CADDA

CAD/3D2D

CAD/CAM

CAD/CAQ

For mechanical engineering, tool− and mouldmaking

in construction and CNC manufacturing

This brochure complements the information leaflets for DAVEG's CADDA system. It intensively deals with the CAD/3D2D applications of CADDA and gives an overview of the CAD/CAM and CAD/CAQ areas. For the latter two, further brochures are also available.

1. C−ENGINEERING in continuous flow

Today, the use of CAD systems has become a matter of course in all areas of constructive planning. The provision of CAD data and the increased profitability going with this have considerably contributed to this development. CAD data exchange can be seen as the basis for the operability of the labour−divided industry characterised by suppliers. This is a central aspect in the C−engineering offer of DAVEG where all available communication methods can be used. The second essential aspect in the DAVEG offer deals with C−engineering interaction within an industrial enterprise. Here, the networking methods between the computers are used in order to support the division of labour in the enterprise to a maximum. Division of labour and cooperation in the C−engineering area are strongly influenced by the ability of integrating the implemented CAX systems. CADDA systems have a highly developed integration ability with the product development CAD systems as well as with CNC machine technology.

2. Demands on CAD systems

The construction and the following CNC manufacturing have very different demands on CAD applications nowadays. 3D volume modelling has gained spreading in the last years. It has in particular gained ground in classical mechanical engineering because it could yield a profit through drawing derivation and support of the other machine documentation. In the area of car development pure volume modelling is limited by the forms of the car body which require the use of hybrid modellers or surface modellers. The CNC technologies have different demands on the geometry providing CAD systems. Freeform surface milling demands 3D surfaces. For wire cutting programmes, contours from 3D systems are often useless. The economical use of CNC machines manufacturing series demands cost−effective processing strategies. The range such often contradicting information concerning the connection of CAD and CAM could be continued.

3. CADDA solution profile

DAVEG has always, in the course of the further development of CADDA, incorporated and converted CAD and CAM user requirements. The productivity features of the CADDA solution have regularly been led to practice maturity with progress conscious customers in a pilot project phase. It were DAVEG customers after all, who gave the idea to develop the CAD/CAQ solution component.

The range of CADDA components available today covers the C−engineering demands of the metal industry to a great degree. The CADDA components make use of 3D techniques, where 3D models need to be processed. They allow a very effective 2D construction, where the 2D working method is the more economical procedure. One of CADDA´s strengths is the inclusion of 3D−models into the 2D−construction. With the volume modeller SolidWorks, which allows an especially economical 3D construction, 3D models can be generated, which CADDA processes further without problems.

CADDA−3D adopts 3D models from SolidWorks or the product modeller of the client, e.g. an enterprise of the automobile industry. With CADDA−CAD the tools, forms or machines are developed to manufacture the part represented as 3D−model. With CADDA−CAM the corresponding component parts are CNC−programmed. With CADDA−CAQ mesurement programs are generated, which prove the quality of the component parts.

4. CADDA work stations for the metal industry

Today, the software CADDA is several thousand times successfully in use in machine engineering, tool− and mouldmaking enterprises as well as suppliers. These are mainly manufacturing businesses with CNC machine equipment, who either take over client CAD data or also have to generate CAD drawings or CAD−models themselves. This CAD data is used directly in the CADDA system to program the CNC machines. However, CADDA users are also other enterprises, for example construction service providers, whose construction results are to deliver the geometrical basis for programming the CNC machines of the client. For many enterprises it is of special interest that CADDA users are able to import 3D product data models from the clients' CAD systems.

These models are used in order to develop special machines, tools or injection moulding forms with CADDA for manufacturing these products. CADDA offers its users special functions that achieve particularly economical results. An example is the CAD methodology called IWEKO, which considerably reduces construction expenses compared to other CAD systems when applying it in toolmaking for the development of follow−on composite tools

5. Facts of the CADDA development

CADDA is continuously developed further. Up to today, a highly integrated, versatile package has emerged, which fulfils the demand of medium−sized businesses for higher CAD/CAM productivity in full. CADDA´s communication capability is a centrally important element, here. In larger enterprises, which often use 3D hybrid CAD systems for the product development, CADDA is often the more economical in−house solution cooperating perfectly with the product development systems through highly developed integration technology.

In this way, DAVEG GmbH belongs to the few German system houses which have been successful on the market with a CAD/CAM software developed in the own house.

For CADDA workstation−class PC systems with PENTIUM III processors are required, which can be obtained from DAVEG or can be provided by the customer.

CADDA software is at present available in the fifth generation. The programming language C++ is the kernel of the CADDA software technology. WINDOWS operation is the natural means of the CADDA usage. In addition to an operation with WINDOWS menus, CADDA−CAD−2D can also be used by commands over a grafic−tablet. In this case, the tablet works as a big menu for the acceleration of the CAD inputs and, if required, as a digitising tablet, too. The CADDA 3D system is based on a 3D kernel in NURBS mathematics.

Today the CADDA 3D and 2D−field contains a software kernal based on the NURBS−mathematics. Since this software fundemental consists threedimensional. Now the third dimension of CADDA 2D is partly available in the future. This technologies secures the marketleading integration of the CAD/CAM and CAQ branches with the full support of the freeform−geometry.

Beside the CADDA 3D as a 3D function of communication for any 3D geometry the 3D volume modeller SolidWorks is at disposal as a particulary economical system for constructions.

The CCL language (CADDA Command Language) is a strong instrument in order to generate user−specific CADDA functions with parametric use. CADDA users can learn how to program with CCL in a seminar. With parametric CADDA functions, additional CAD benefit can be realised.

6. 3D modeller

DAVEG offers the volume modeller SolidWorks to those enterprises for which an in−house product development system is required. SolidWorks communicates with CADDA−3D and CADDA 2D. So all CADDA CAD/CAM− and CAD/CAQ−functions are available for the further processing of CAD−data generated by SolidWorks.

6.1 SolidWorks

The SolidWorks 3D modeller executes a very efficient volume modelling as it is increasingly used in product development and mechanical engineering. Powerful functions for the development of sheet metal parts make this product as a supplement of the CADDA solution especially interesting. The development of injection moulding parts is very effectively supported by the effective modelling of demoulding slopes, roundings and walls. SolidWorks allows the automatic derivation of a 2D representation of the 3D model and behaves bidirectionally associative.

In addition to the operation purposes described above, DAVEG customers also employ this software package for the construction of special machines and appliances, because here an extra benefit arises with the easy generation of 3D representations for the machine documentation.

6.2 Linking other surface or hybrid modellers

DAVEG has already in the past ensured that the CADDA system is technically capable to cooperate with important 3D modellers of the market, for example in the automobile industry. CADDA users have always demanded this, if, for instance, car manufacturers required the use of a specific 3D−CAD system within the framework of comprehensive projects. In such cases such a system was used that communicated with CADDA work stations via the CADDA−3D support.

With the new NURBS−based CADDA−3D functionality developed in 1999, linking up with other modellers has become even more efficient.

Today, the 3D communication capabilities of CADDA−3D lead large suppliers, already equipped with 3D systems, to install further CADDA systems. This increases the efficiency in development and manufacturing preparation.

7. CADDA−CAD/3D2D

CAD models, which are pretend from the employer are imported and processed by CADDA 3D.CADDA−3D displays an imported model, while a series of representation options are selectable. The model can be moved in the plane, turned and shown more closely or further in the 3D representation. Not required elements can be deleted. For 2D−processing contours can be selected and cuts calculated. CADDA−3D and CADDA−2D use a common data model in NURBS technology. This is throughout available from CADDA−3D up to CADDA−CAM. The CADDA−CAM processing contains functions that replace NURBS elements by an elementary geometry, which is still required for the great majority of the used CNC controls.

CADDA 3D has a new additional component 3D sheetbending, which will be considerably important for all toolmanufacturers. This software imports 3D models from punchbending parts. The data models are processed interactive, each bending is unwinded individually till a complete 3D displayed unwind is reached. The result of the unwind will be processed with the CADDA−CAD/CAM functions, for example for the tool development.

The CADDA−2D system is a comprehensive package for mechanical construction. It enables the user to make a clean outline and structuring of his construction. In addition, the geometry units pattern, pattern families and planes are available. The general handling of imported data throughout the systems from CADDA−3D to CADDA−CAM has already been explained above. For the geometry preparation of imported data in particular, effective preparation routines are contained in the CADDA basic functionality. Standardised parts required by the user are available in a basic set oriented towards mechanical engineering, together with the standard package. A series of extra modules are on offer as options, in order to meet the demands of tool and mould makers, for example.

Particularly powerful mechanisms are available in CADDA for the import and re−use of CAD data. In such a way, parts or units can be generated with parametric functions or be adopted from present constructions. They can also be extracted from externally generated CAD constructions or from CAD catalogues (e.g. FESTO, FIBRO, HASCO and others) and be inserted.

We refer to the following list of essential functional details for the constructor:

- Geometry input by means of auxiliary geometry and "draw out lines" or classical input over Cartesian or polar coordinates
- Automatic rounding off and chamfers
- Automatic hatching of contours
- Dimensioning automatics
- Automatic coordinate dimensioning
- Associativity of hatch and dimensioning
- Calculation of surfaces, circumferences, moments of resistance and inertia, centres of gravity, forces
- Workplace−related data security for the current construction work with interactive backup functions
- Archiving and/or import of drawings onto floppy disk, hard disk, server hard disk, CD−ROM (normally import) or magnetic tape (DAT) depending on available peripherals including central data security in the net.

A great number of additional components are available, whose use gives a particular shaping to the CADDA package. This is particularly important for the specific requirements of the tool− and mould−making as well as the mechanical engineering.

8. CAD/CAM and CAD/CAQ

The CAD/CAM functions of CADDA support the following technologies: 2½D milling/drilling, 3D freeform−milling, turning, erosion−cutting, sink−erosion, grinding.

Starting from imported or prepared CAD data, the CADDA CAD/CAQ function produce complete, ready−to−use programs for CNC measuring machines.

The geometry models for the 3D freeform−milling−system are provided by CADDA 3D, SolidWorks or external 3D systems. The user interface of the 3D milling software is completely threedimensional. Existing DNC systems can be used for the transfer of the CNC programs to the machine shop. For companies who do not yet want to use DNC systems, DAVEG offers cost−efficient solution for data transfer based on personal computers.

If desired, DNC systems can be delivered together with CADDA solutions.

9. The use of the CADDA systems

CADDA workstations are usually configured as specialized CAD/3D2D, CAD/CAM or CAD/CAQ systems.

For smaller companies the CAD/CAM systems can be equipped with all additional CAD functions so that a monolithic CAD− and CAM system results.

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DAVEG CAD/CAM/CAQ−Software

1. CADDA CAD 2−D/3−D

CAD 2D plus DXF/IGES−import/export plus STANDARD PARTS plus one 2D option

3D−VDAFS free−form import, 3D visualisation, surface selection and cut calculation, output of surfaces and cuts

CAD 3D sheetmetal bending on imported models as an option to the CAD 3D

2D−options:	Bore plan (required for automatic drilling)
	Sheet metal bending 2D
	Gear profile construction
	Cam disk module (for blanking and forming automata)
	Standard parts file − toolmaking
	Standard parts file − mouldmaking
	Part supplier catalogues such as HASCO, STRACK etc.

CADDA CAD workstations can import 3D product files, e. g. stampings or injection mouldings for which tools or appliances have to be constructed in 2D.

2. SolidWorks 3D volume modeller

SolidWorks modeller
SolidWorks FeatureWorks
SolidWorks FotoWorks
SolidWorks training manual
SolidWorks subscription 1 year (software maintenance)
SolidWorks subscription 3 year (software maintenance)

SolidWorks workstations are networked with CADDA stations in order to use the CAM− and CAQ functionality of CADDA.

3. CADDA CAM 2½D

CADDA CAD 2D plus DXF/IGES−import plus 1 CNC−technology including 1 standard postprocessor

CNC technology options:	Drilling/milling
	Turning
	Wire cutting
	Sink erosion
	Grinding
Further options to Drilling/milling:	Automatic boring
	for machining centres
	Multiple side machining
	2½ D drilling/milling
	on 3D free−formed model

Postprocessors are available for all common CNC−controls

CADDA−CAD−options can also be ordered with CAM−stations

4. CADDA CAM 3D free−form milling

3D−VDAFS−import and 3D free−form milling including 1 standard postprocessor additional function for CADDA−3D or SolidWorks respectively

Postprocessors are available for all common CNC controls

5. CADDA CAQ 2D/3D

CADDA 2D plus DXF/IGES−import plus CAQ−technology including one standard postprocessor

Option 3D free−form import, visualisation, cut calculation

Option result presentations of measuring and contour scan

Option Lead Frame measuring

For Mahr, Mitutoyo and Werth measuring machines ready for use postprocessors are available at present.

Annotations:

Hardware procurement, hardware test, hardware start−up, system software and applications software installation, delivery to the customer with installation, start−up and introduction as well as training sessions are further deliveries and services of DAVEG.

The software maintenance for the modules specified under 1 to 5 including telephone and online support are provided from DAVEG for a monthly maintenance fee.

All previously mentioned CADDA−modules run under LINUX on PENTIUM hardware.

A WINDOWS NT−version is in preparation, it is going to be offered alternatively to the LINUX−version in the future.

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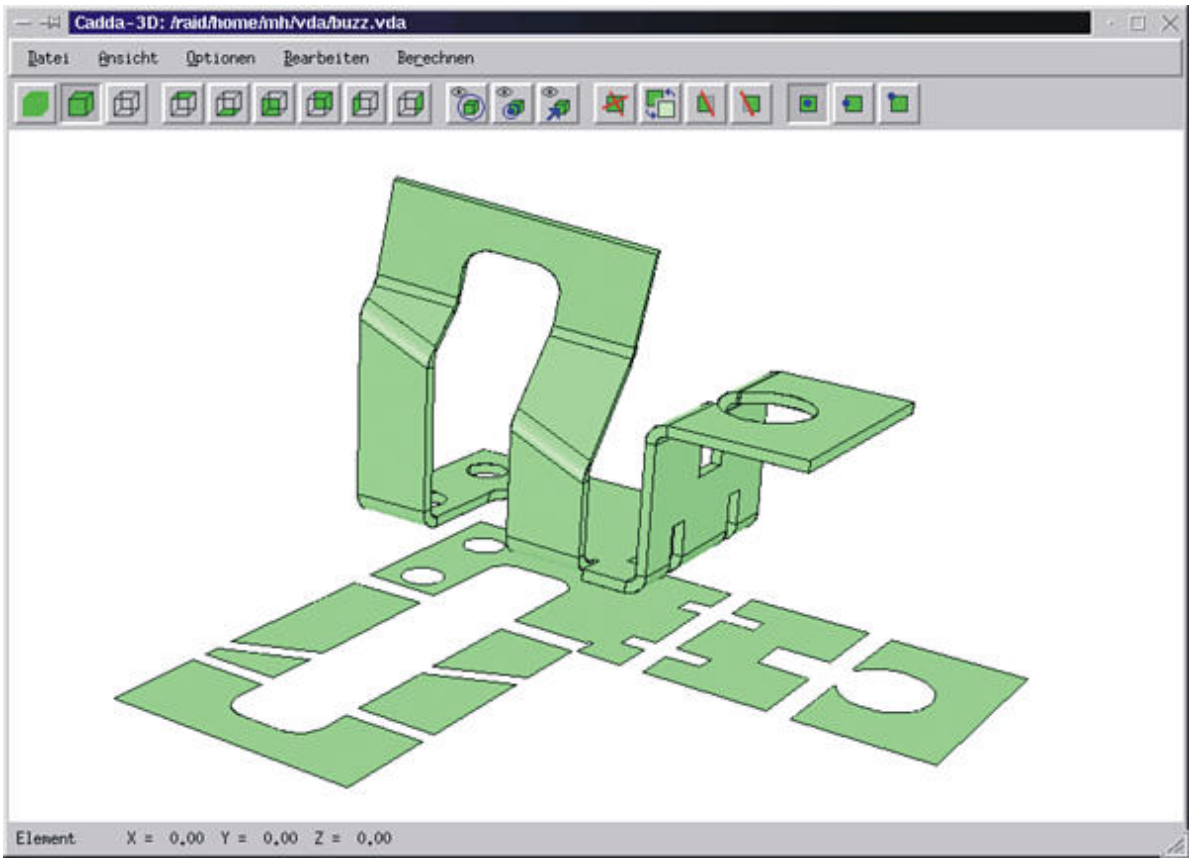
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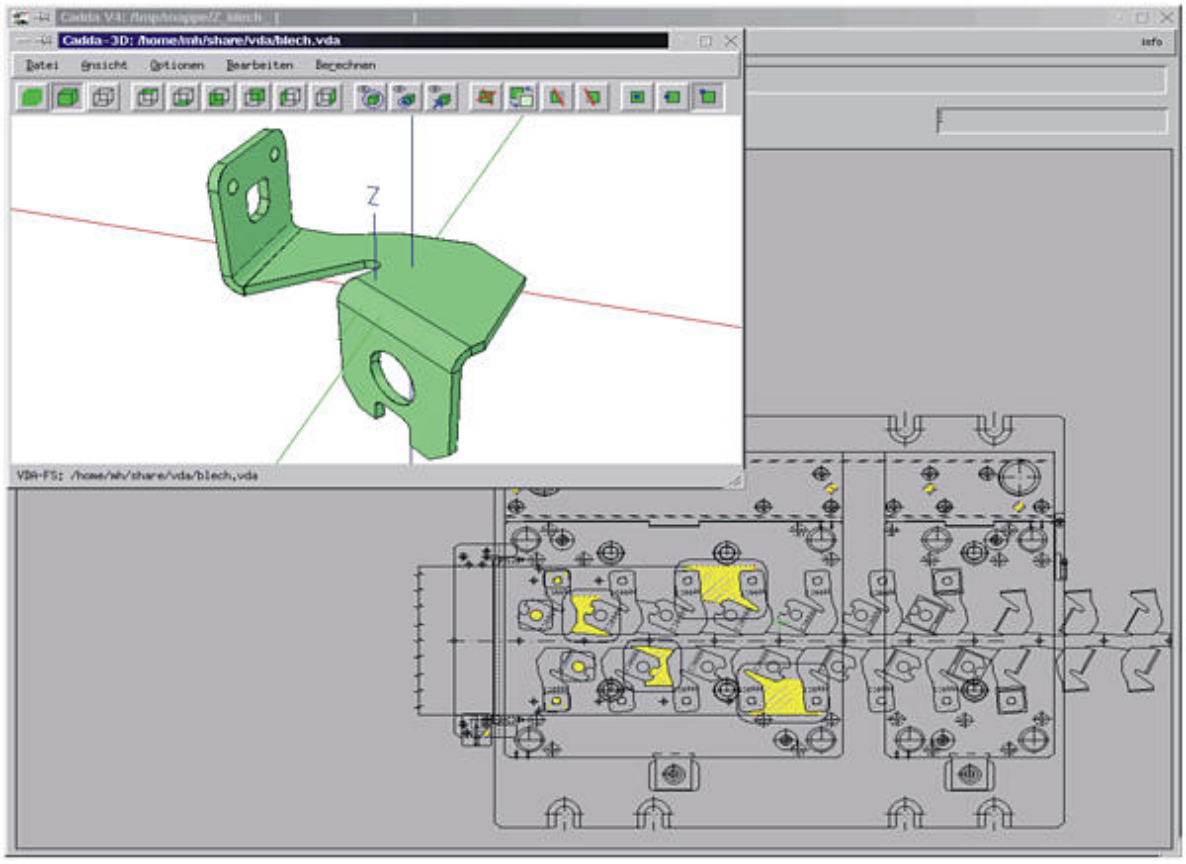
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CADDA

CAD/CAM

CAD−BASED PROGRAMMING

FOR CNC−MACHINES

1. Computer support in construction and manufacturing

The use of CAD−computers is fundamental for fulfilling current demands on product development. Simultaneously, precise CAD−construction is the decisive prerequisite for economical manufacturing with CNC−machines. Therefore, CAD−supported construction continuously finds currency.

So, for CAD−construction not only time saving can be considered as an advantage compared to manual construction. The decisive point of view is the geometry modelling. For the CAD−user this means, that all geometrical elements and representations are represented to scale in the computer and stored with such an accuracy, which, as a rule, exceeds the attainable precision of manufacturing by far.

Therefore, it seems obvious to generate CNC−production programs based on CAD−constructions. This method is today a central aspect in DAVEG's offer. Concrete advantages in comparison to other CAD/CAM−systems and their required interfaces are brought about.

CADDA−CAM−workstations for the 2 ½ D area make control elements for CAD construction as well as supplementary elements for all CAD/CAM disciplines on one user interface available. Depending on the requirements of the user, pure CAM or CAD/CAM−workstations can be configured. CADDA−CAM−systems process CAD−generated geometry, that either CADDA−CAD−workstations or other CAD−systems have generated. Of course, the CADDA−CAM−systems can also be used to produce geometry. The full CADDA−CAD−functionality can also be made available.

CADDA−CAM can be used together with CADDA−CAD and CADDA−CAQ. In this configuration, a comprehensive system of great efficiency is available to the user integrated without interfaces.

2. The procedure for CNC−programming with CADDA−CAM

CADDA−CAM−systems can directly process the geometry generated by CADDA−CAD. Geometry produced by other CAD−systems is imported for CADDA−CAM−processing with geometry import functions.

2.1 Generation of geometry

CADDA 2½D−CAM is directly mountable onto geometry generated by CADDA−2D. 3D geometry comes from CADDA 3D, SolidWorks or other 3D systems. It can e.g. directly be processed further in 3D free−form milling. CADDA−3D imports 3D models and makes these available to 2 ½D−CAM directly as NURBS bends. CADDA 3D is an additional modul, which if is required can be included in the solution volume.

With this concept, DAVEG supports a maximum continuity of 2D and 3D geometry for CAM−use in CNC−manufacturing.

2.2 Geometry import

Geometries of other CAD−systems are read with the geometry import function. This import function works with the standard CAD−interfaces like DXF, IGES and VDA−FS. A STEP−interface will also be available in future, following the development of the market. Both 2D and 3D data can be imported. 2d data can be imported by

DXF (conform Autocad Version 12) and IGES also 3D data by VDA−FS.

The CADDA 3D module accepts any freeformed model in particular such as in use in the automobile industry. It makes the geometry and/or geometry parts available to the CADDA modules that process further like the description in 2.1.

2.3 Processing a CNC−program

In a business, in which CAD is already being used intensively, computer−stored CAD−constructions are available as a starting point for CAM−programming. Data, that have not yet been constructed with CAD, can be generated with the corresponding CADDA functions.

The first processing step is to read in or construct the geometry model. The term geometry model stands for all kinds of contours and surfaces to be processed. So, these range from simple contours of borings or milling pockets to 3D bodies with complex free−formed surfaces.

The contours or surface structures, which are to be processed with a CNC−machine, are then selected. For selection a box is spanned. The box is interactively generated and visible on the screen.

The next step is used for processing the geometry. The CNC−paths are calculated and displayed on the screen. The required tool data are described in the tool file. During the interactive processing, the respective tools are selected and their properties considered as parameters of the calculation.

The results of the calculation are graphically displayed on the screen. It is possible to retrieve a 3D display in a 2 ½D technology. The user can let the screen representation run repeatedly as a simulation of the computer.

The calculated program is stored and made available to the postprocessor of the respective CNC−machine for complementing technological and machine−specific details.

2.4 The postprocessor run

DAVEG has developed a great number of postprocessors in the course of the CADDA development. The adequate postprocessor is normally available as complete software for commercially available CNC−machines, today.

For new CNC operations or rarer CNC makes, postprocessor software can be developed by DAVEG in each case within the framework of commercially available delivery times.

A calculated CNC−program is translated with the postprocessor run into NC−code of the respective control.

3. The communication with the CNC−control

The generation of punched tapes as data media for the machine ready NC−program, once common, is outdated for present CNC−machines, nowadays.

With DNC−systems a great number of tool machines can be continuously supplied with CNC−programs. They communicate through network and data transfer techniques with both the CAM−workstations, which generate CNC−programs, and with the controlled machines, that require CNC−programs for execution.

For smaller businesses DAVEG can offer PC−based systems, which enable an especially reasonable communication between the CAM−systems and the CNC−machines.

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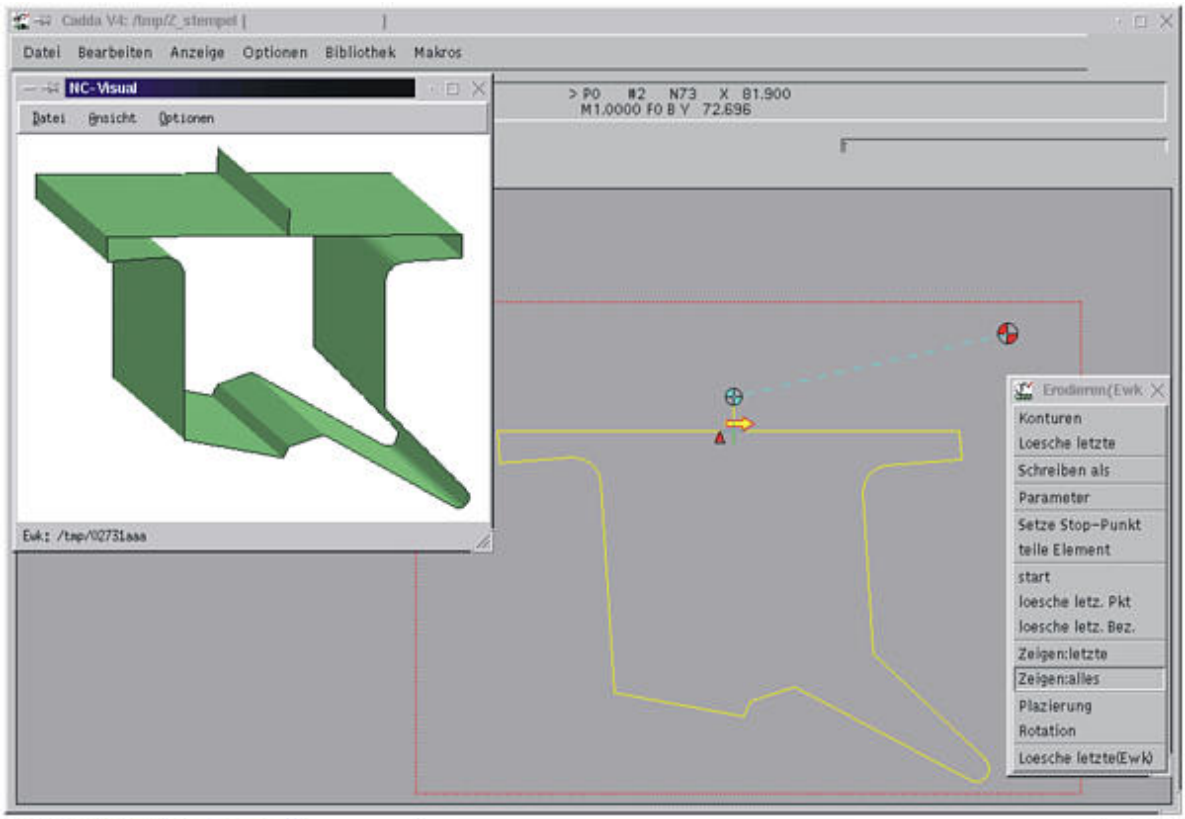
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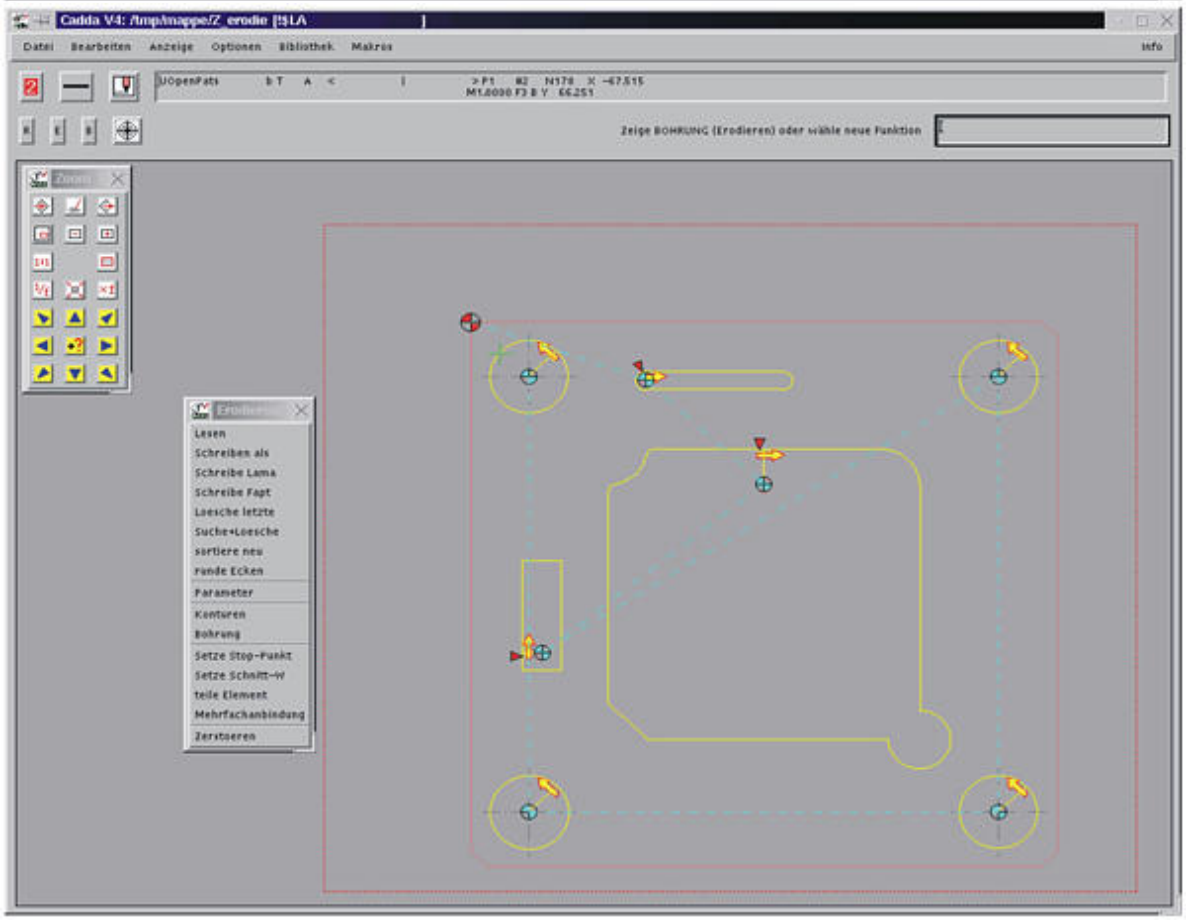
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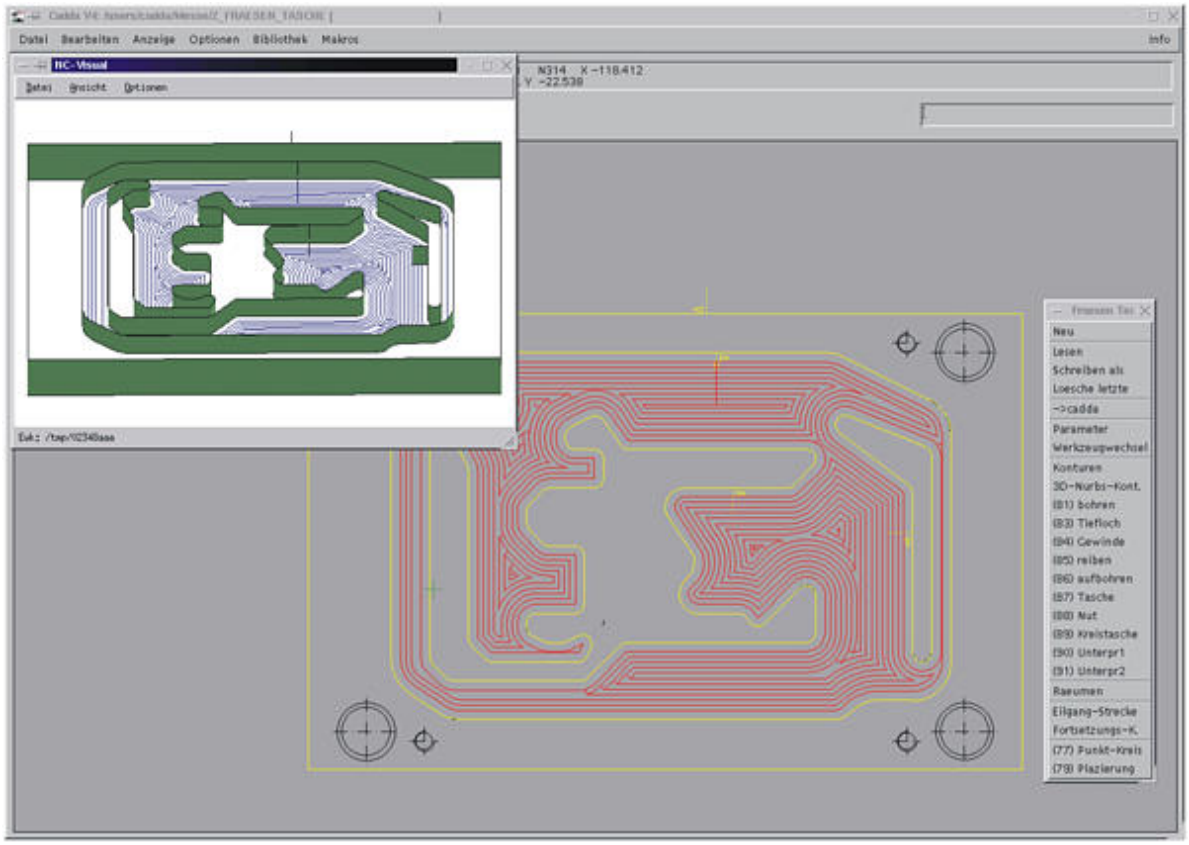
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Eilgang-Strecke
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(77) Punkt-Kreis
(78) Plazierung

CADDA

3D Free form milling

For tool− and mouldmaking

The 3D free form milling software reads computer−generated free form surface models and provides functions for the generation of complete CNC programs for three−axis milling machines.

The 3D models can be provided by any 3D modelers or SolidWorks. CADDA 3D is a very well−suited tool to prepare data obtained from 3D modelers for the 3D milling application.

The following text provides an overview of the essential details of the procedure.

VISUALIZATION AND EXAMINATION

The 3D description of a component is displayed on the screen. Both wireframe and shaded surface viewing modes are available. The examination suitability covers among other things the question of gaps in the surface, consistent orientation of the surface normals, location of the coordination−system (within the accessible range of the milling machine) and the minimum cutter diameter. Functions such as correcting normals, rotating, moving and deleting can be used in this mode.

3D MILLING

After the selection of the 3D surface for processing, the calculation of the milling programs follows.

The actions of the programs can be simulated on the screen. The following characteristics of the milling processing are supported at the moment:

cutter type:	spherical cutter
	milling cylinder
	end mill cutter with corner radius
processing procedure:	isoparametric
	plan parallel (in lines)
	axis parallel, axis parallel with angle
	roughing cycle for milling cylinder and spherical cutter
	collision checking of all NC paths
	automatic residual material processing
	and path optimization

THE MATHEMATICAL BASIS

NURBS (non−uniform rational B−splines) are a mathematical description for surfaces and bends, which has found increased application in recent years. Their main advantage is the ability to describe free form surfaces while also permitting the exact representation of regular surfaces such as cylinders, spheres and torii. With this data model, 3D data obtained from other programs can be processed without any loss of precision.

ANALYTICAL NC−ORBIT PREDICTION

The NC pathes are calculated by analytical procedures from the internal data model. The advantage of this is a higher precision and high rate. The process side can be selected or generated automatically by changing the direction of the normal.

ISOPARAMETRICAL MILLING PATHS

The isoparametrical NC−pathes, which are often described as contour following, follows the bend of the surface and the cours of the boundary bend from the surface. This processing form has as advantage a high surface quality. The direction of processing (U or V) can be selected and changed by the user.

AXIS PARALLEL MILLING PATHS

Using axis parallel processing, the surfaces are not machined sequentially, but in continuous parallel paths. These paths can run parallel to, or at an arbitrary angle to the X− or Y−axis. This procedure simulates the process of copy milling. The advantage is a greatly reduced amount of data, resulting in lower processing time.

COLLISION CHECKING

After calculation of the paths, an automatic collision check is performed. This uses a numeric algorithm based on plane−adaptive G buffers. In contrast to the other procedures it is possible to perform permanent collision checking and correction even with large amounts of data. Even parts of holding fixtures or other machinery can be included in the collision checking.

RESIDUAL MATERIAL PROCESSING

The residual material processing is a further method to minimise the processing time.

Here the work piece is machined with a big milling cutter first. In a second step only the sphere sectors in which the big milling cutter left residual material are processed with a smaller milling cutter. This usually leads to an appreciable reduction in processing time.

ROUGHING CYCLE

Special roughing cycles for cylinder and sphere cutters allow an efficient broaching of the workpiece in levels with defined down feed.

The 3D free form milling software is used by the DAVEG clients in addition to the CADDA 3D system. It complements the CADDA 2 ½D milling, if the CADDA user has to process free form workpieces as well. For special applications, DAVEG can provide a surface modelling system instead of the volume modeller. This can be advantageous for extreme free form surfaces such as deep−drawing dies.

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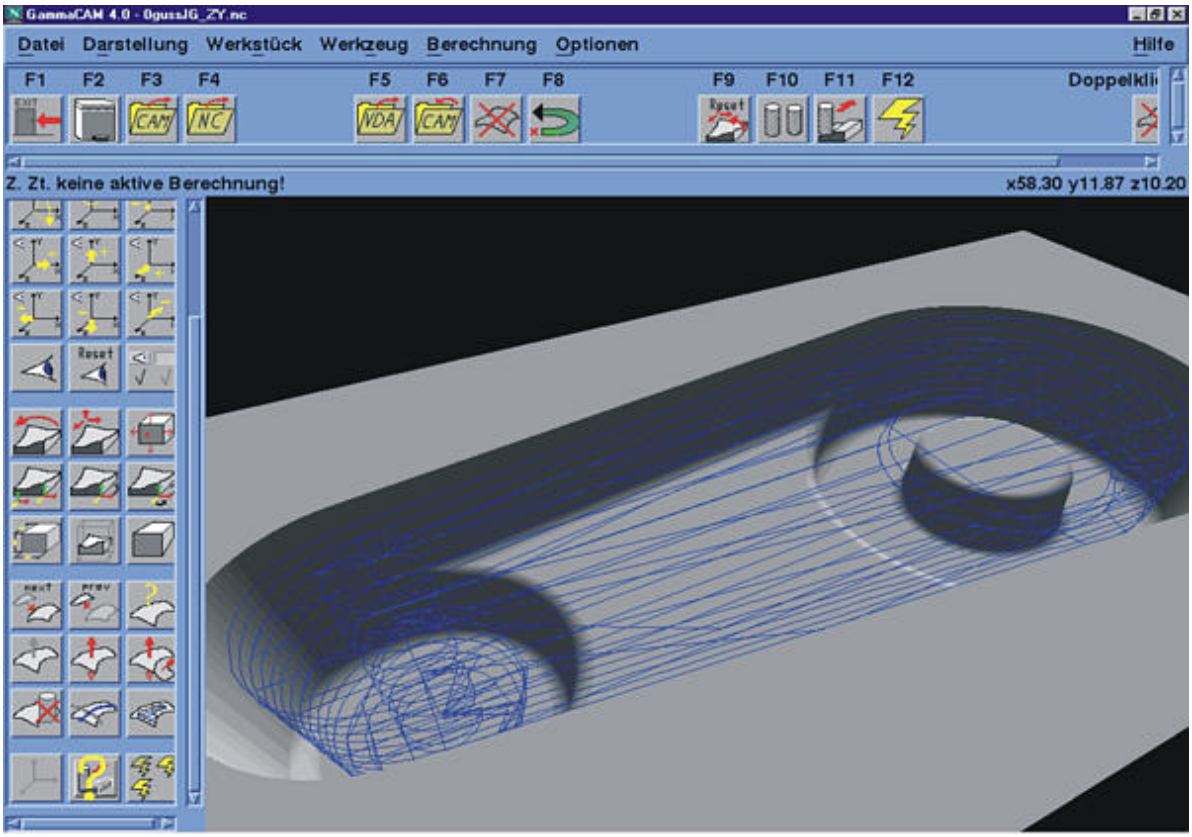
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CADDA

CAD/CAQ

MACHINE REMOTE, CAD−BASED PROGRAMMING

OF MEASURING MACHINES

1. Computer aid in manufacturing

The use of CAD/CAM−computers is fundamental for fulfilling contemporary quality requirements in manufacturing.

The advantages of CAD−construction are not only in time savings compared to manual construction. The decisive point of view is the geometry modelling, i.e. for the CAD−user all geometrical elements and representations are represented to scale in the computer and stored with a precision, which, as a rule, exceeds the attainable precision of manufacturing by far.

CAD−supported construction continuously finds currency.

Therefore, it seems obvious to generate CNC−production programs based on CAD−constructions. This is a central point of view in the offer of DAVEG, today, which brings about concrete advantages above all concerning the interfaces required in other entire systems.

In addition, DAVEG has for some time developed the CAD/CAQ−support. With the aid of this software, based on the CAD−construction of a part, a measuring program is generated, which runs on an appropriate CNC−measuring machine. The advantage of this method is at first general, in that the measuring programs can be generated drastically faster, as this was possible with the conventional programming of the measuring machines. The effort is for specific measuring machines and tasks only a tenth of the conventional way.

CADDA−CAQ can be used together with CADDA−CAM and CADDA−CAD.

In this configuration, a comprehensive system is available to the user, integrated without interfaces.

On the other hand, the CADDA−CAQ−software is usable via the customary interfaces, like DXF or IGES, for all technically up−to−date CAD/CAM−systems. The connection to the measuring machine is established by the postprocessor. Its output is transmitted to the computer of the measuring machine.

2. The procedure for the generation of measuring programs with CADDA−CAQ

2.1 Geometry import or geometry export

The geometries to be measured are read in with the geometry import function.

This import function makes it possible to give the measuring program geometries of foreign CAD/CAM−systems and/or CADDA−CAD/CAM−data as a basis.

Of course, it is also possible to construct the geometry to be measured with CADDA.

This data are 2D contours and immediately used for the definition of measuring programs. If 2D models instead of 3D models are decree, a cut of the piece part can be produced with the CADDA 3D module and used for the measurementprogram definition.

2.2 Processing of the measuring program

Processing occurs by using the CADDA−geometry functions and the measuring processing functions of the CADDA−CAD/CAQ modules.

For the CAD/CAQ processing is a menu available analogous to the CAD/CAM processing.

Always the measuring process begins with the determination of the reference contours and the system of coordinates.

The task of these functions is the generation of logic links between the elements to be measured. This is basically the specific dimensioning of the parts geometries to be measured. These links can also be optionally equipped with tolerance entries.

The numbering of the measures indicates the temporal sequence of the measurement procedures on the machine.

The corresponding CAD/CAQ−commands are available for all measuring operations.

2.3 Postprocessors for measuring machines

For all major measuring machines, a CADDA−CAQ−postprocessor is available.

Neverless the machines which use optical and/or laser technical measuring methods are be in the foreground. Mechanical measuring systems were also supported, but their priority is no so high. The cause of this fact can be seen to that a faster measuring method requires particulary clear faster programming methods.

In the postprocessor, the interactive query of the boundary conditions occurs for the individual measuring operations. Here, the tolerances can be checked once again and, where appropriate, be corrected.

After determining the boundary conditions, all measurement points for visual control are displayed on the screen.

With that, measurement processing is completed. The postprocessor now automatically generates the program code for the measuring machine.

2.4 The digitising function

As a rule, measuring machines are equipped with the function "Digitise". Accordingly, the CADDA−CAQ−processor can import digitised data from the measuring machine and process them further in the geometry processing unit. The data can become a part of a comprehensive CAD−construction and/or can be further processed in CAM−programs.

2.5 Further extra functions

In combination with measuring machines of certain fabricates extra functions are available. Here is a module for screen− and print−presentation of measuring results.

In the field of Lead Frame manufacturing a extra function which spreads up the processing route is available for the measuring tasks.

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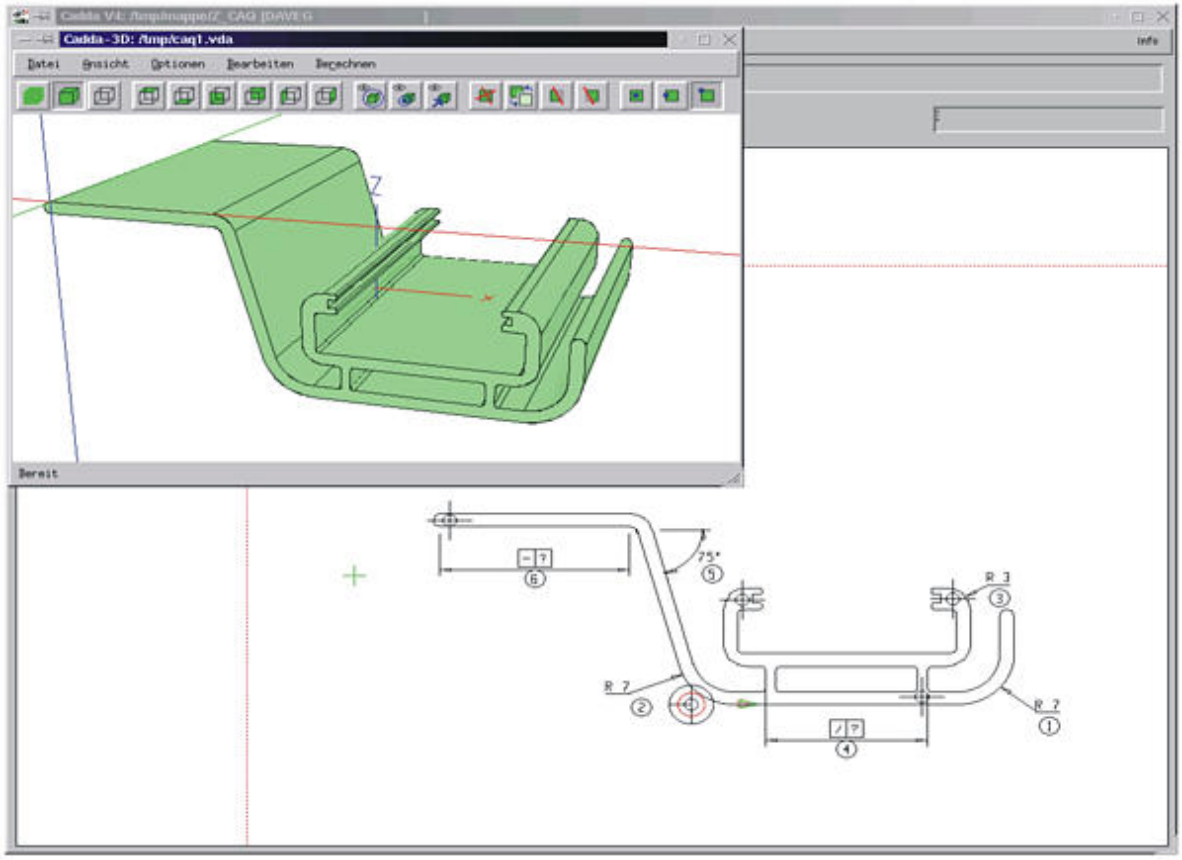
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