

Julius Vogel

Education and professional experience:

- |                   |   |
|-------------------|---|
| 03/2007           | Graduate form University of Paderborn (Diplom-Ingenieur), Department of Mechanical Engineering                      |
| 04/2007 – 08/2007 | Teaching Assistant at University of Paderborn, Department of Mechanical Engineering, Mechanical Process Engineering |
| 08/2007 – present | Graduate Assistant Research, Iowa State University  |

Research summary:

In general my research focuses on bio-plastics. In more detail, I study secondary operations such as ultrasonic welding and cutting as well as impulse welding of PLA (a commercially available bio-plastics). In addition fundamental aspects of polymer diffusion during welding operations are also studied including the effect of time, temperature and pressure on the optimum weld strength. From this mechanical strength testing the activation energy for diffusion can be calculated. Additionally, I characterize the life cycle costs of bio-plastics in order to allow industry to determine their benefits as well as drawback in terms of their environmental and economical performance. Based on those findings I programmed a software that allows the user to compare bio-plastics to petroleum plastics. The software takes the input from the user such as material, tool and equipment costs for a manufacturing operation such as injection molding or extrusion and calculates the output as the 'cost per part', the energy and emissions associated to the production, the manufacturing and disposal of parts, and it shows the user where bio-plastics have their advantages and drawbacks for large scale industrial applications.