CAGILA® 2D and 3D software

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*).
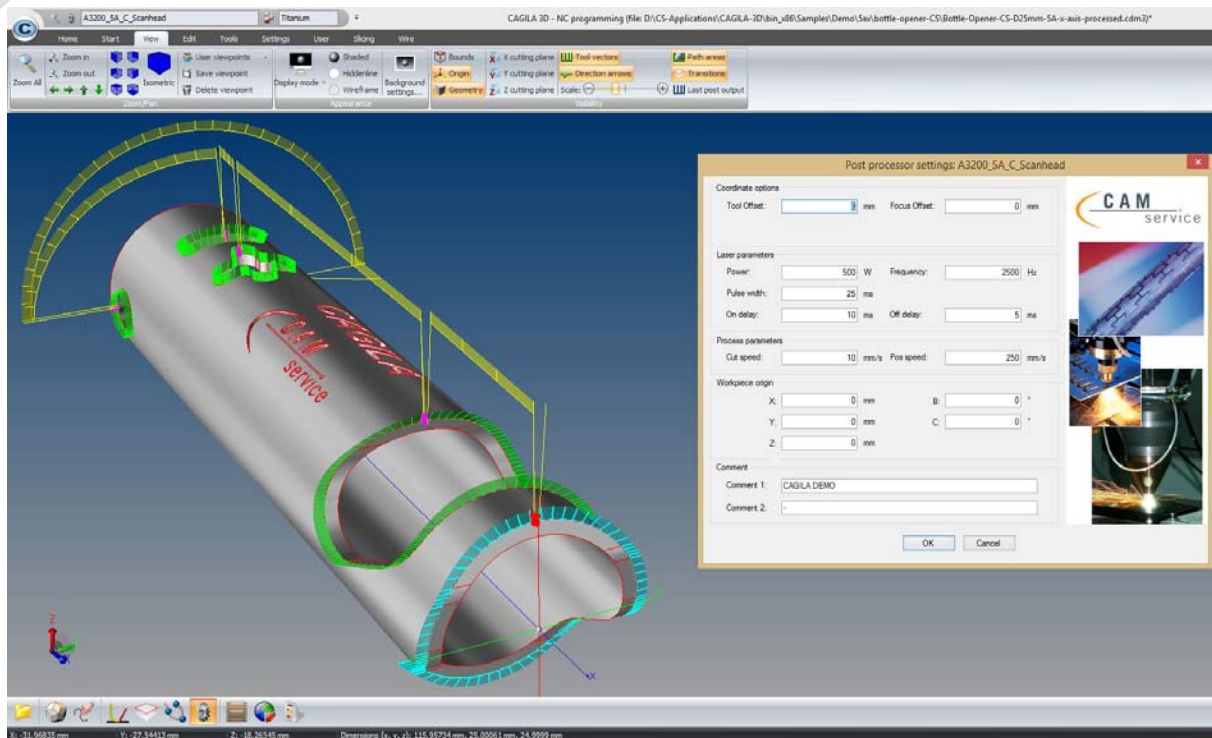
The new *CAGILA® 2D Version 4* **provides a lot of great features:**

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.
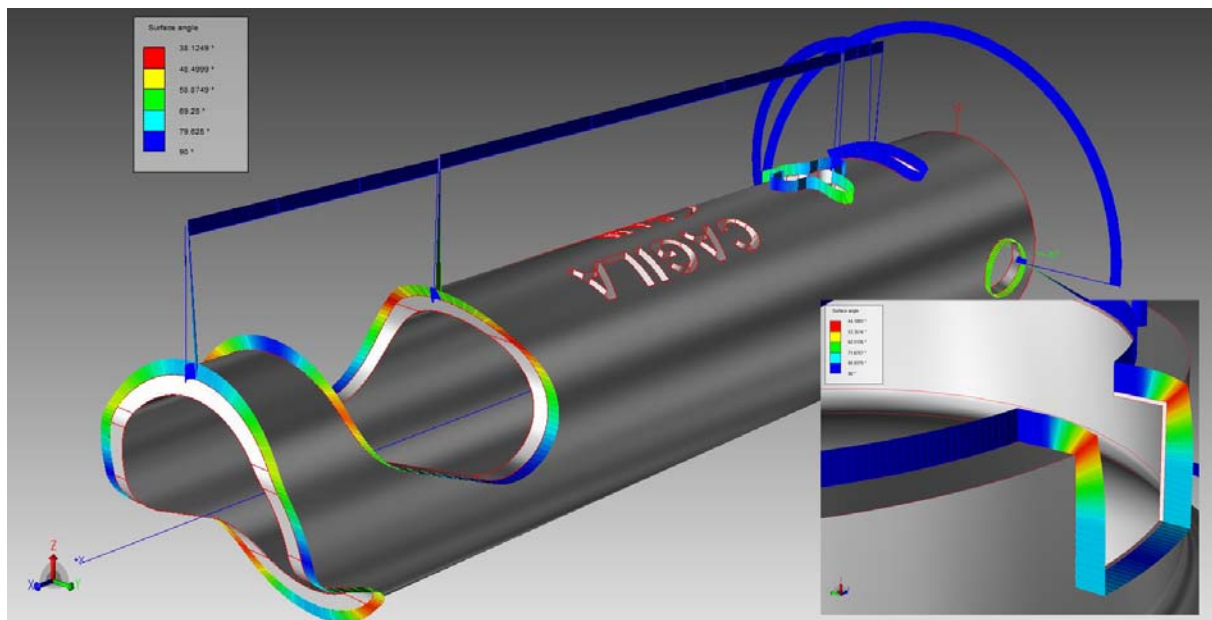
CAGILA® 2D features sophisticated algorithms that generate **some 100.000 lines** for **contour hatching within a few seconds** and optimize the tool path for **high speed laser processing by scanners** (*Pic 6*). In case of constant Z profiles, CAGILA® 2D is able to process 2,5D NC files by extruding 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).*
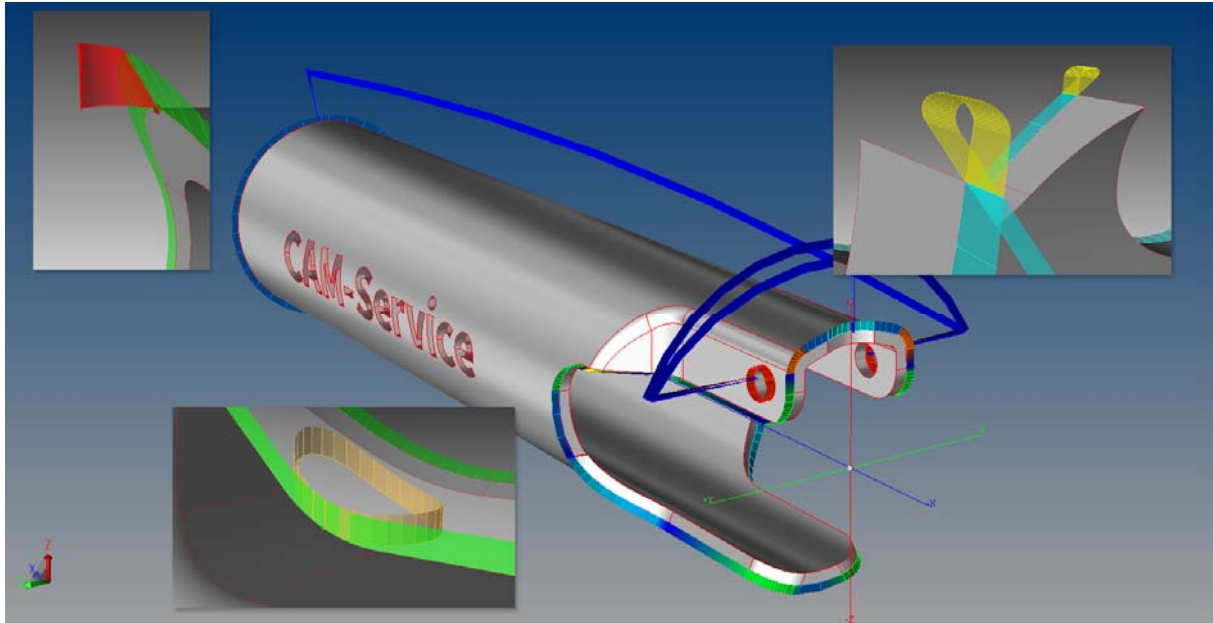
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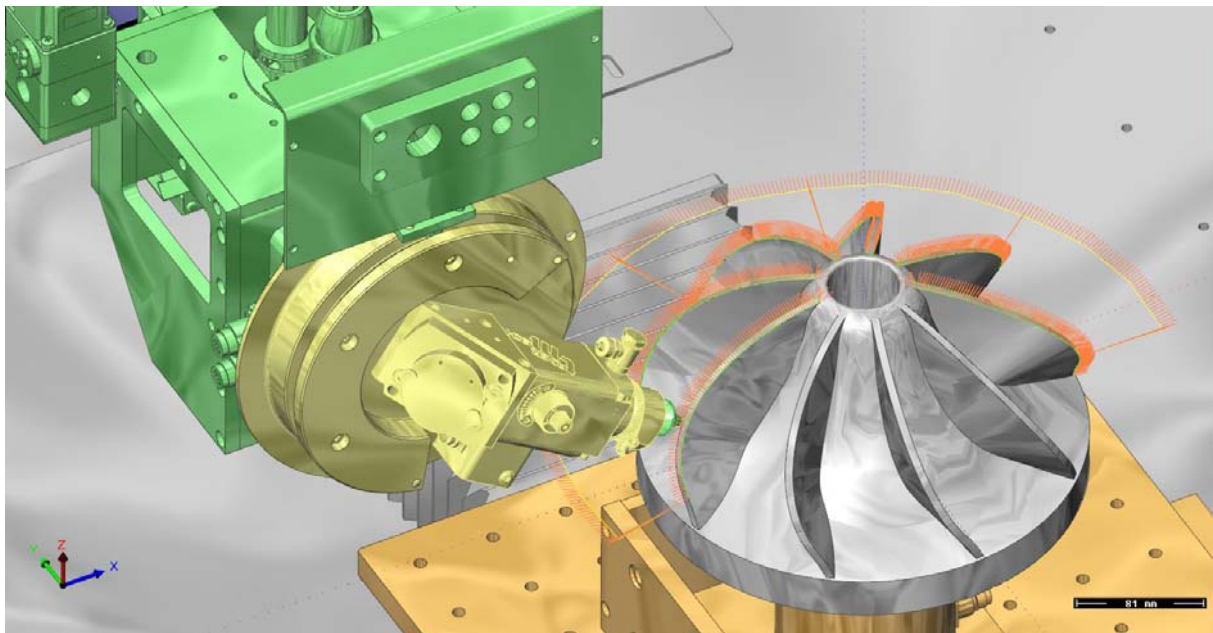*Contact   : Dr.-Ing. Alexander Koehler   E-mail: koehler@cam-service.com*

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
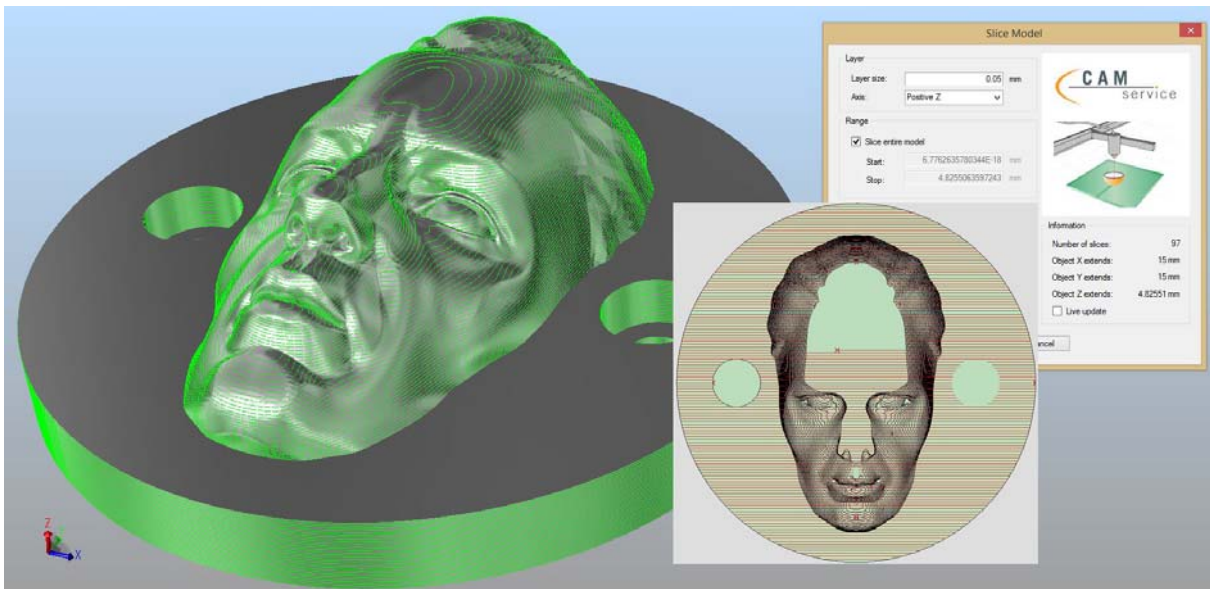
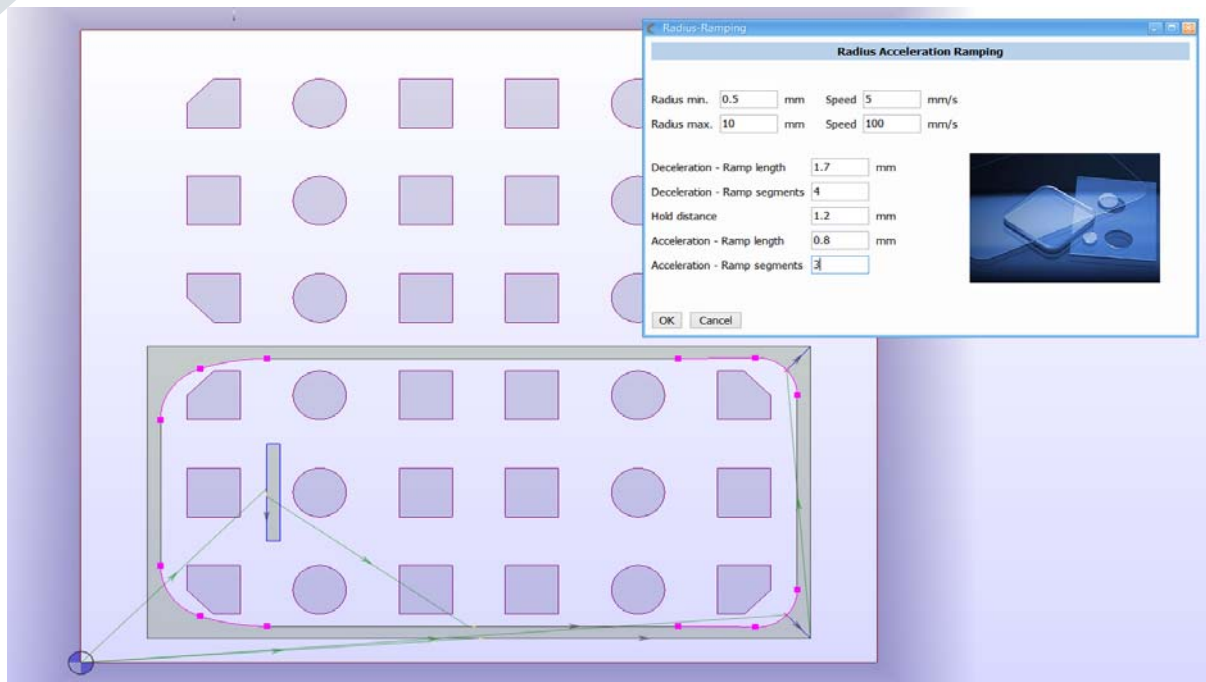**Pic 3:** Path optimization by leads, destruction loops and sky writing for acute angles by CAGILA® 3D

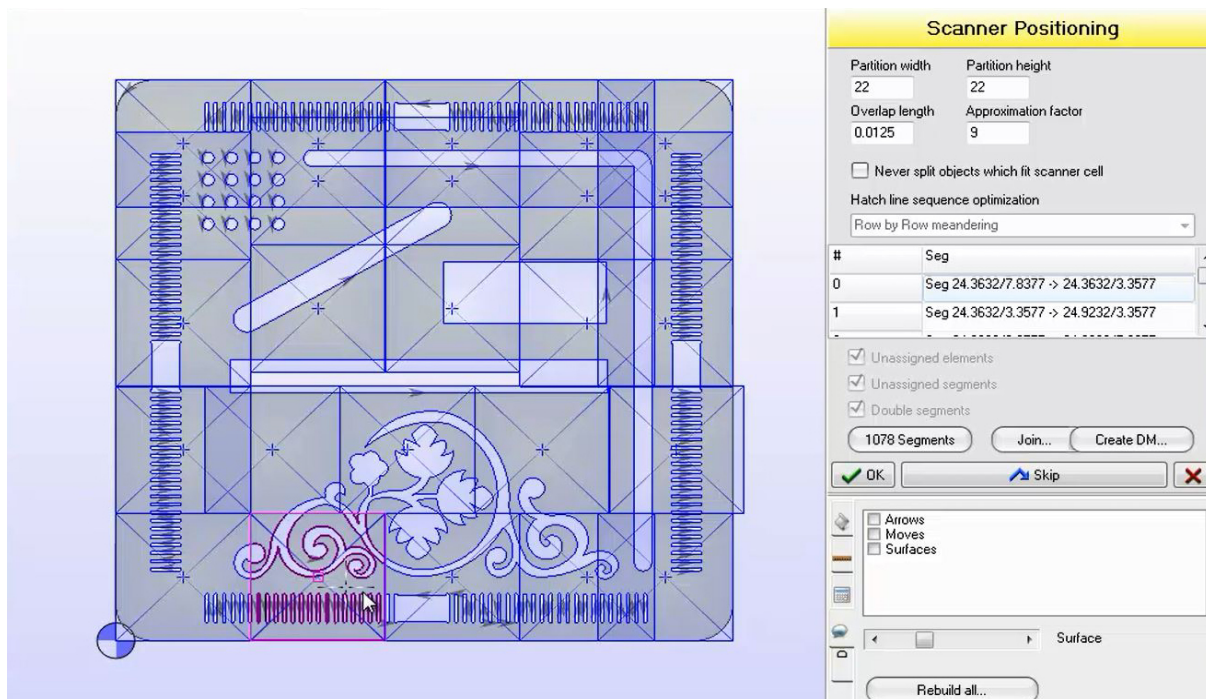**Pic 4:** NC simulation of impeller with 5 axis laser machine by CAGILA® 3D

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