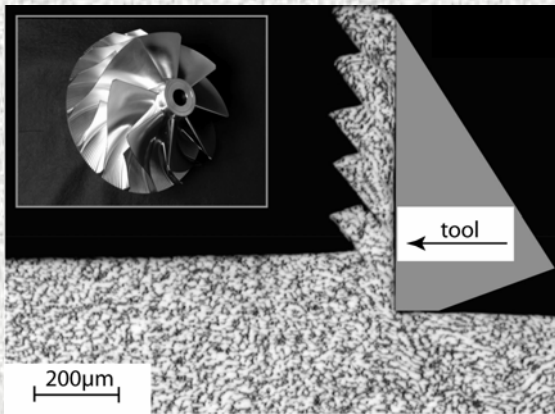
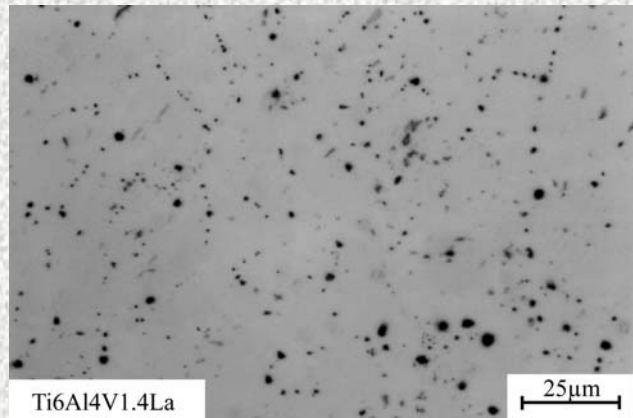


High-Speed Machining of Metallic Materials

Research Topic: Free-machining Titanium



Quick-stop experiment



Microstructure analyses of free-machining Titanium



Chip forms of different Titanium alloys

Within the research topic *Development of free-machining Titanium alloys* Titanium alloys with improved machinability are developed at the Institute for Materials Science, e.g. by adding small amounts of Lanthanum.

During machining of standard Titanium alloys long chips develop whereas in the new free-machining alloys short breaking chips are observed. Therefore, machining operations can be automated if the free-machining alloys are used.

Currently, the complete process chain has to be developed for the new alloys starting with melting and casting followed by thermo-mechanical treatments and the investigation of the physical, chemical and mechanical properties.

Actual research activities focus on:

- Investigation of the deformation characteristics in laboratory conditions and in larger scales (together with *ThyssenKrupp VDM* in Essen)
- Development of heat treatment procedures to achieve different microstructures
- Measurement of physical and mechanical properties in dependence of the thermo-mechanical processing parameters
- Investigation of possible phase transformations by means of standard X-ray diffraction and synchrotron radiation analyses (together with the *HASYLAB* in Hamburg)
- Investigation of the corrosion characteristics (together with *DECHEMA e.V.* in Frankfurt)
- Machining investigations using industrial conditions (together with *Fassondreherei Hermann Blum* in Gutach)

Qualifications required: Basic knowledge in material science

Interest in experimental work

Starting point: any time (duration: three or six months)