GIBcam.Info

Integrated machine

In our daily work, we repeatedly encounter interest, enquiries and also problems in connection with process-safe and collision-free programming for multi-axis NC machining. It does not matter whether it is 5-axis simultaneous milling, generative 5-axis simultaneous machining, 2.5D milling/drilling in 3+2-axis operation or deep drilling with a set tool. Each machining task has its own special features. However, a common technical intersection is the preliminary check of the NC machining for the specific NC machine still in the programming process or in the work preparation. Possible faults should be detected and eliminated before the actual machining.

What kind of disorders are we talking about?

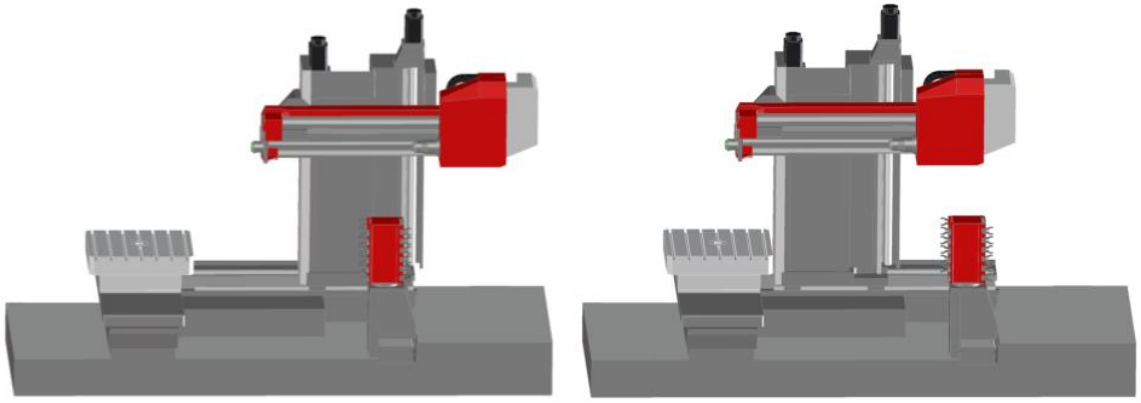
First of all, it must be assumed that the calculations and programming steps already carried out have produced a machining operation for which the CAM module has carried out the tool-related collision analysis with the nominal geometry or actual geometry of the part. Likewise, tool holders or tool projection lengths or tool clamping lengths should have been effectively determined.

- Collision between machine components (e. g. spindle head and table)
- Collision between machine components and clamping devices
- Collision between machine components and workpiece or blank geometry
- Exceeding permissible angular positions with rotary NC axes
- Control of the travel range by monitoring the limit switch positions

In the language of the GIBcam community, we call this issue:

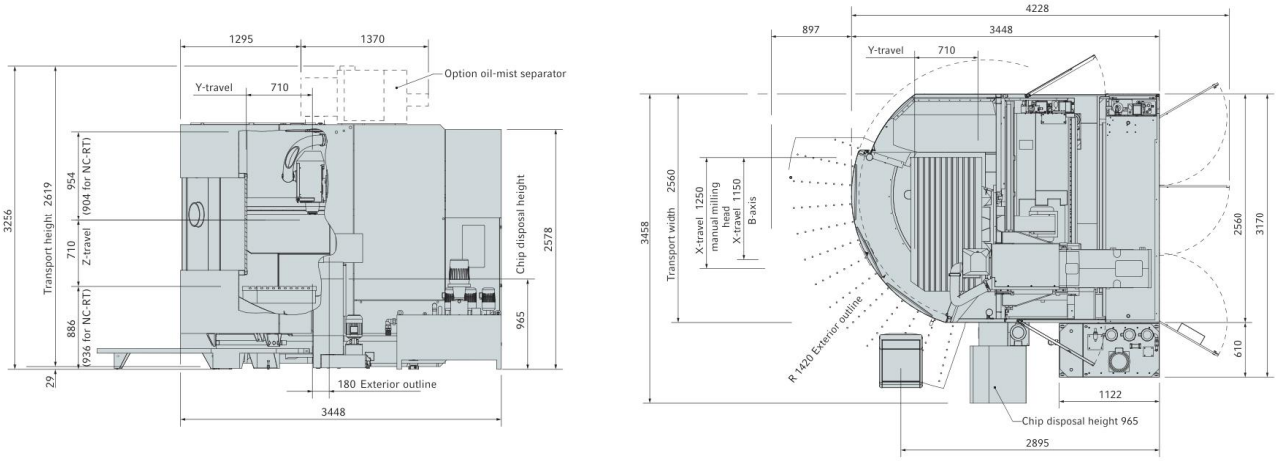
"Machine room monitoring by means of integrated machine"

For this purpose, the complete, prepared machining process including the assigned tool data is transformed into the machine's reference system. This happens in real time for every path point, every path increment and at every point in time.



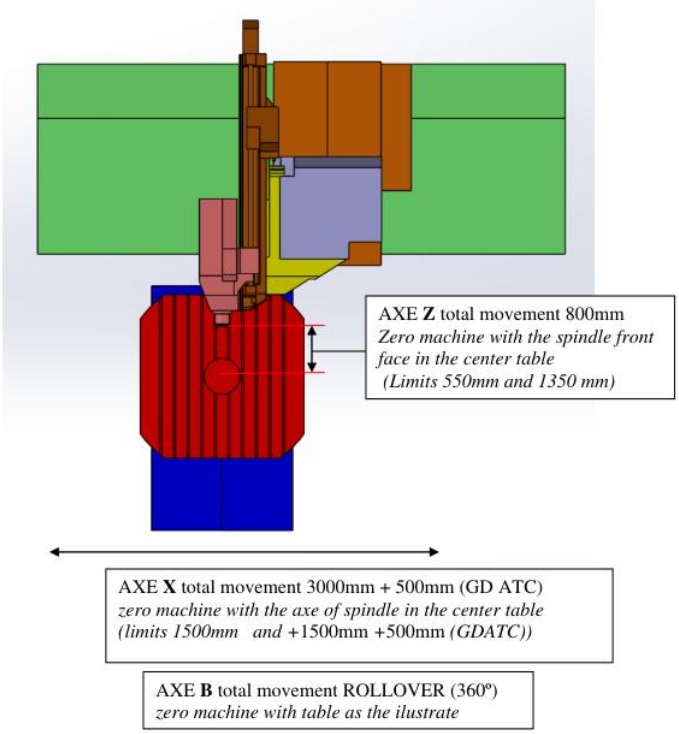
documented end positions of an NC axis
for a deep drilling milling centre
(Source: SAMAG info material)

The calculations required for this are carried out with the aid of an integrated simulation processor on the basis of the exact description of the NC machine in terms of kinematics and geometry.



documented dimensions of the machining area
for a 5-axis milling centre
(Source: DMU Informaterial)

The data for this is determined from the CAD data of the machine, the documents and information of the manufacturer as well as through verification (e.g. in the case of asymmetrical travel range).



documented travel range for a deep drilling machine
(Source: CHETO info material)

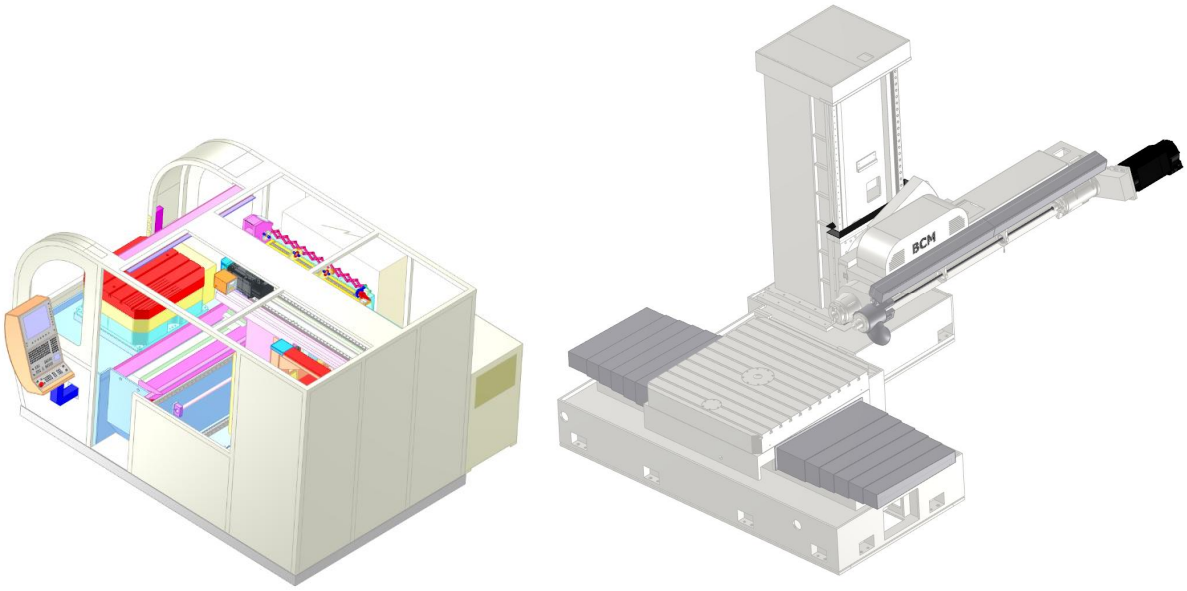
	A	B	C	D	E
25	A	-25	Y	**1600.0**	150.0
26	A	-24	Y	**1610.0**	150.0
27	A	-23	Y	**1620.0**	150.0
28	A	-22	Y	**1630.0**	150.0
29	A	-21	Y	**1640.0**	150.0
30	A	-20	Y	1650.0	150.0
31	A	-19	Y	1650.0	150.0
32	A	-18	Y	1650.0	150.0
33	A	-17	Y	1650.0	150.0
34	A	-16	Y	1650.0	150.0
35	A	-15	Y	1650.0	150.0
36	A	-14	Y	1650.0	150.0
37	A	-13	Y	1650.0	150.0
38	A	-12	Y	1650.0	150.0
39	A	-11	Y	1650.0	150.0
40	A	-10	Y	1650.0	150.0
41	A	-9	Y	1650.0	150.0
42	A	-8	Y	1650.0	150.0
43	A	-7	Y	1650.0	150.0
44	A	-6	Y	1650.0	150.0
45	A	-5	Y	1650.0	150.0
46	A	-4	Y	1650.0	150.0
47	A	-3	Y	1650.0	150.0
48	A	-2	Y	1650.0	150.0
49	A	-1	Y	1650.0	150.0
50	A	0	Y	1650.0	150.0

CHETO-IXN-3000_Endschalt

determined asymmetric travel range of an axis combination
(basic values without intermediate interpolation)

The user - typically the NC programmer, the technologist or the machine operator - has 2 extension components for the CAM module GIBcam (see matrix below) at his disposal (extension level II includes extension level I).

	GIBcam-DRILL	GIBcam-25AX	GIBcam-5AX
Expansion stage I Integrated machine Spindle head control	✓	✓	✓
Expansion stage II Integrated machine Machine room monitoring	✗	✓	✓



complete geometry description using CAD data
for an IMSA MF1000 AF (left) and a BCM FCP 1025 IFT (right)
(Basic values without intermediate interpolation

With the available expansion stages, it is possible for every programmer to quickly and efficiently check the processing they have planned.

In the end, the question remains whether all this can be had for free? How is it integrated into the programming?

First of all, an upgrade of the licensed GIBcam package is required. In addition, the geometry data and all kinematic parameters of the NC machine must be available in a usable form. Depending on the scope and quality of these data, they must be prepared and, if necessary, verified on site.

The necessary scope of implementation is determined in advance and planned together.

After these preparations, the programmer can access and work with the "integrated machine". To achieve meaningful results, the machine must be virtually set up and loaded for each machining operation. Only when the position, orientation and clamping situation of the component in the machine room correspond exactly to reality can the virtual machining process be started. Of course, the tools used, tool holders and extensions as well as drill bushes or other aids must also be precisely recorded and measured.

GIBcam v2023 … [10-02-2023]

[The availability of the individual functions depends on the range of functions of the GIBcam basic package as well as any additionally licensed components.]