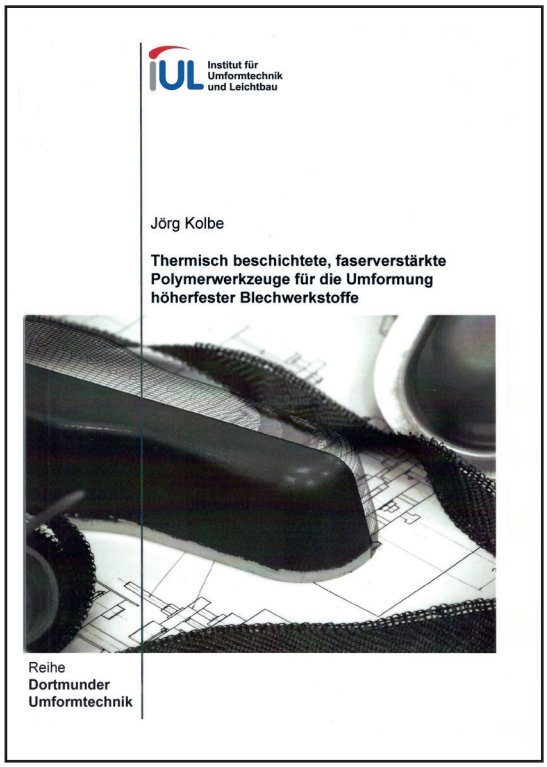
English version below

Institut für Umformtechnik und Leichtbau

Thermisch beschichtete, faserverstärkte Polymerwerkzeuge für die Umformung höherfester Blechwerkstoffe

Jörg Kolbe



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Zusammenfassung

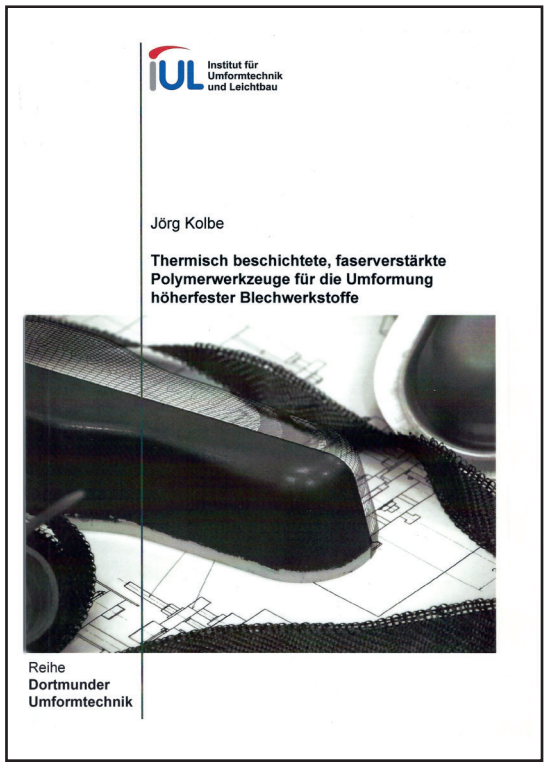
Topic of this thesis is the investigation of thermally sprayed hybrid deep drawing tools made of polymers for forming high strength steels, which are used in small to medium batch size productions. The focus is on the development of cost-effective deep drawing tools, ready in short-time for operation. The tools are realized in a differential construction. A body material made of polymer is wrapped with a thermally sprayed coating, which is a protection against wear. The stiffness and the strength of the tool can be increased by the use of fillers and fiber reinforcements. This results in a higher reliability of the tool against failure during forming of high strength materials. In addition, a reduction of stresses in the thermally sprayed tool surfaces is realized. An indirect coating process is developed in order to manufacture these coatings. This process leads to a suitable adhesion between the body material and the coating itself. The coatings are adequate for a direct use in forming processes without mechanical finishing. With these coatings the wear resistance of the tools is increased significantly compared to common polymer deep drawing tools. The aspired piece number of sheet metal parts can be manufactured.

The hybrid deep drawing tool is adequate to form mild as well as high strength steels. Here, a comparable geometrical accuracy of parts formed by the hybrid tool with the accuracy of parts formed by conventional tools is possible. The higher elasticity of the hybrid tools compared to conventional tools made of steel reduces local contact peaks. This provides a potential of shorter try-out times of the hybrid tools in the press shop.

Institut für Umformtechnik und Leichtbau

Thermally sprayed, fiber-reinforced polymer tools for forming high-strength sheet materials

Jörg Kolbe



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Abstract

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