CAM system for true shape nesting and NC programming

Vintech RCAM 11 is a CAM system, specially designed for true shape nesting and programming of CNC machines for laser, plasma, oxy-fuel, water-jet and other types of cutting of sheet parts. The system is being developed for more than 23 years.

Vintech RCAM 11 can work together with the system for true shape nesting preparation **Vintech Manager**, with the MES system for management of the true shape nesting production ViNES.

Vintech RCAM performs the following:

- ✓ supports geometry and data in Database of parts by client orders,
- ✓ imports geometry and attributes of parts,
- ✓ sets a machine, material, cutting type and plates by choosing from Technological Datasets,
- ✓ automatically and interactively nests parts and blocks, nests parts of orders according to priorities,
- ✓ applies processing technology according the material, the machine and the type of cutting,
- ✓ generates NC programs and processing documents,
- ✓ calculates the processing time, the prime cost and creates offers.

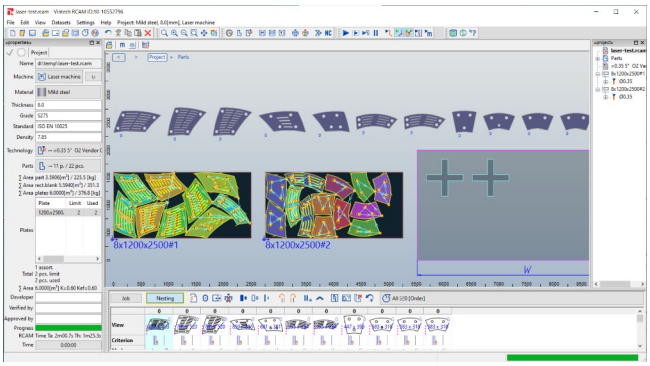

Fig.1: Automatic nesting with Vintech RCAM

Configuration

The **Vintech RCAM 11** bundle includes:

- ✓ Vintech RCAM – CAM system for true shape nesting and NC programming,
- ✓ Orders DB – single-user DB and a library for parts by client orders,
- ✓ Libraries: Parametric parts; Vintech rPipe, Vintech rJet, Vintech rAMT, Vintech rLaser,
- ✓ Library Vintech rSales - Pricing and offering by orders of multi-plate nesting layouts,
- ✓ Vintech NCV – System for verification of NC programs for thermal cutting.

Optional Libraries

- ✓ Vintech rBevel – bevel cutting technology.
- ✓ Vintech rDrill – Drilling, boring and milling technology.
- ✓ Vintech NetDB – Multi-user DB for technological datasets and library for parts by client orders.

Characteristics

Vintech RCAM is 64-bit technological software for Windows or Linux. The CAM system is based on original algorithms for automatic or interactive tight step-by-step nesting with optimisation and **on-line** control against overlapping, without shape or size restrictions of the working area and parts.

Technological datasets

The Technological Datasets (TD) store in a single-user SQL DB settings and specific parameters for processing, which are accessible for overview and applying.

Nesting Geometry

Vintech RCAM imports geometry from CAD files in the following formats: DXF, DWG*, SVG, ESSI, DSTV, NX XML, CDW*, FRW*, PSM*.

The input CAD geometry can contain arcs, segments, ellipses, splines, point sets and text.

- ✓ Vintech RCAM corrects geometric defects and marks the locations of the remaining errors while importing.
- ✓ From the input geometry it automatically defines the contour type of the parts as: outer and inner closed contour, hole, slit, marking geometry, text and point sets.

*- in case the respective CAD system or a universal translating software are installed.

Management

Vintech RCAM saves the data during the nesting process in a project file in a folder of the operating system.

To manage the design process the system uses Job, Nesting queue, Project navigator, Project tree and galleries – Parts, Blocks and Nesting layouts.

Plates for nesting in project

Vintech RCAM nests on multiple whole plates or usable remnants (UR)

Creating technology at any time

Vintech RCAM Vintech RCAM offers powerful instruments for management of the technology consisting of cutting paths and route of rapid moves.

A distinctive characteristic of Vintech RCAM is that it can create or change the Processing technology for the whole layout or for a part of it at any time without changing the location of the parts.

Automatic and interactive nesting

Vintech RCAM nests with high efficiency. It uses algorithms for tight step-by-step nesting with **on-line** control against overlapping and unlimited part-in-part nesting of parts in holes..

Vintech RCAM allows interruption of the automatic nesting,

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interactive action and resumption of the automatic nesting, at any moment.

The interactive nesting can be with true shape or in a pattern, controlled by corresponding “handles” for manipulating selected blocks, always with on-line control against overlapping.

A large variety of functions for working with group of nested parts – blocks are developed in Vintech RCAM.

Cutting paths and route of rapid moves

Paths can be created automatically or interactively, with **on-line** control against overlapping, in accordance with material, contours' type and length.
Vintech RCAM uses the information from the Technological Datasets to create paths.

The Lead_in/outs of the cutting paths as well as the different types of gaps, bridges, corner processings are path elements. The system finds space for the path elements using the **on-line** control against overlapping.

The route of rapid moves defines the order of processing the paths in a part and in a nesting layout. The route is generated automatically or interactively according to the nesting level of each part.

Creating and editing paths

Vintech RCAM automatically creates paths and path elements, such as: Lead_in/outs; Gaps; Loops and other sharp corner operations; paths for marking or engraving; paths for accurate cutting of holes; common cut cutting; cutting with bridges; paths with “eyelets” for Lead-In from adjacent path; “L-locks” on the path; Pseudo-bridges with leading line.

The system interactively changes the place of Lead_in/out or Gap by dragging along the path, changes the slope and length of Lead-In and Lead-Out by dragging the relevant „handles“, changes the type of Lead-In/Out using „halos“.

Transferring a nesting layout between machines

Vintech RCAM supports powerful **functions for transfer** of NC programs between different types of machines. Vintech RCAM allows automatic change of machine, cutting regime, technology, kerf and post-processor in the project at any time. When the kerf is not changed, the system keeps the paths with common cuts.

Special tasks for true shape nesting

- ✓ common cut snap of nested parts,
- ✓ avoiding collisions by reorientation of Lead_in/outs , with automatically circumventing the cut areas with rapid moves,
- ✓ automatically or interactive “processing to the material”,
- ✓ creating nesting layouts only with continuous cutting and lead-in from the edge of the plate,
- ✓ automatically or interactive slicing the scrap skeleton,
- ✓ automatically cutting gaps after the main processing,
- ✓ automatically or interactive transforming rapid moves into cutting paths for chain cutting with circumventing,
- ✓ creating technologies for processing by frames (with repositioning) for plates longer than the work stroke of the machine,
- ✓ automatically splitting of a nesting layout into successive settings for cutting and drilling,
- ✓ post-marking on the machine – automatical programming the marking of the heat № of the current plate on particular parts from the nesting layout.

Generating NC programs and reports

Saves HTML, PDF and DXF documents for a single layout or for all layouts in a project.

Vintech RCAM generates NC programs in ISO / EIA, ESSI and other command systems. It creates NC programs using Universal or External postprocessor for:

- ✓ thermal and water-jet vertical cutting including with automatic control of the cutting regime,
- ✓ bevel cutting,
- ✓ vector marking, laser or jet marking of texts.
- ✓ drilling, boring processing of plane contours with tool change from tool magazine,
- ✓ cutting with tangential knife or band,

Thermal cutting solutions

Laser cutting

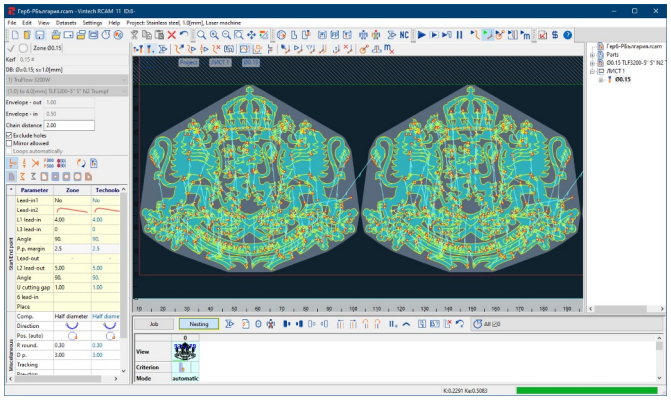

Fig.2: Nesting layout of laser cutting and engraving of complex part

Vintech RCAM has advanced functionality for programming laser and fiber laser cutting machines with specific technological tables for the type of the machine. Creates nesting and cutting technology with a wide range of features for laser processing taking into account the material and contour type and length. It programs cutting, cleaning and engraving. It generates NC code with rotation and translation of NC subroutines.

Plasma and oxy-fuel cutting

Vintech RCAM has advanced functionality for programming plasma and oxy-fuel cutting machines. It nests and creates cutting

technology for plasma cutting of thin metals, and for oxy-fuel or plasma cutting for thick metals.

The system programs thermal cutting combined with:

- preliminary dust, percussion, plasma, jet or laser marking of vector geometry with a special tool,
- preliminary or part-by-part marking of texts with text-printing heads,
- preliminary or part-by-part engraving of vector geometry with plasma cutter.

The system programs thermal cutting together with drilling with sized tool in advance. It drills start holes for piercing, but it does not drill start holes when piercing from the edge or from already cut contour.

The system generates NC code, including for controlling the automatic gas consoles and programmable plasma sources.

Bevel cutting

Vintech RCAM creates bevels and NC programs for plasma and oxy-fuel **bevel** cutting through the optional library **Vintech rBevel**.

The library provides flexible tools for creating nesting layouts with bevel cutting. It can be used to interactively create and manage:

- ✓ Single bevels – lower, upper, lower and upper chamfer,
- ✓ complex – Y, K, X, bevels,
- ✓ variable bevels and chamfers,
- ✓ bevels on whole contours or parts of contours, without limitations.

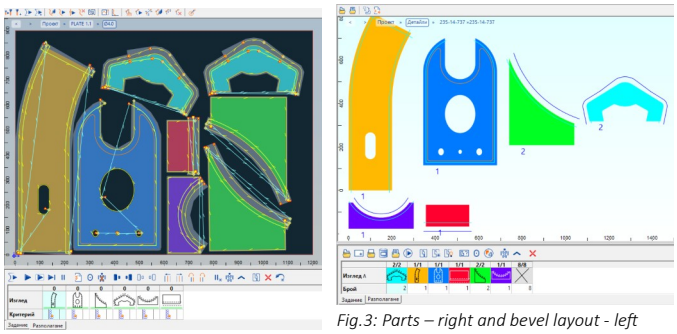

Fig.3: Parts – right and bevel layout - left

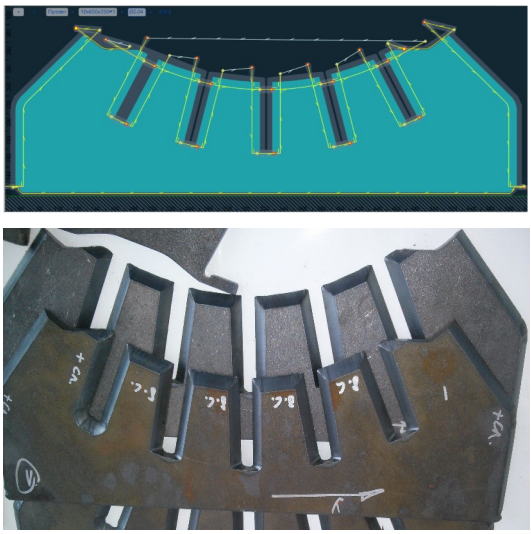

Fig.4: Part with complex bevels: project(up) and test parts(down)

The system creates a technology for bevel paths, according to the capabilities of the CNC machine, the bevel head and the tracking system by controlling:

- ✓ specific path elements, including Technology Points for auxiliary bevel cutting functions management,
- ✓ different types of processing with bevel paths of corners: with separate paths, loop, rounding, sweep, point; of corners at external and internal paths,
- ✓ angular transitions between paths with equal or with different angle of the bevel,
- ✓ transitions between bevel and vertical paths.

Vintech RCAM provides advanced capabilities for control of dimensional accuracy in bevel parts, using NC program or CNC controller,

The system creates NC programs for bevel cutting with different bevel heads constructions with 4- and 5-axis control with movements along axis XYCA, XY45°CA, XYAB, XYZAB.

Library Vintech rDrill

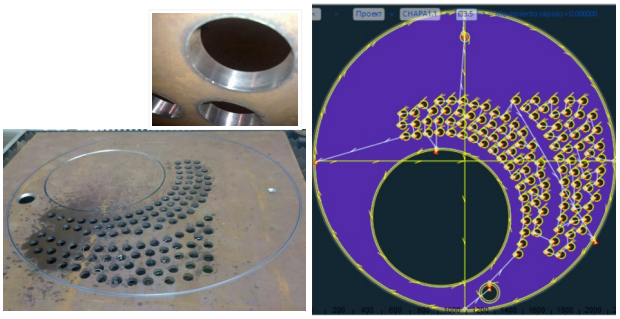

Fig.5: Project (right) and tubular mesh (left) processed with combined plasma bevel cutting and boring holes

Vintech RCAM creates technology for drilling, boring and milling combined with thermal cutting using the optional library **Vintech rDrill:**

- ✓ Defines complex processing of step holes and 2D milling contours on the geometry of flat parts,
- ✓ supports drilling, boring and milling tools and the relevant cutting regimes,
- ✓ assigns the sequence of the tools in the tool magazine by the NC program,
- ✓ creates NC programs for thermal cutting combined with drilling, boring and milling with tool change from the tool magazine.

Pricing and offering

Vintech RCAM defines prices from the nesting layouts in a project and creates commercial documents using the library Vintech rSales.

The library accurately calculates the spent metal and time based on the cutting, marking and cleaning program, and distributes them by parts, layouts, nesting jobs and orders.

It calculates cost price based on norms from Datasets by:

- ✓ Length or time for processing,
- ✓ weight (or area) of the parts in the order, usable remnants, remnants to order and waste scrap.

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It adds profit or discount, additional costs and factory expenses in the calculations.

It creates:

- ✓ commercial documents such as Pro-forma invoice or offer,
- ✓ document sets, such as list of plates and usable remnants, nesting layouts, specifications or other types of reports.

It allows the documents to be generated for sales:

- ✓ in national currency, with or without VAT,
- ✓ in foreign currency, in multiple languages.

Module Vintech rAMT

Vintech RCAM creates true shape nesting and NC programs for plasma or oxy-fuel cutting machines with the functionality for changing the number of parallel torches and the distance between them (Advanced Multi Torch) with the module Vintech rAMT:

- ✓ Creates nesting layouts with automatically or interactively positioned groups of parts for parallel processing,
- ✓ creates cutting paths and a route of rapid moves,
- ✓ visualises and traces parallel processing,
- ✓ interactively creates nesting and technology for multi-torch processing of long parts with parallel edges.

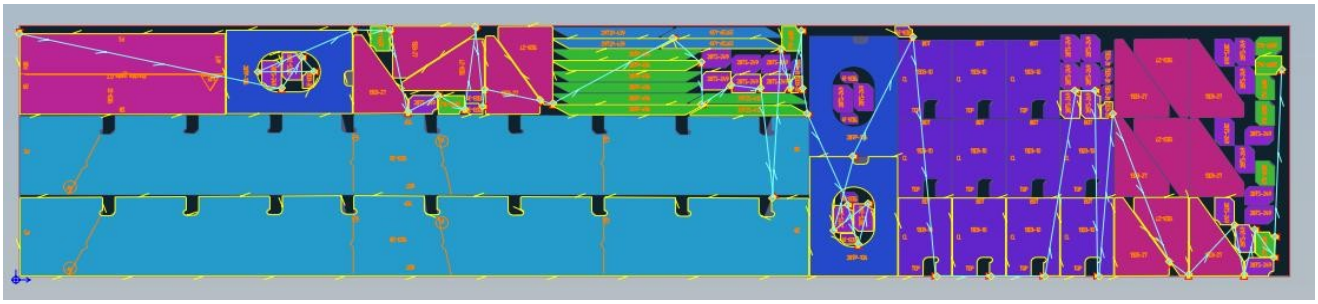
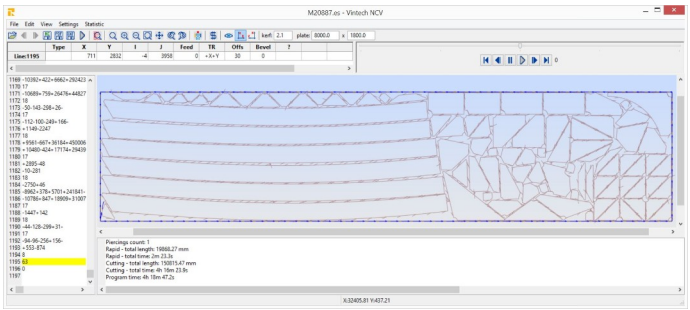


Fig.7: True shape nesting with AMT. The parallel cutting with variable number of torches and distance between them in the example can control up to three cutters. Cutting paths (yellow lines) and rapid moves (blue lines) for parallel cutting are shown only for the leading cutter.
True shape nesting with AMT can be applied to parts nested in holes as well.

Vintech NCV

Standalone system for verification of NC programs and NC program packages for thermal cutting.



- ✓ Vintech NCV generates a graphic simulation of the processing moves of ESSI and ISO / EIA NC programs, and:
  - checks for correspondence between NC commands and the moves of the graphic simulation, allows direct editing of the NC programs,
  - verifies NC programs with subroutines in absolute or relative coordinates, with translation and / or rotation of the subroutines,
  - uses CNC machine profiles to verify programs with different structure and format,
- ✓ Vintech NCV loads NC programs and NC program packages in the CNC controller via serial DNC interface. Allows management of the DNC interface by the CNC controller (Linatrol, Burny, Mazatrol, Amada, etc.).
- ✓ Vintech NCV generates cutting programs with post-marking by using a post-processor for converting the text data into NC marking code for the specific CNC machine.
- ✓ Vintech NCV converts ISO/ESSI NC programs and saves the geometry in AutoCad DXF file format.

VINTECH – Your partner for CNC thermal and jet cutting of sheet material!

VINTECH is the author and the creator of the **Vintech** CAM system – a system based on IT excellence and more than 40 years of experience in the integration of effective CNC/CAM/MES solutions.

Vintech RCAM- CAM system for true shape nesting and NC programming,
Vintech Pipe - CAD/CAM system for NC programming of 2D pipe cutting machines,
Vintech Duct- CAD/CAM system for parametric design and NC programming of orders for flat patterns of fittings of HVAC systems,
Vintech NCV- Verifier of NC programs for thermal cutting,
Vintech Manager- CAPP system for management of the technological preparation of true shape nesting production,
ViNES- MES system for management of the technological preparation, warehouse and true shape nesting production

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