HEXAGON

Solution brochure

Solution for sheet metal fabrication

Creating an end-to-end smart manufacturing workflow for sheet metal

Competing in a challenging market

Sheet metal fabrication involves the design and manufacturing of sheet metal components and assemblies. It is essential for industry verticals including automotive, aerospace, industrial equipment, electronics, medical, oil and gas, and consumer products. The key challenges faced by the sheet metal industry include:

- Optimising raw material sheet utilisation to save on raw material cost and therefore overall product cost
- Designing sheet metal parts faster, taking into account manufacturing capabilities/constraints
- Optimising the manufacturing cycle time for sheet metal parts
- Ensuring first time right manufacture every time and minimising rejection and rework
- Ensuring smooth execution of manufacturing activities to meet the delivery date to the end customer
- Ensuring the quality of the finished product irrespective of operators' skill levels
- Optimising the overall product and project cost

Hexagon's end-to-end solution for sheet metal fabrication addresses these challenges at each stage of the workflow from inquiry to dispatch using a smart manufacturing approach based on RADAN, DESIGNER and WORKPLAN.

Sheet metal fabrication workflow

A typical sheet metal manufacturing project involves several stages:

Project enquiry

1

WORKPLAN

Preparation for manufacturing

2

DESIGNER

Cost estimation and quotation

3

Radquote

Manufacturing operations, inspection and dispatch, and invoicing

10

WORKPLAN

MES

CAD for manufacturing

CAM

4

Optimisation for manufacturing

DESIGNER

5

Part programming for bending

Radbend

6

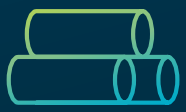
Part programming for cutting

Radcombi/ Radtube/Radm-ax

Sheet metal nesting and final CAM programming

9

Radnest/Radcombi/ Radtube/Radm-ax



Materials management

8

WORKPLAN

Manufacturing planning and scheduling

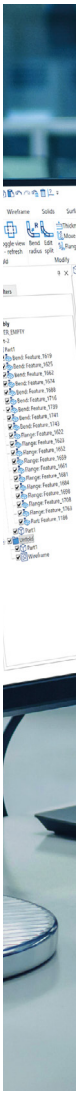
7

WORKPLAN

1 Project enquiry

Hexagon's WORKPLAN manufacturing project management platform provides users with the ability to manage the workflow, starting with the product enquiry.

Opportunities can be created in WORKPLAN and will maintain all details related to the customer – contact details, delivery and invoicing addresses etc. Users can then keep track of the progress of each opportunity, including various communication details for the project.



2 Preparation for manufacturing

Once the job is accepted, technical input from the customer, such as model files, must be validated for manufacturing feasibility and the model prepared from a manufacturing point of view.

DESIGNER is Hexagon's CAD application for smarter manufacturing and provides a variety of solid, surface, sheet metal modelling capabilities, creation of 2D drawings, electrode design, design automation through macros and scripting, and a link to Hexagon CAM software and reverse engineering functionalities.

Large assemblies can be easily managed and analysed and split into constituent parts (disassembly) using DESIGNER. Several powerful sheet metal functions are available to prepare parts for unfolding.

DESIGNER also has functionality to correct the thickness, change bend radii and make changes to flange angles and lengths.

3 Cost estimation and quotation

WORKPLAN can create a quotation for a particular opportunity. WORKPLAN also has an interface with Radquote, which is essentially a tool for cost estimation of the project.

Radquote is a sheet metal quotation program that will enable quick and easy quotes creation for sheet metal parts and purchased parts. It gives a full breakdown of the costs and allows each cost area to be altered to give flexibility when negotiating. Flexible reporting allows users to send professional quotation letters or emails and make internal reports for analysis.

Radquote uses RADAN's extensive toolset to perform specialist cost calculations for cutting and bending operations. Manufacturing cycle times and material usage are calculated using RADAN's CAM engines, whereas handling times and costs can be calculated using either a CAM engine or a database of empirically determined settings and calculation methods, accounting for the complexity, size and weight of the parts.

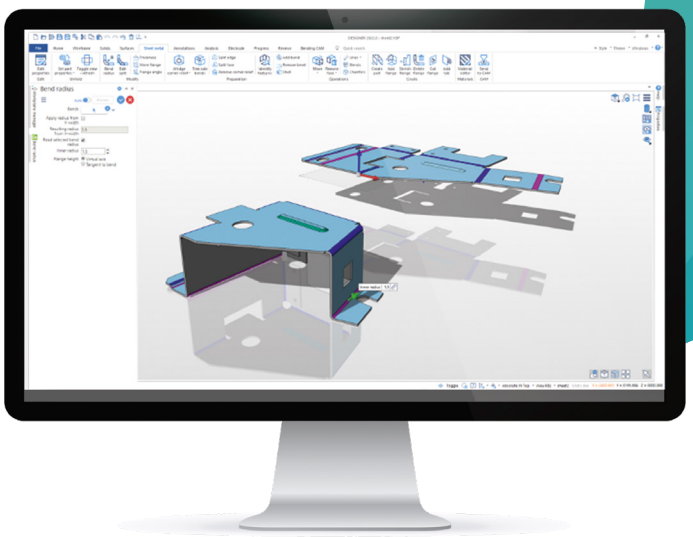
The costing details calculated in Radquote are imported in to WORKPLAN and then the quotation can be sent to the prospect via PDF. Revisions of the quotation will be tracked until it is converted to an order.

4 Optimisation for manufacturing

DESIGNER also supports optimisation for sheet metal manufacturing with specific functionality for sheet metal. Decisions can be made to determine factors like the optimum top face and where to split or join the part. For larger parts, the user can decide where to weld and where to bend the part.

Specialised functionality can help determining the ideal corner solutions to optimise the cutting process and minimise subsequent operations such as welding and grinding or polishing.

DESIGNER will also check the part for inconsistent material thicknesses and verify that the unfolded blank is complete and free from overlapping flanges.



5 Part programming for bending

Radbend from RADAN is the comprehensive offline programming solution for press brakes. It also provides a full 3D simulation of the bending process, ensuring process stability.

Radbend uses tooling databases to determine the most optimum tooling configurations to minimise setup time and handling. The part design is verified, and any potential problems are shown early in the process.

Automatic sequence calculation determines the ideal bending process without taking machine or operator time, while proving the process digitally removes the need for expensive prototype parts. User documentation decreases the chance of handling errors by the operator, avoiding expensive rework operations.

6 Part programming for cutting

Radprofile is a market leading solution for programming profiling machines. Having driven the first profiling machines to be introduced to the market, RADAN now successfully drives thousands of profiling machine tools worldwide. Designed to seamlessly integrate with Radprofile, the RADAN punch/profile solution delivers optimisation for punch, profile and combination machine tools. This formidable combination will grow with the business to program all future punch, laser, plasma, router and combination machine tool investments from one system. Radnest extends the functionality to provide true shaped nests that produce high utilisation, manufacturable nests from sheets, off-cuts and remnants delivering substantial savings in material.

Radtube
Radtube is an industry-leading Laser CAD CAM software for rotary and multi-axis cutting machines, developed specifically for the tube cutting and manipulation industry.

Radm-ax
Radm-ax is an industry-leading 5-axis Laser CAD CAM software developed specifically for the general engineering, automotive and aerospace industries.

7

Manufacturing planning and scheduling

WORKPLAN schedules projects and jobs based on set priorities and availability of resources. It supports forward looking, backward looking or period simulations. Manufacturers can use WORKPLAN's GANTT charting to optimise workload, reduce bottlenecks, control milestones and meet due dates.

WORKPLAN includes an easy to use drag and drop graphical tool to set routing order and create workflows. These workflows can be simulated for a set period, based on project due dates. Users can also set various internal due dates, to ensure tighter management and provide a buffer in your workflow. WORKPLAN automatically generates a resource load planning schedule, which considers existing available capacities.

Using these modules of WORKPLAN, various manufacturing activities can be planned, resources optimised and progress tracked against the plan to ensure that the project is delivered on time as per the customer requirement.

8 Materials management

WORKPLAN provides all the necessary features for the management of the complete purchasing process. This includes the purchasing budget requirements, the RFQs and stock management, purchase order receipts and supplier billing check and control functions. Reports are available in real time for stock on hand for projects and trace stock items in the system.

WORKPLAN automates the budget request and approval for raw materials, standard components, composed components, all the stock reservation and availability is checked in progress.

Automatic import of detailed Bill of Materials (BOM) information from popular CAD systems is a time saver and helps minimise mistakes.

WORKPLAN uses RADAN CAD CAM's nesting functionality to estimate the future material requirements and create purchase orders when required.

Using this module of WORKPLAN, manufacturers can ensure that all the required raw material and bought-out items are made available on time to meet the date to the end customer. This also helps optimise the inventory carrying cost.

9 Nesting and cutting

Radnest analyses the true shape, material and thickness of all components in a batch, separating and sorting automatically, producing high utilisation, manufacturable nests from sheets, off-cuts and remnants delivering substantial savings in material and improving machine efficiency.

Even the smallest improvements to productivity can have a significant impact on cost savings.

10 Manufacturing operations

Using time management functionalities within WORKPLAN, users can manage and track time spent on all the projects. Data can be entered through touchscreens, workstations, barcode readers or timecards. This functionality can also help track and report on unproductive tasks, employee hours, time spent correcting problems or other quality issues, overtime, leaves, holidays and more.

WORKPLAN's Time Management module is an easy to use, all-in-one tool to manage employees' attendance, hours and track their progress on tasks. WORKPLAN helps check the times spent at each scheduled work centre on the project. Data can be entered from a computer terminal, touch screen, barcode readers or via manual input and timecards.

Using WORKPLAN, users can track the progress of various manufacturing activities and take corrective measures, if required, to complete the manufacturing activities as planned. The actual manufacturing cost of the project can also be monitored.

Inspection and dispatch

The quality module within WORKPLAN enables separate tracking of time and costs associated with non-conformities – the cost of poor quality.

This module is not only a great help to get the ISO certifications and meet ISO standard requirements mentioned in the quality management system (QMS), but it will manage supplier evaluation and give access to cross-functional features to improve quality and meet internal policies.

Additionally, the maintenance of measuring devices used in quality assurance, quality indicators and KPI analysis are key to achieving ISO Certificates.

Delivery notes can also be created once the project is ready to dispatch.

Invoicing

WORKPLAN issues invoice and manages the invoicing process.

Additional modules offer a view on cash inflow and outflow based on scheduled payments, as well as creating invoices for accounts receivable and ordered materials from accounts payable.

WORKPLAN performs detailed analysis specific to quotes, jobs, times, costs and other metrics with a few simple mouse clicks to improve the estimating and planning processes. It also enables comparison of the planned versus actual project cost and its components.

Seamless integrated workflow

Using Hexagon products – WORKPLAN, DESIGNER and RADAN, sheet metal customers will have a seamless integrated workflow from enquiry stage through to dispatch.

Integration between Radquote and WORKPLAN

WORKPLAN utilises a powerful dedicated sheet metal pricing tool which includes material costs and forecasted production times:

- Sync part files to illustrate all documents of production with image

Integration between DESIGNER and RADAN

Data can be sent from DESIGNER, which is Hexagon's CAD application for smarter manufacturing, to RADAN for CAM programming

Integration between RADAN and WORKPLAN

A direct link between RADAN and WORKPLAN provides fluid data exchange for improved productivity:

- Sheet metal requirement estimation
- Import parts to be produced in RADAN
- Stock inventory import by material type, format and thickness
- Sync program directly in WORKPLAN to manage the production

Shop interface between RADAN and WORKPLAN

- Production management, productive and unproductive tasks
- Real-time allocation on jobs and parts quantities
- Program validation to dispatch time and material on projects

Key benefits

Key benefits of Hexagon's end-to-end solution for sheet metal fabrication include:

Optimisation of raw material sheet utilisation

Better control over the quality of the product

Optimisation of overall product and project cost

Seamless integrated workflow for ease of use and faster training

Better resource utilisation for equipment and operators

Faster time to market, ensuring on-time deliveries to the end customer

Optimisation of manufacturing cycle times

HEXAGON

Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that utilise data from design and engineering, production and metrology to make manufacturing smarter. For more information, visit hexagonmi.com.

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at hexagon.com and follow us @HexagonAB.

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