a lower specific thermal expansion. The grey cast iron liners will expand only about half as far during operation as the surrounding aluminium engine block. For this reason the overlap (press fit) in the aluminium engine block must be greater than in a grey cast iron engine block. Because of the greater overlap and the reduced strength of the aluminium engine blocks, the grey cast iron liners must not be pressed in. The pressure required for pressing would ruin the engine block under certain circumstances.

Aluminium liners do have the same thermal expansion coefficient as an aluminium engine block, but because of their reduced strength would be severely deformed or destroyed during press fitting. Furthermore, aluminium cylinder liners would be seized immediately in the cylinder counterbore due to the surface pressure required. The pressure required for press fitting would increase dramatically and the liner and the engine block would be destroyed.

Note!

When repair liners made of aluminium or grey cast iron are installed in an aluminium engine block, they must basically be inserted into the engine block by the shrinking process.

Slip fit versions of liners such as those often used in grey cast iron engine blocks cannot be used in aluminium engine blocks at all because of stress problems. Generally, press fitting of grey cast iron and aluminium cylinder liners is not possible in aluminium engine blocks.
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