

Progressive dies



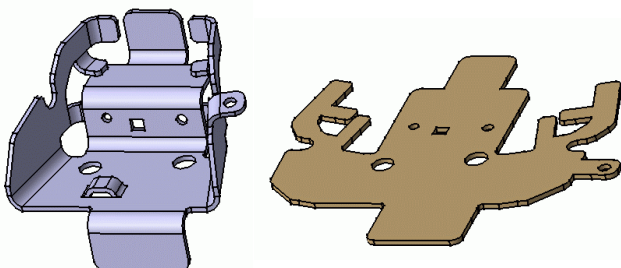
The new generation of die-design- systems for progressive dies

The design of progressive dies will still often be done by 2D drafting systems, because the modeling with the basic functionality of solid modeling systems is far too complex for this task.

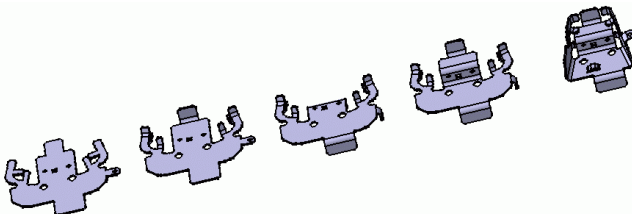
The VAMOS die design system is a very powerful tool to model large and progressive dies efficiently in solid model representation and to use all the inherent advantages of the solid modeling philosophy. This is done by specific VAMOS components (building blocks) together with a certain functionality for manipulating these components. In combination with the complete integration of the VAMOS system into CATIA V5 this is a powerful tool for the die designers task.

Approach for progressive die design

- Bending



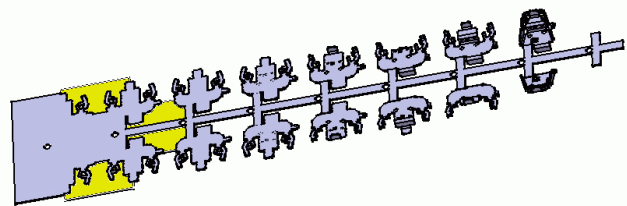
- automatic bending of the part
- station related buildup of the bending layout
- creation of bending procedures
- creation of punching -, breading- and forming elements



- Strip layout design

- Pre configured assembly of the strip layout with stations
- Parametrization of the strip layout
- Inserting the bending layout into the strip layout
- Station oriented setup of the strip layout
- Easy modifications of the strip layout (integration of new stations)

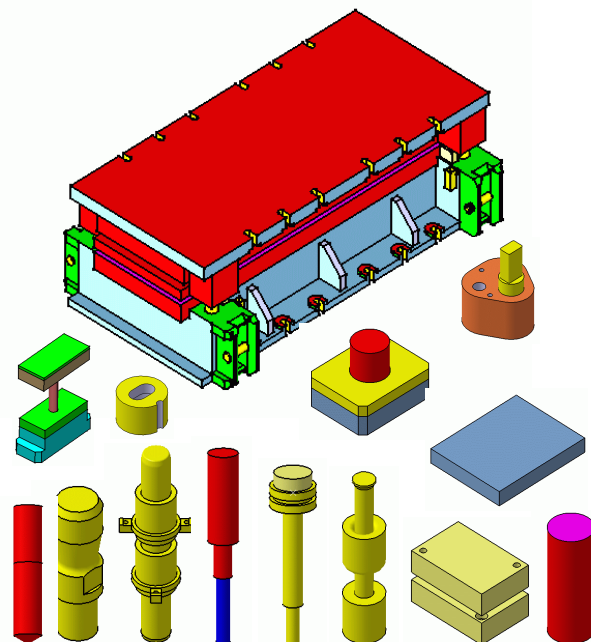
- Easy inserting of the cutting definitions in the strip layout
- Support to create the forming surfaces for punch and button
- Insertion of assemblies of cutting and forming punches already into the strip layout.



- Components

The available components in the catalogues for progressive dies ranges from simple plates, punches, divers standard parts, sub-assemblies up to complete pre configured dies.

components



- Cutting and forming

- Integration of pre configured cutting and forming assemblies from libraries.
- Easy copying of punches and plates within the assemblies.
- Easy customization and enlargement of the libraries to the company standards

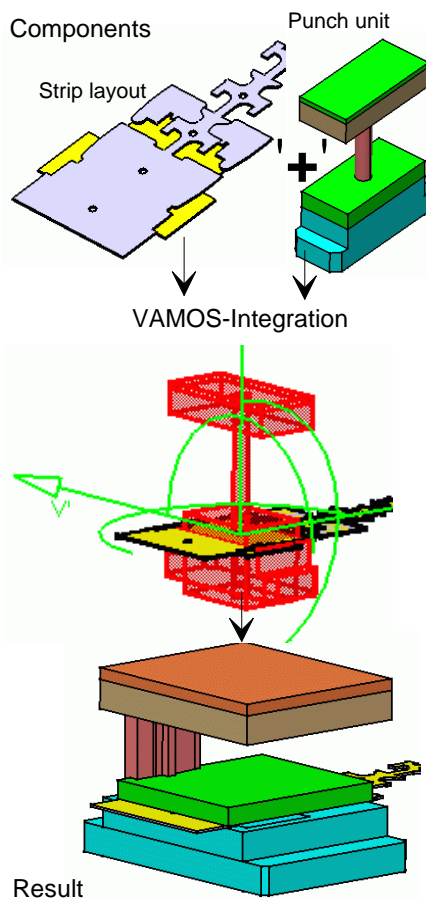
- **Die build up**

- Pre configured dies from plates resp. castings and plates.
- Easy extension of the plate assemblies
- Several strip layouts can be handled in one die
- Easy integration of complete cutting and forming building groups.

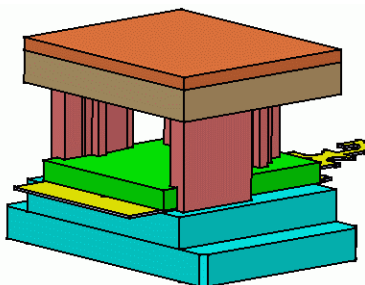
Modeling of dies

The step by step integration of die components to more and more complex objects is the basic approach of the VAMOS die design modeling. The following example is used to clarify this procedure.

- The first step is the integration of the two components: the strip layout and a punch unit. (the punch unit contains only one punch). The user has to make some inputs about parameters and links.

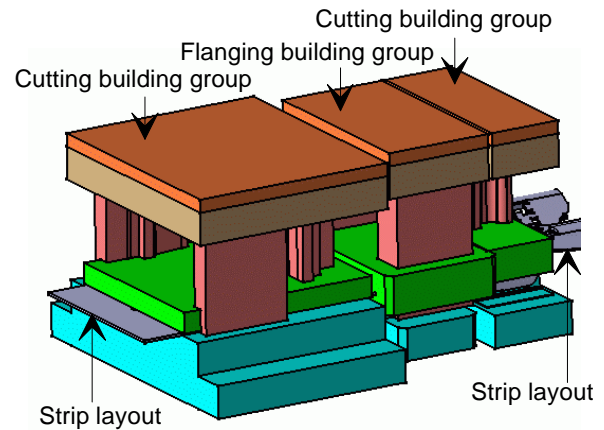


- In the next step the punch will be copied three times to those positions where further cutting contours at this station are located. This is the first building group:

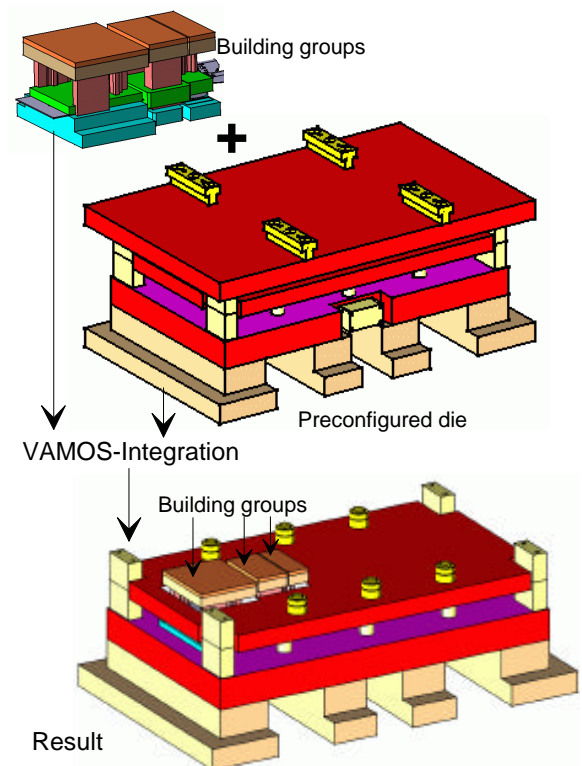


- In the same way further building groups will be created for the

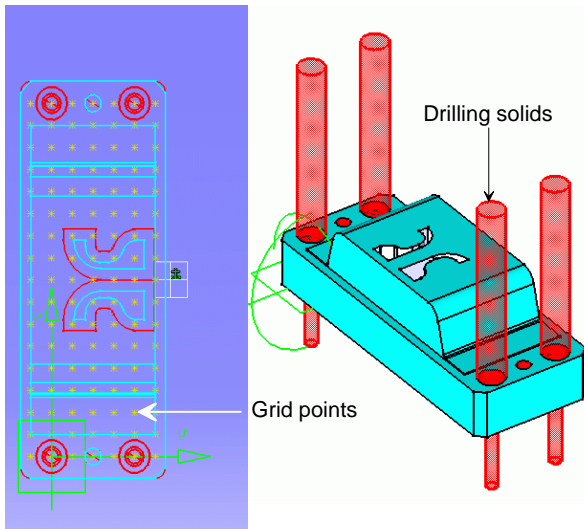
stations of the strip layout. This example will be restricted to 3 building groups.



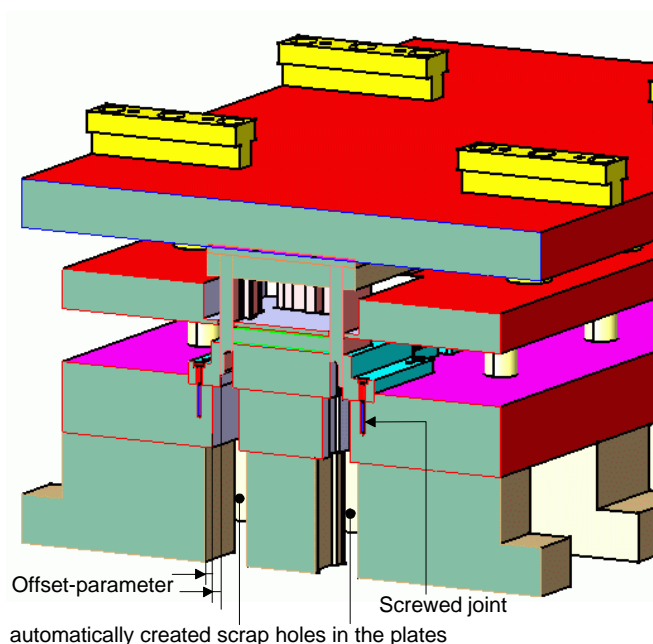
- The next step is an integration with this building group assembly and a pre configured die from the components library. Some inputs are required: on which plate of the die and on which position the building group assembly has to be located. Within the execution of this command correction solids will be automatically created for the generation of pockets and scrap chutes.



- The screwed and the pinned connection of building groups with plates will be done with a general powerful VAMOS-Utility. The inputs are the involved plates and building groups and the drilling positions, which will be selected by a grid. The library contains all known screws and pins. Other positions can be selected using the 'Manipulator' (using coordinate inputs).



- The completion of the die to the final result will be done by further integration of components.
With each integration one or more components will be added and in parallel the environment of the resulting object will be modified correspondingly by pockets and openings.
Parameters exist to control the size of pockets, openings and scrap chutes
E.g. the integration of a punch unit creates automatically the scrap chute. The size (offset) of the scrap chute in the plates underneath can be set by a parameter.
- A check of the die can be done easily with the CATIA-section cut utility: A section cut plane (z-y/z-x/x-y) is shifted across the die and you can see all details inside. The following picture shows a section cut through two scrap holes created by two punches. The size of the holes is modified by offset parameters for the opening.

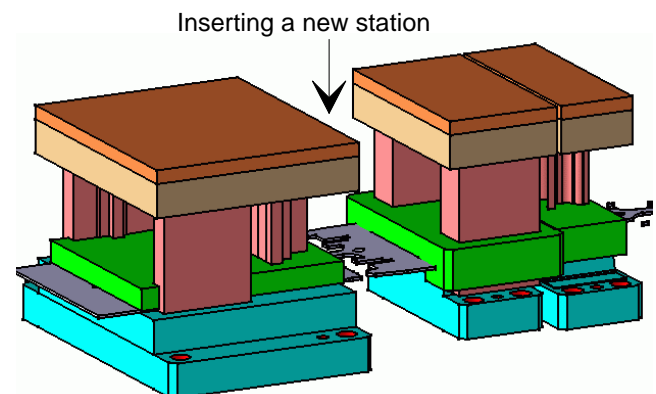


Manipulations at the die

In the example above only the VAOMS integration function were used. Changes by inserting new components will be done as shown above.

For other modifications at the die model the following powerful functions are available:

- **Editing a component**
All parameters, which were set during the integration can be changed in the EDIT modus of the component, e.g. the position, the link to other components, the numerical or graphical parameters (surfaces, contours).
As most of the components are defined by contours and surfaces the modification of the component means an exchange or modification of the contour (surface).
The position of components will mostly be defined in relation to contours of other components (associativity). Is e.g. the cutting contour modified in position and shape at a station then the corresponding punch will be changed respectively after a recomputation of the model.
- **Duplicating a component**
An existing component can be duplicated one or n-times. The structure and the parameters of the original component will be copied identically with the exception of the contour, for which an other has to be selected.
It is an easy way to create several punches for new positions.
- **Replacing a component**
This function is only valid for standard parts and should be applied only to similar standard parts.
- **Deleting a component**
Removes a single or compound component from the die.
- **Inserting or deleting of stations**
A special case of the EDIT function refers to the component strip layout. The strip layout component contains besides several general parameters about the strip layout also the number of all stations and each numbered station.
By adding a new station number at the end and moving each existing station by one position up a new station is created between two existing stations. This is done with the example above with the 3 building groups. Between the 1. and 2. station a new is inserted. With the move of the station the bending layout is moved correspondingly.



Analysis of the solid die model

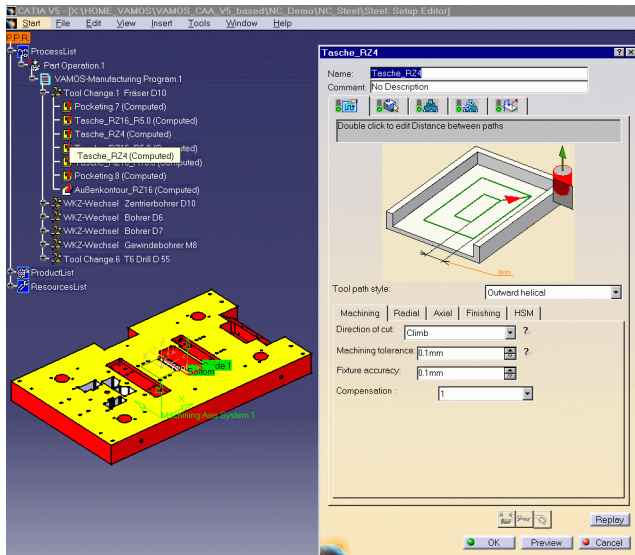
For the manufacturing of the single parts there are the two possibilities:

- Export of the NC manufacturing data from the solid model into the STEP-Format and from there into an other NC-System or
- the automatic generation of the machining operations in the Prismatic Machining Module of CATIA.

This procedure is indicated below:

- NC-machining

The example is the plate on which the three building groups will be mounted. The definition of the milling of a pocket is shown:



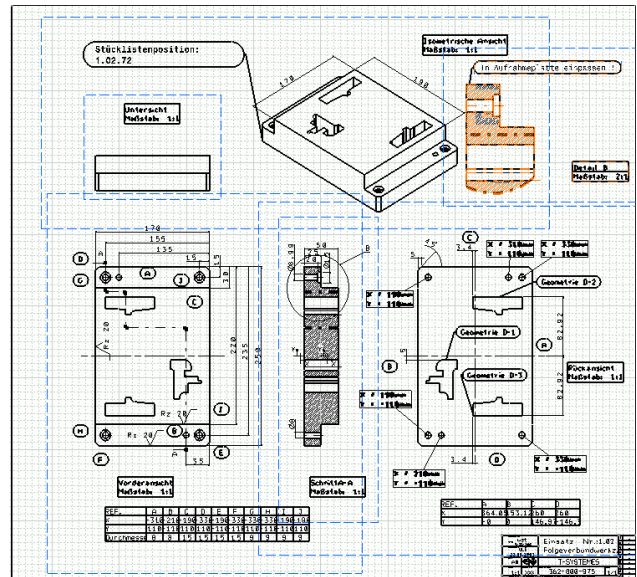
For the further pockets and drilling holes the corresponding NC-operations has to be defined.

A check can be done by a simulation of all milling and drilling operations.



- Preparation of drawings

The system contains a powerful set of functions for the creation of drawings. The drawing is associative to the 3D model. The example below uses the button of the building group for the 1. station.



- Bill of material

The bill of material will be created from the data of the solid model.

Advantages of the VAMOS Die Design System

The VAMOS application in the process chain for progressive dies will lead to considerable savings:

- due to modeling by
 - a standardization of components
 - a reuseability of complex building groups
- due to manufacturing by
 - the integration of the process chain using paperless manufacturing (creation of NC- and bill of material data from the solid model)
- reduction of lead time by
 - 'Concurrent Engineering'
 - the parallel work on different parts of the solid die model
 - reuseability of existing similar die models

Software-prerequisites of VAMOS CAA V5 based:

VAMOS is an application on CATIA V5 and is available on IBM AIX as well as on MS Windows NT, 2000 and XP.