Cygnet Infotech

IT is about you

INTELLIGENT NESTING AND OPTIMIZATION CAD/CAM SOFTWARE SOLUTION FOR A TURKEY BASED CLIENT

Project
Details

Customer Size	Large Organization
Country	Turkey
Domain	Manufacturing
Solution	Frameworks and Technology: .Net framework 4.0, C# .Net, WPF, DirectX, SharpDX 2.6.3, SQLite, Helix Toolkit, Multi-threading & Parallelism, Protobuf-Net

Reduced remnants and increased profitability per job by 50%

Client
Profile

Our client is amongst one of the world's largest manufacturers of high tech metal working machinery since 1973. They are a well-known global brand in machining and metal cutting. Catering to the software domain, our client provides effective solutions with intelligent nesting and optimization software program. Sharing a rich experience of 40 years in manufacturing parts of CNC machines like generators, torches, servo-motors and with one-of-a-kind approach, our client is the first company in this domain to provide its own nesting software program; which has put them on a competitive edge.

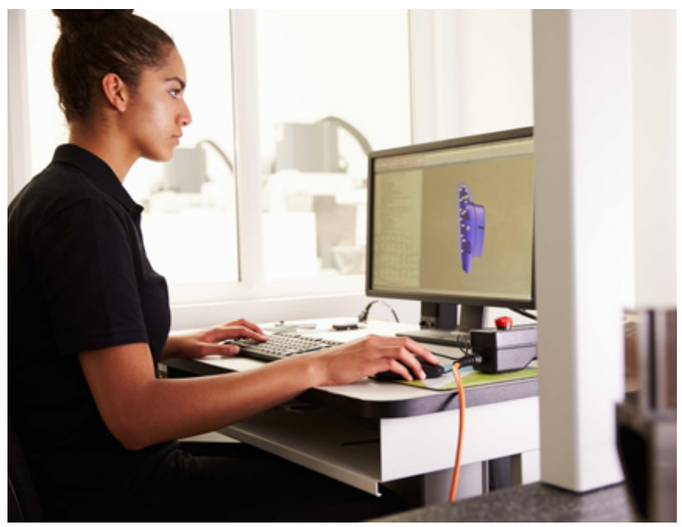
> "Efficiently turning 2D drawings into CNC programs and finished parts with integrated smart CAD/CAM software"

Business Scenario

Our client masters in providing effective solutions with intelligent nesting and optimization software to their clienteles. They were seeking to develop a cost-effective CAD/CAM solution to increase the productivity of the machines, save on capital expenditure with more accurate design cuts thereby by enabling quick and effective machining with less remnants. To manage their clienteles efficiently and improve their quality benchmark, they needed a technology partner who could work closely with their local team in Turkey to build a solution that had the following functionalities:

- Cost effective solution to optimize cutting and minimize remnants
- Seamlessly import/export drawings from/to other software
- Generate instructions for CNC machines in G-code/ESSI format
- Real-time simulation of the cutting process
- Support different types of bevel cuttings

Due to lack of resources, they were unable to provide solutions according to the standards set. Hence, they were desperately seeking a trustworthy and efficient technology partner. Knowing Cygnet's expertise across various fronts like handling cross-functional teams, providing agile methodology the client zeroed-in on us as their technology service provider.



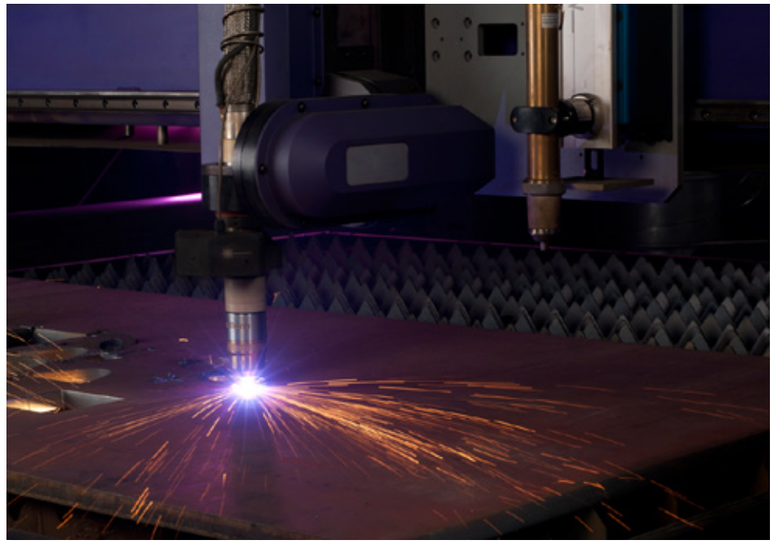
Cygnet's Solution

During the initial phase, Team Cygnet understood the existing operations and analyzed the workflows to gain deeper insights. After a thorough research, Cygnet came up with a comprehensive solution structured in two parts i.e. CAD and CAM using .Net framework to enhance the user experience.

- Cygnet developed CAD part which manages the functions to create and manipulate 2D drawings. It also allows hassle free exporting/importing of drawings in DXF format; which is an industry standard
- Cygnet developed CAM part which manages automatic and manual nesting to define jobs using machine, stock and shape information. This system allows users to manage tool path, generate G-code and ESSI codes for CNC machines, set cutting sequence and cycle and keep a track on average cutting time
- To further enhance the user experience, Team Cygnet also developed features where entire cutting process was simulated on a 3D simulator

Key features considered to create business solutions were:

- **Automatic Nesting:** Optimized nesting process to reduce remnants and optimize sheet cutting along with the optimization of total cutting time with efficient toolpath generation.
- **CAD Import and 2D Drawing Creation:** The system allows import of sheet metal parts from any CAD system in industry standard format DXF.
- **Allocation of Machining Attributes:** With several functions linked to the cutting technology, our solution steps beyond the classic styled nesting. It quickly evaluates entire sheet area and intelligently positions parts around each other to optimize sheet utilization and reduce remnants. Specific features of cutting - technology like bevel cutting, lead-in/out, micro-joints, loos, part connections are enabled. It also enables the user to view a 3D preview of drawings with different bevel settings.
- **Interactive Nesting Operations:** Our system provides numerous nesting strategies which are fully automated with enhanced anti-collision function. This enables automatic control of part positioning constraints like rotation and symmetry and provides automatic management of nesting priorities where nesting in multiple formats and sheets is also enabled. Support for various technological requirements like common cut, micro joint, part connection is provided.
- **Tool Path Optimization:** Tool paths are optimized by automatic calculations and enhanced algorithms respecting technological constraints such as avoid warping etc. Interactive modifications for lead-ins, cutting sequence and trajectory is provided with simulation of the tool path in a 3D simulator. To further enhance tool path optimization features like continuous cutting/common cut to minimize lead-ins, programmable bevel management, speed control (accelerations and decelerations), loop support, collision avoidance with parts cut are added.
- **Remnant Sheet Generation:** Many times, a large part of irregularly shaped sheet remains unutilized. By generating a remnant sheet, one can save the shape of the leftover sheet and in future can utilize it to nest other jobs.
- **ISO Code Generation and Cost Analysis:** An advanced post-processor generates instructions/steps for CNC machines in G-code/ESSI format. This also facilitates creation of job reports in PDF/Excel format with details like exact cutting time, total piercing, total part perimeter, reusable material, scrap, cutting cost etc. with other important data that are needed for analyzing cost.
- **Real-time Simulation:** Real-time simulation is provided for the cutting process. Simulation allows a user to utilize the kinematics of the machine and provide full visualization for testing before confirming a job for optimization.
- New DirectX based rendering implementation for faster and heavy rendering is used.



Benefits to the Client

- Unique and unequalled performance in nesting
- Combination of several functions resulting in a complete interactive product (Collision detection and anti-collision detection management, automatic nesting followed by a manually initiated nesting)
- Seamless integration with CAD Systems / Production management systems/ERP solutions
- Cost effective
- Improved sheet yields and reduced remnants
- Profitability per job increased by 50%

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