In this paper newly developed manufacturing system of pallets from waste plastics is presented. The emphasis is focused upon the manufacturing equipment, design of mold and recycling system for manufacturing of pallets from waste plastics. Tensile and fatigue testing results of plate specimens cut from manufactured pallets from waste plastics such as polypropylene film, polypropylene pellets, polyethylene, fly ash, polyethylene composites and carcium carbonate-polyethylene composites are presented. The results of compression test, bending test and drop test of the manufactured pallets are also presented. It can be concluded that the newly developed manufacturing system enable to provide pallets from waste plastics with more than ninety percent of ultimate tensile strength and fifty percent of manufacturing cost of pallets from new plastics.

NTM-05: Twin-Roll Strip Casting and Structure-Control Rolling of AZ61 Magnesium Alloy
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Continuous strip casting method attracts attention as the integrated production process to obtain wrought Magnesium alloys. In this research, AZ61 sheet was cast from molten metal by twin-roll strip caster and it was rolled. The effects of casting and rolling parameters on surface aspect and microstructure of the sheet were investigated. Obtained results are as follows: (1) By adding Ca-0.5mass%, the surface of molten metal was covered by the thin oxide film, and the combustion could be prevented. (2) Grains were fined as roll gap, roll speed and molten temperature decreased. Mean grain size of the sheet cast in conditions [roll gap: 2mm, roll speed: 10m/min, molten temperature: 883K] was about 20μm. (3) Excellent wrought AZ61 sheet with uniform fine microstructure and isotropic texture in-plane and oriented texture in inclination of 65 degrees could be obtained without crack by structure-control rolling [473K/4passes → 573K/4passes → 473K/4passes (Four-directions rolling)].

NTM-06: Nano-machining by Cantilever with Diamond Tip Using Atomic Force Microscopy
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The diamond tip cantilever on an atomic force microscope enables nanomachining with a removal rate of several tens to hundreds nanometers and is developed by utilizing a combination of photolithography and hot-filament chemical vapor deposition. Nanomachining experiments on silicon using the cantilever are demonstrated under various machining parameters in order to evaluate the cantilever as a nanomachining tool. The silicon surface can be removed with a rate of several tens to hundreds of nanometers in ductile mode, and the cantilever shows a superior wear resistance. Demonstration of these nanomachining experiments indicates a high performance of the developed cantilever for nanomachining.

Modified Layer-
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Laser alloying is a quick and inexpensive method to improve tribological, corrosive and erosive behaviour of metallic materials. However a broad potential ability of this method is restricted owing to difficulties in optimisation of a great number of varying parameters. Usually laser alloying is conducted at room temperature. It is known from literature that preheating of samples before laser treatment can improve uniformity of the modified layer. However there is no data on influence of temperature during laser alloying on the structure and properties of modified layer. In the present work we investigated relationship between temperature of the type 316 stainless steel substrate during laser alloying and structure and microhardness of modified layer. Alloying material (Al-Si powder mixture) was placed on the surface of stainless steel substrate by pasting. The surface was scanned by a pulsed Nd:YAG laser beam to achieve surface alloying. The microstructure and microhardness of the alloyed layers were then studied. It has been found that four different types of structure formed in the alloyed zone depending on the temperature. These structures differ from each other in phase composition, microhardness and inclination to cracking. At the given conditions a hard, crack-free microstructures are formed at temperatures of about 350 and 750°C. However variation of any other parameters of laser alloying also leads to change of chemical elements ratio in the melt and to formation of other types of structure. On the basis of the results optimal parameters for production of a uniform and crack-free layer with a high hardness were developed.

CSW-13: Synthesis of Diamond-like Carbon Films by Nanopulse Plasma Chemical Vapor Deposition at Subatmospheric Pressure
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Diamond-like Carbon (DLC) films show high hardness, high electrical resistivity and self-lubricating properties. DLC films are usually deposited under low pressure, typically below 10 Pa (1x10^-4 atm). Preparation of DLC films at atmospheric pressure will promote a variety of new applications of the films, because in-process and in-use coating of hard carbon films will be realized. However, it has been generally believed that it is difficult to deposit hard carbon films at atmospheric pressure because carbon and hydrocarbon ions are needed to fabricate hard films. To realize this process, a high ion density and non-arcing plasma at subatmospheric pressure are needed. A static induction (SI) thyristor with an Inductive Energy Storage (IES) circuit was used. A deposition experiment of a DLC film was performed under the conventional low-pressure condition first, because no results have been reported to date on the fabrication of DLC films using a nanopulse generator. Consequently, the DLC film can be deposited using the nanopulse plasma derived from the SI thyristor and the characteristics of the high electron temperature and the exponential relationship between pulse frequency and growth rate were observed. Deposition of the DLC film was also achieved at subatmospheric pressure at 26.7 kPa using this nanopulse plasma CVD method. The hardness of the DLC film as measured with a nanoindentor is 20.8 GPa and the elastic modulus is 170 GPa. These results show that DLC films can be fabricated about 100-fold pressure compared with conventional deposition methods.

CSW-14: High-rate Synthesis of Diamond-like Carbon Films by Bipolar Nanopulse Chemical Vapor Deposition Method
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Nanopulse Chemical vapor deposition (CVD) method opens the way