CAM-Service does present the new CAGILA® 3D software. Beside all common data formats like STEP, IGES, VDAFS, CAGILA 3D also supports interfaces for popular native formats like SolidWorks®, Solid Edge®, NX® (Siemens), CATIA®, ProEngineer®, Autodesk Inventor®, etc. The NC programming of the 3D laser paths is based on automatic curve recognition based on the faces and sidewalls of the 3D solid model, while allowing the user to define variable cutting angles and supporting 4 to 5 axis simultaneous processing (Pic 1). An innovative analysis module does investigate the tool path regarding tool angle, deviation, step length and process qualification (Pic 2). Especially for micro machining, CAGILA 3D does provide destruction loops for the rest material at small struts and a so-called ‘Sky writing’ function, which enables e.g. the scanner to turn off and on the laser at acute angles for higher speed. CAGILA 3D does use a sophisticated lead module for different 3D lead in and out types, which provides an optional overlap or micro joint (Pic 3). CAGILA 3D does support a speed and power ramping for welding, to increase and decrease the process parameters by user defined increments. A library of retraction areas provides positioning movements between the contours on a safety surface plane, to avoid collisions with complex 3D parts.

Beside NC controls with kinematic transformation (e.g. A3200, Beckhoff-ISG, PMAC, Sinumerik 840D), CAGILA® 3D also provides intelligent NC post processors for NC controls, that do not support kinematic transformation, in order to guarantee a constant surface speed of the laser focus on the workpiece. A real NC simulation showing the machine kinematic behavior with a collision detection, ensures error-free processing by the laser machine (Pic 4). Like the popular CAGILA® 2D software, CAGILA® 3D as well provides an easy to use and intuitive user interface.

CAGILA® 3D does provide as well a real 3D hatching of curved faces for ablation or RP where 3-5 axis can controlled to process curved faces on a 3D part. Beside loops for 3D ‘sky writing’ the hatching module does also provide a random angle for the hatching orientation of multiple planes (Pic 5). For 2,5D layer based ablation or deposition of 3D solids, CAGILA® 3D provides a so-called Slicing module. This module generates 2D spline based curves per plane for subsequent NC processing of 2,5D ablation or deposition by CAGILA® 2D (Pic 6).
The new **CAGILA® 2D Version 4** provides a lot of great features:

The **AutoCAD DWG version 2015** interface is now available for CAD file import. The CAGILA® 2D graphics engine is now based on **OpenGL and up to 10 times faster** than in version 3. A **new script language extends the flexibility of the post processors and strategies** for best customization. The technology database is improved for better performance and versatility.

CAGILA® 2D features sophisticated algorithms that generate **some 100,000 lines for contour hatching within a few seconds** and optimize the tool path for **high speed laser processing by scanners** (*Pic 6*). In case of constant Z profiles, CAGILA® 2D is able to process 2,5D NC files by extruding simple 2D DXF/DWG drawings. Optimized post processors do use specific NC controller features like the PSO command for the Aerotech A3200 to provide precise laser positioning on the contour. CAGILA® 2D does allow ‘cut on the fly’ for leads with an optional overlap, **ramping of laser power and speed**, as well as cutting a path several time with an **increasing offset** to process materials like glass or ceramic (*Pic 7*).

Other innovative functions of the CAGILA® 2D software include **high speed perforation / drilling of faces** as well as an **intelligent path planning for parallel processing of large contours by several lasers** (e.g. cutting of filters from a textile coil by 4 laser scanners). In regards to the infinitive field of view of the scanner CAGILA® 2D provides automatic **segmentation of large contours with support of stitching** for path overlap (*Pic 8*). The **high performance nesting module** with its superb savings of material waste for sheet and coil, is now available to support **multicore CPU processing** which provides **better nesting results two times faster** (e.g. using up to 8 cores on a quad core CPU like Core i7).

---

**Company** : CAM-Service GmbH  
**Address** : Garbsener Landstr. 10, 30419 Hannover, Germany  
**Phone** : +49 (0)511 979397-90  
**Fax** : +49 (0)511 979397-91  
**E-mail** : info@cam-service.com  
**Internet** : http://www.cam-service.com  
**Contact** : Dr.-Ing. Alexander Koehler  
**E-mail** : koehler@cam-service.com
Pic 1: NC programming of tube with 2, 4 and 5 axis contours by CAGILA® 3D

Pic 2: Process-Analysis of tool orientation and deviation in regards to part surface and cutting face, step length, etc. by CAGILA® 3D
Pic 3: Path optimization by leads, destruction loops and sky writing for acute angles by CAGILA® 3D

Pic 4: NC simulation of impeller with 5 axis laser machine by CAGILA® 3D
Pic 5: 3D hatching of curved faces using outer loops (sky writing) and random orientation for multiple planes by CAGILA® 3D

Pic 6: Slicing of 3D CAD data by CAGILA® 3D for generation of planes for 2.5D processing by CAGILA® 2D using fast hatching algorithm
Pic 7: Glass processing using leads with cut on the fly and automatic ramping of power and speed for different curvatures by CAGILA® 2D

Pic 8: Automatic segmentation of contour path for scanner processing with support of stitching with path overlap by CAGILA® 2D