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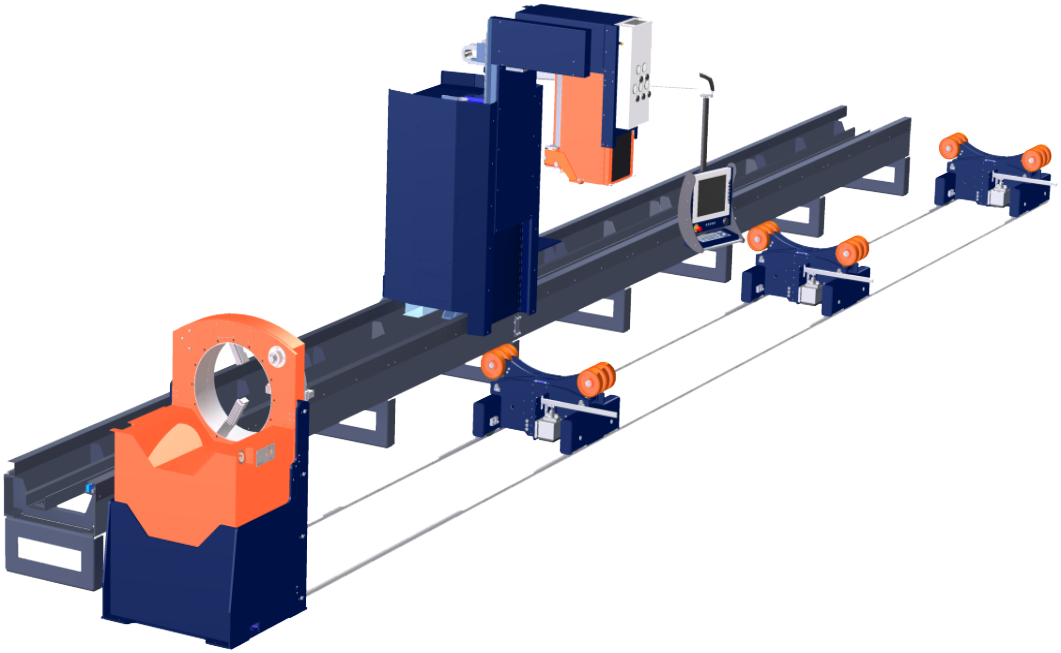

SPC 1200 PT

HGG specialists in 3D profiling

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Erkiz

Turkiye

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Quotation Pipe Profiling Machine SPC 1200 PT

The SPC1200 Chuck type pipe cutting machine in combination with Pipe Trolleys is designed and engineered completely in house by HGG. The SPC1200 has a pipe capacity of Outside Diameter Ø 48mm (1.89”) - Ø 1225mm (48”) with a maximum load ability of 8 Ton (optionally 12 Ton).

Hardware			Quantity
Support	Pipe trolley 3 Ton	Hydraulically height adjustable pipe support for 3 Ton weight. The hydraulic height movement allows easy operation under full load and allows repositioning after pipe loading.	3
Main Frame	Cutting in front of the main drive (increments of 2m / 6.6ft)	Maximum pipe length in front of the main drive. Length is specified in meter.	12
Main Drive	Long Jaws	Reduction of scrap length, while cutting in front of the main drive, to 50 mm / 2" only.	1
	Main drive SPC1200 8 Ton	Height adjustable main drive, absorbs the variation in centerline height in case of diameter variation. The main drive is equiped with a solid self-centering 3-jaw chuck.	1
Cutting Trolley	Cutting trolley 300-1200	The cutting trolley includes the patented 'Biaxial Cutting Head'. This cutting head integrates simultaneous torch rotation with torch tilting +70 degrees or -70 degrees and automatic pre-heater torch. The remote control is attached to the cutting trolley. Two sensor arms, at each side of the cutting torch, keep the torch material distance constant through regulated CNC control. On the back of the cutting trolley the controll unit, with integrated heater and air conditioning, is mounted.	1
Cutting Process	Oxyfuel Acetylene (3-50mm / 0.12-2")	Low pressure acetylene cutting, wall thickness from 3-50mm / 0.12-2" under 70 degrees cutting angle, including automatic preheating torch. Preheating torch will improve the cutting speed at 70 degrees cutting angle with 100% and at 45 degrees cutting angle with 50%	1
Plasma	Hypertherm PowerMax125	Hypertherm PowerMax125 with torch and operator protection glass.	1
Exhaust	3 Point Fume Exhaust system	Unique integrated three point fume exhaustion system whereas exhaust from all three points are joined in a single exhaust at the chuck side of the machine leading to a spark collector.	1
Filtration	DFPro 6 (up to OD 1220 mm / 48")	Fume Exhaust filter unit, Donaldson model Torrit DFPro 6	1

Quotation Pipe Profiling Machine SPC 1200 PT

Hardware			Quantity
Foundation	In concrete foundation frame option 1 (Drawings)	HGG will supply drawings for the foundation frame which is embedded in the concrete floor.	1
Marking software	Text + Reference line marking	The unique 'ID name' marked on the part - and miscellaneous text- Lines that help to orientate, measure or assemble parts.	1
Marking device	Punch marking	Permanent marking. - Pneumatically operated needle 'punches' the marking into the material.	1

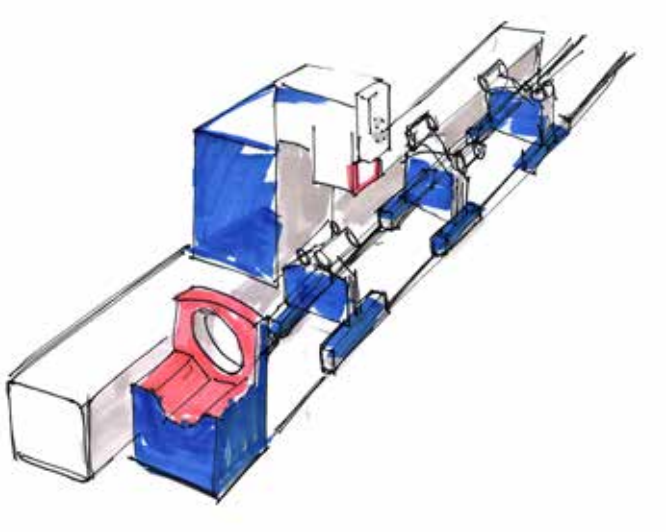
Software			Quantity
ProCAM	License key	Single user offline licence key.	1
ProGRAM	ProGRAM	ProCAM-ProGRAM is composed of: - MDI (Manual Data Input) for parameterized programming of positions; - automatic nesting for optimal assignment of programmed parts into customer stock material; - 3D viewer tool to view a real representation of the programmed positions.	1
ProCAD	ProCAD Tekla Structures	ProCAM-ProCAD for Tekla Structures postprocessor to transfer cutting data to the pipe profiling machine	1

Cutting Shapes PPM			Quantity
Standard set macros	chamfer	A pipe to plate connection.	1
	chamfer PJP	For small sloped and highly dynamic pipe to pipe connections. Easy cutting, fitting and welding.	1
	hole set-in	For pressure connections with a smaller branch pipe diameter.	1
	hole set-on	To fit a saddle on a hole.	1
	mitre hole and saddle	To make equal diameter pipe to pipe connections for low pressure piping.	1
	oblong hole	To fit inserted plates at pipe ends or to create intermediate oblong holes.	1

Quotation Pipe Profiling Machine SPC 1200 PT

Cutting Shapes PPM			Quantity
	saddle	A pipe to pipe connection in tubular structures.	1
	saddle PJP	For small sloped and highly dynamic pipe to pipe connections. Easy cutting, fitting and welding.	1
	saddle set in	For pressure connections with a smaller branch pipe diameter.	1

Plasma	Hypertherm HPR130XD	Hypertherm HPR130XD, with mixer, machine torch and operator protection glass.	1



Product Description

SPC 500-1200 PT (Pipe Trolley)

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SPC 500-1200 PT

Introduction

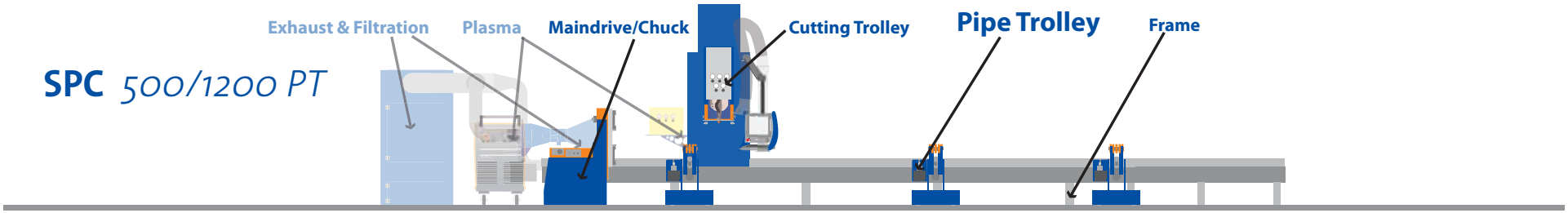
- Pipe Trolley support
- The production process

Hardware

- Foundation & Main frame
- Main drive
- Cutting trolley
- Pipe Trolley
- Cutting technology
- Cutting compensation
- Exhaust & Filtration
- Marking (if applicable)
- Health and Safety

Software

- ProCAM framework
- ProGRAM
- ProCAD
- ProMIS
- ProQMS

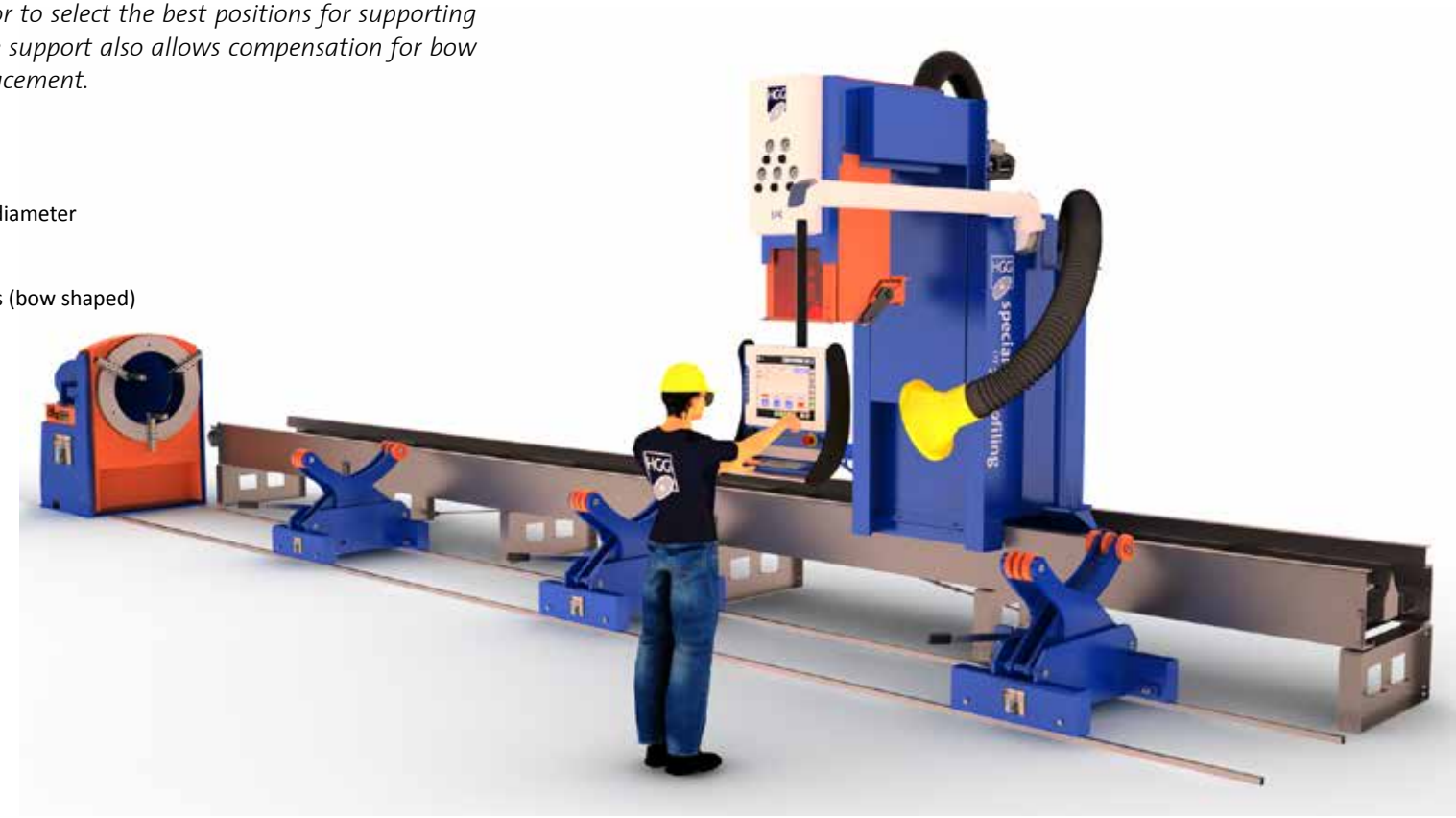


Pipe Trolley support

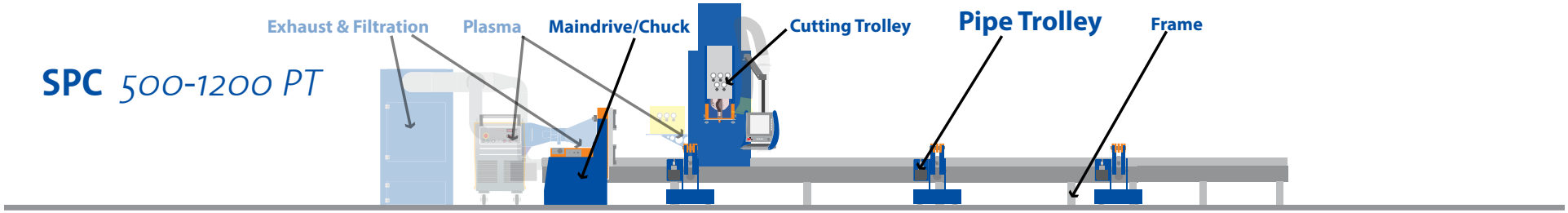
The PC Pipe Trolley is a multiple point support system which can easily be adjusted depending on the diameter, length and maximum weight of the pipe. The pipe trolleys allow the operator to select the best positions for supporting the pipe. This flexibility of the pipe support also allows compensation for bow shaped pipes by strategic trolley placement.

Characteristics

- Highly adaptive to pipe length and diameter
- Flexibility and ease of use
- Compensation for length distortions (bow shaped)



SPC *500-1200 PT*



Main Drive SPC 500-1200

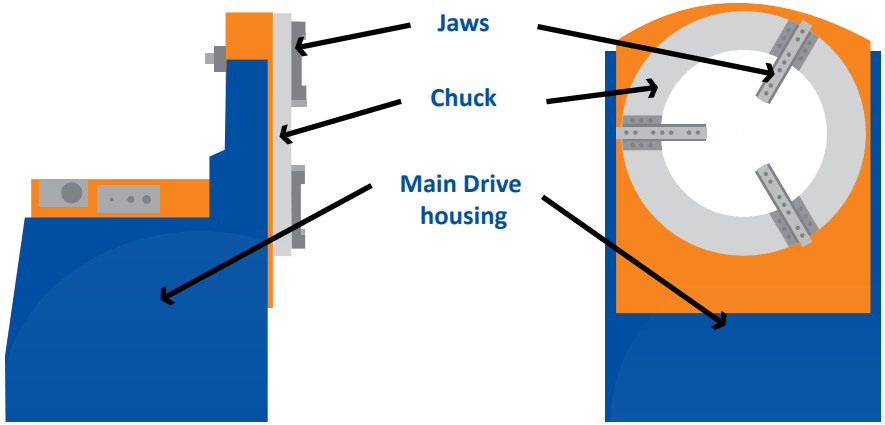
In the configuration of the pipe cutting machine, the chuck plays an important role in the achievement of high quality cutting results. Because every pipe has some degree of distortion in the length (bow shaped) and roundness (ovality) the centreline is the only fixed reference point. The most important function of the main drive is to ensure the accuracy of the pipe cutting process. The self centring three jaw chuck achieves this accuracy by clamping the pipe avoiding slip during rotation and creep (longitudinal movement).

Components

The major components of the main drive are the housing and the chuck. The solid self centring three jaw chuck clamps and centres the pipe and rotates with it. The housing containing the internal hardware: the gearing, the motors, hydraulics and electronics.

Solid self centring three jaw chuck

No pipe is perfectly round. By clamping the pipe in the chuck, the centreline of the pipe is defined making degrees of rotation around the centreline an accurate and reliable measurement. Having three jaws ensures that all jaws are in contact with the pipe at all times. The centreline is the basis for the projection and processing of all cutting routines on the pipe.

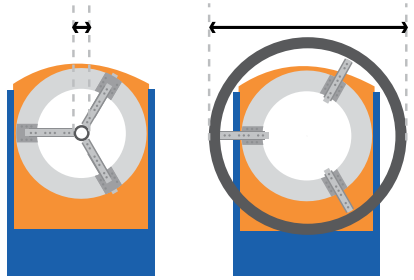


The Main Drive and the basic components solid self centering 3 jaw chuck

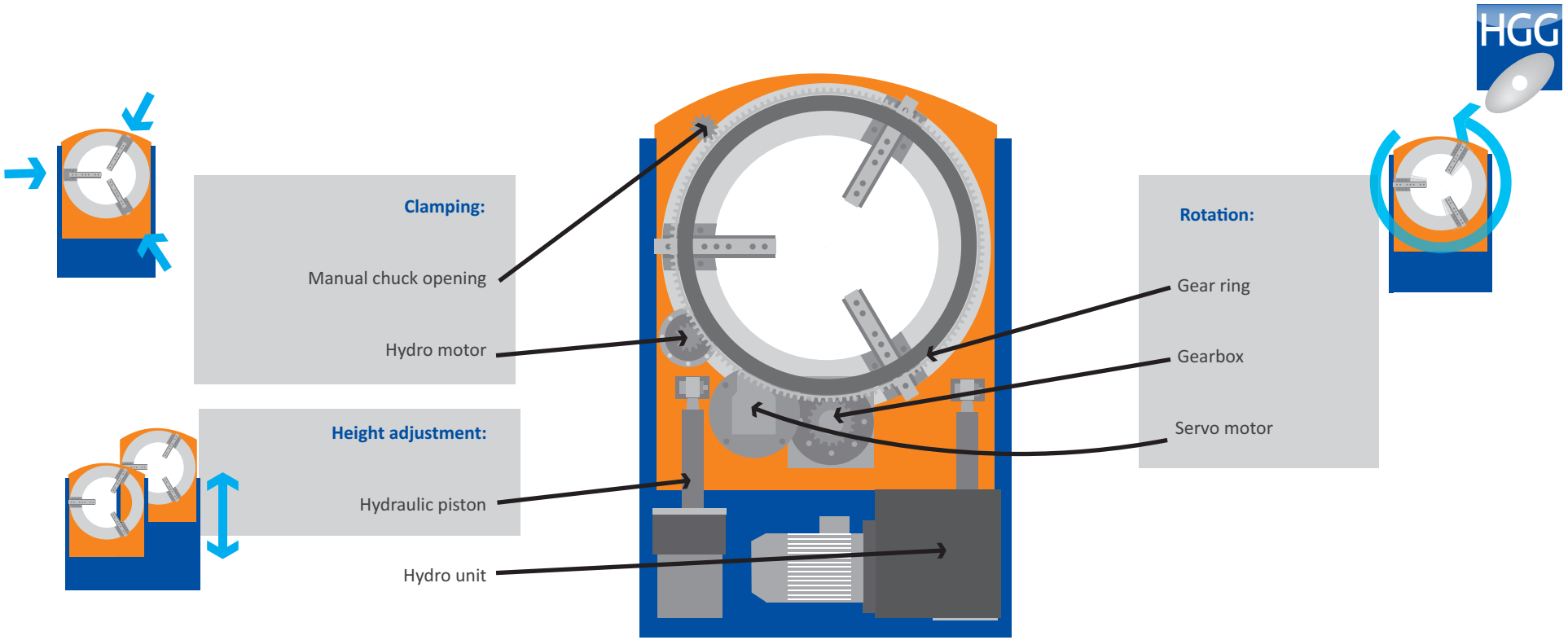
The chuck and the jaw mounts are custom designed by HGG and the fact that it is milled from a solid block of steel contributes to the extreme accuracy. The hole through the centre of the chuck allows cutting on both sides of the main drive (the maximum diameter being determined by the size of the hole) and facilitates the integration of the chuck into a linear logistic production system.

Housing and internal hardware

The major internal components are shown in the section view. This section provides a short description of the parts and their relationship to each other. The hydro unit powers the hydro motor that is used for clamping as well as the pistons that control the height adjustment. The rotation of the main drive is powered by a low maintenance, brushless DC motor. This runs through the gearbox to the gear ring that is attached to the chuck. The machine is totally motorised but there is an extra, manual chuck release point ensuring that the main drive can be opened at all times.



Left small diameter with outside clamping. Right inside clamping for larger diameters.



Major internal components of the Main Drive.

Movement

Clamping

Clamping is the process of holding and locking the pipe in position to ensure that there is no slipping when the pipe rotates. Clamping is hydraulic, the hydro unit powers the hydro motor which clamps the pipe. The reason for hydraulic clamping is that this provides greater accuracy and control over the force that is applied. This is important because if the pressure is too low the pipe will slip, if it is too high the pipe could be deformed. A maximum of 70% of the total pressure is used to clamp the pipe to make sure that the chuck can be released, 100% of the total pressure is used to open the chuck and release the pipe.

The jaws can clamp both the inside and the outside of the pipe. This means that a large range of pipe diameters can be clamped, pipes with small diameters are clamped on the outside of the pipe, those with larger diameters on the inside. It is also possible to manually reposition the jaws (using a Hex key {Allen key} to move the easily accessible mounts) to utilise the full range of the chuck.

Rotation

During the cutting process the main drive is fully automatic and CNC controlled. The rotation is powered by a brushless DC servo motor connected to a gearbox.

Height adjustment

The main drive is height adjustable to allow it to adapt to the different pipe diameters. The movement is controlled by the control unit.

"The Main Drive makes pipe cutting accurate; chances of slip during rotation are eliminated together with creep or longitudinal movement."

Cutting Trolley SPC 500-1200

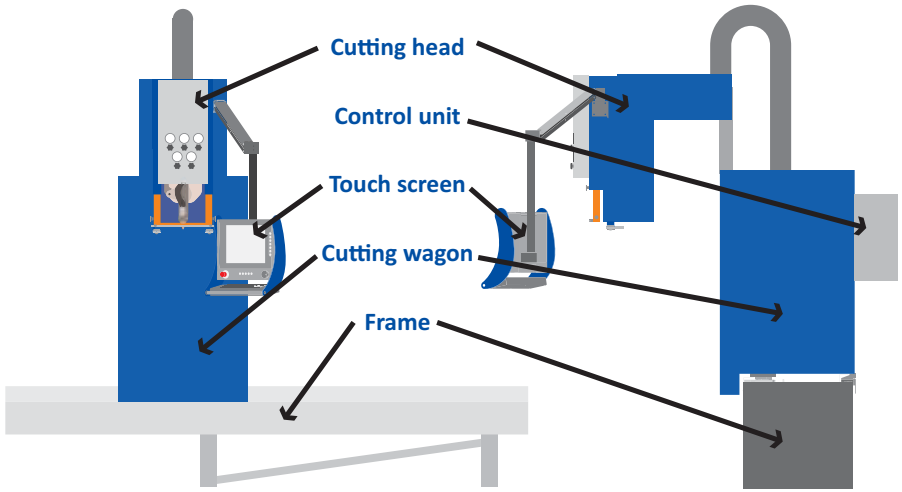
The cutting trolley is the command centre of pipe cutting. The trolley ensures a high quality result using the patented 'Biaxial Cutting Arm' to cut complex three dimensional shapes with maximum precision. Both the control unit and the touch screen operating panel are mounted on the cutting trolley allowing the operator to always be close to the cutting process to monitor the progress. The cutting trolley adjusts to the pipe diameter and detects deviations in the roundness of the pipe.

Components

The cutting trolley has two main components: the wagon and the cutting head. The cutting trolley runs on rails along the length of the pipe. The cutting head is height adjustable and provides the tilting and turning movement necessary to cut complex three dimensional shapes.

Cutting wagon

The cutting wagon is the basis of the cutting trolley. The wagon is connected to the frame by two precision hardened linear guides to ensure that the cutting head runs perfectly in line with the centreline of the pipe. To ensure the accuracy of the CNC position along the pipe length, the brushless DC motor runs with a single gear along the toothed rack.



Cutting Trolley and the basic components

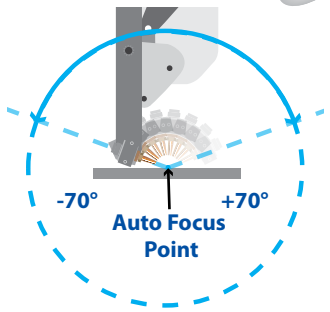
Cutting head

The cutting head is the part of the machine that puts HGG in a league of its own because it incorporates the patented Biaxial Cutting Arm. The other components integrated into the cutting head are the cutting torch, the sensor arms and the initialisation laser pointer.

Patented Biaxial Cutting Arm

The lightweight cutting arm has been patented, the characteristic feature of this arm is that it is auto focused. This affords considerable advantages over other cutting head guidance principles such as pantograph, scissors or azimuth. Because the cutting arm is tilted during 3D cutting, the focus point remains exactly centred. This results in a more constant and accurate cutting path compared with other guidance systems which need an additional axis to regulate the focus with additional axial movements based on the theoretical (or sensor detected) pipe surface.

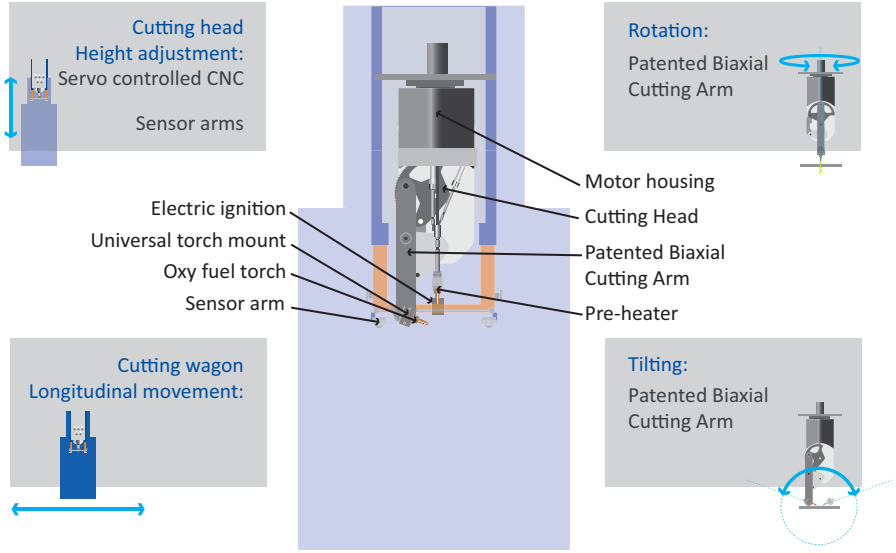
The other important characteristic of the cutting arm is that it is very compact. This allows rapid movement of the torch without limitations caused by mass inertia of the motorised parts. This compactness also allows cutting very close to the main drive which minimises the scrap length when cutting. Last, but not least, a compact cutting arm makes it possible to shield off and extract harmful gasses from the shop floor, especially important during plasma cutting. The Biaxial Cutting Arm is easy to calibrate either by physical by alignment or by using a 'Calibration Cutting Routine'. A test piece is cut with the machine, the resulting cut is measured and the dimensions of the test piece are re-entered into the software and the arm is calibrated by comparing the actual cut's deviation from the programmed cut.



Auto Focus point

Cutting torch(es)

The SPC series is always supplied with an oxy-fuel cutting system modified for any type of cutting gas locally available. An electrical ignition unit operated from the machine's touch screen control panel guarantees safe and user friendly operation. A pre-heating torch is also installed which is activated automatically when the machine is cutting angles greater than 30°. At these angles, because of the angle of the torch, the heating of the material is spread over a greater area. The pre-heater compensates for the heat loss guaranteeing the high quality of the cut. In addition to the oxy fuel torch, a plasma torch can be integrated to provide a dual cutting system giving the best of both worlds. Changing from one cutting system to the other takes no more than five minutes thanks to the specially designed universal torch mount.



Left cutting trolley on rails. Right cutting head cutting arm.

Sensor arms

The very compact, patented Biaxial Cutting Arm allows a sensor system to be positioned within 200mm of the actual cutting process. This is critical because the closer the measurement is to the actual cutting, the more accurate the cut will be. The sensor arms are of mechanical design to provide maximum reliability of the sensor system which has to deal with distorted pipes (bow shaping or ovality). The sensor arms safeguard an optimum torch-to-material distance at all times, resting on the pipe with a preset weight in order to detect any deviations in roundness or height.

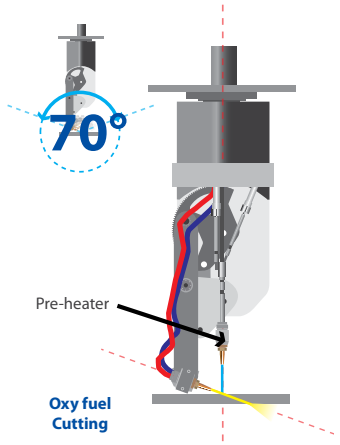
Initialisation laser pointer

The cutting trolley is equipped with an initialisation laser pointer which helps the operator align the end of the raw material. This allows accurate positioning of the trolley, adding to the ease with which the machine can be operated and helps reduce scrap to an absolute minimum.

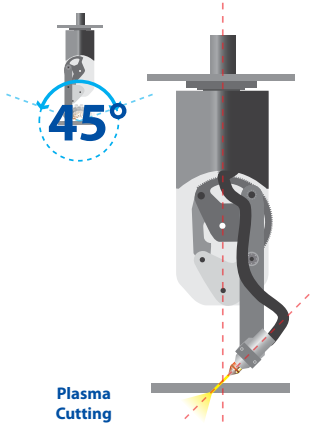
Movement

Longitudinal movement

The longitudinal movement refers to the movement of the whole cutting trolley. This movement is CNC controlled and allows the trolley to move along the entire length of the pipe on the trolley rails.



Maximum oxyfuel cutting angle with pre-heater system.



Maximum plasma cutting angle.

Height adjustment

The height adjustment is controlled by a servo motor and allows the cutting of different diameters while maintaining the exact torch-to-material distance. The sensor arms at each side of the cutting torch also push the pipe onto its support with a pre-set weight (+250N, adjusted by a spring loaded system). This firmly locks the pipe on its support and senses the actual surface (not rust, dust or residue that may be present on the surface). This force also avoids light small parts to lift up from the support, locking them firmly into place.

Rotation and tilting

The rotation and tilting of the patented Biaxial Cutting Arm are controlled by two brushless DC motors integrated into the cutting arm.

"The cutting head is the part of the machine in which HGG really is in a league of its own since it incorporates the Patented Biaxial Cutting Arm. Other components integrated along with this are the cutting torch(es), the sensor arms and the initialization laser pointer."

Oxyfuel cutting

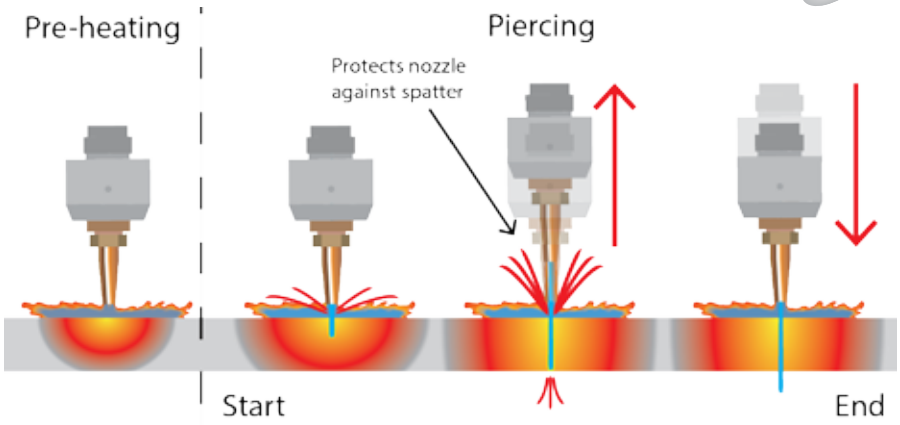
Oxyfuel cutting is a reliable, accurate and competitive cutting technique used for the cutting of mild steel. The very first HGG machines 25 years ago were equipped with the oxyfuel cutting technique. For many applications this is still an excellent solution.

The basics

Before cutting, the cutting torch has to pre-heat the steel to ignition temperature at the starting point. At this temperature of around 960°C (depending on type of alloy), the steel has lost protective properties against oxygen and is still solid. Pure oxygen is then directed through the nozzle at the heated area. This fine and high pressure oxygen stream changes pre-heated and unprotected steel into oxidised liquid steel by an exothermic reaction. This slag has a lower melting point than steel, so the oxygen stream can blow the liquid slag out of the cavity without affecting the non-oxidised solid steel. This exothermic reaction is a continuous process and creates a cut as the torch moves. To keep the exothermic reaction working, the cutting torch keeps the steel heated during cutting.

Only metals whose oxides have a lower melting point than the base metal itself can be cut with this process. Otherwise as soon as the metal oxidises it terminates the oxidation by forming a protective crust. Only mild steel and some low alloys meet the above conditions and can be cut effectively with the oxyfuel process.

el cutting with pre-heater



Oxyfuel 'dipped piercing'

Pre-heater

Oxyfuel cutting is a time consuming process, especially cutting thick walled materials. The shortest distance through the material is a cut perpendicular to the pipe wall. In many cases the cut will need a bevel. This is an angled cut for weld preparation. When the cutting torch is at an angle, the heat transfer to the material will be less than that of a perpendicular cut. On top of this, the steeper the angle, the greater the depth of the cut. Because of these issues, the machine is equipped with automatic speed control, to lower the cutting speed to maintain an accurate angled cut. To achieve a higher cutting speed with the same accuracy, the machine is equipped with an extra perpendicular pre-heating torch. This preheats the steel close to ignition temperature along the cutting path. The extra pre-heater switches on automatically for angles steeper than 30° to increase the cutting speed.

Piercing

Piercing is the initial penetration of the surface to be cut. It uses the same exothermic process as used during cutting.

Dipped piercing

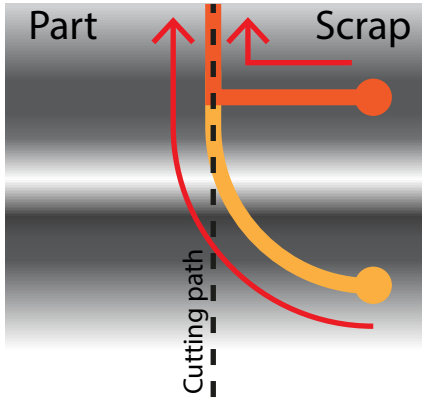
After pre-heating the surface, oxygen will stream through the nozzle to change the solid pre-heated steel into liquid oxidised steel (slag). Spatter occurs during this process, because the oxygen blows away the slag upwards during piercing. To protect the nozzle against spatter during piercing, the cutting torch moves upwards. After the material is pierced, the cutting torch moves back to the correct torch-to-material distance for cutting. Angled piercing is also available. In some situations this type of piercing maintains a better removal of spatter. Out of the pipe or on the inside of the scrap part for example, to protect the inside of the part against spatter.

Proportional piercing (optional)

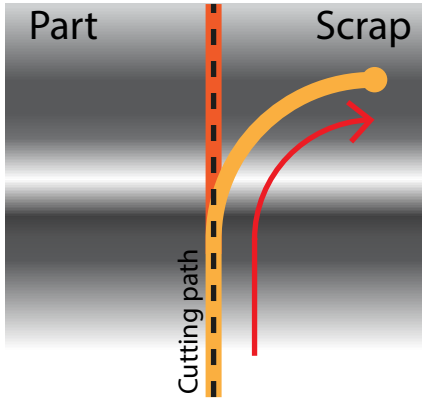
When thick material is pre-heated for slightly too long, the input of oxygen will cause a lot of spatter and create a large crater. This is due to the thick wall and an access of liquid slag. This spatter will stick on the nozzle and affect the gas flow and cutting process badly. Insufficient pre-heating will mean that the full wall thickness has not reached the ignition temperature to maintain the exothermic process. The process will stop half way and the operator will have to try again at another starting point and the damage to the actual cut will cause more grinding and welding. So when cutting thick walled material it is difficult to define the perfect time and temperature to preheat so that even the deepest part of the material is heated to the correct temperature. It requires a lot of practice and experience.

Proportional piercing controls the oxygen flow which controls the exothermic process during piercing. After a very short period of pre-heating, only the surface has reached the ignition temperature. Once the piercing process has started at low oxygen pressure, the cutting torch begins to approach the cut. To keep the exothermic process running and to pierce deeper, the oxygen pressure slowly increases automatically to full pressure until the piercing is completed. As the torch moves towards the initialisation point of the profiling shape, it gradually changes angle to start the profiling shape at the correct angle. Because the movement creates room for the slag during piercing, there is a minimum of spatter. No spatter means a longer lifetime of the nozzle (low costs) and a constant quality of the cut.

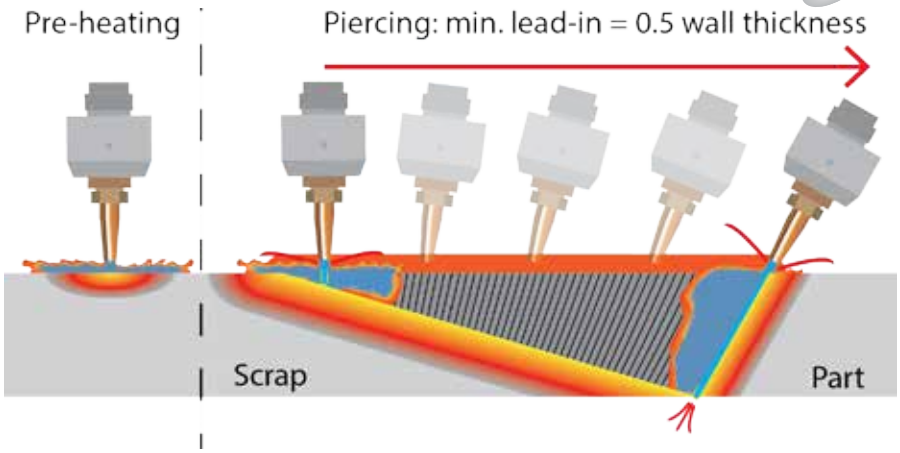
"Reliable cutting technique combined with industry experience"



Straight and radial lead-in



Radial lead-out



Oxyfuel 'proportional piercing'

Lead-in and lead-out

The lead-in is the approach to the profiling shape. After piercing the scrap area of the material, the torch moves toward the programmed start position and angle. This prevents damage to the actual cut caused by the start up of the cutting process. The operator can choose a straight or radial lead-in depending on the situation.

The lead-out is the exit from the cut. When the programmed cut has been completed, the torch moves away from the cut. This radial movement prevents damage to the part during the shut-down of the cutting process.

Characteristics

Thicker walls and steeper angles

Oxyfuel allows the cutting of thicker walled material then plasma. Plasma can't cut thicker walls because of the huge amounts of energy necessary to reach similar thicknesses. Oxyfuel also allows the cutting of steeper angles up to 70° (as compared to 45°) because of the concentration of the oxygen beam. The plasma beam has the tendency to deflect when the angle is too steep.

Lower costs

Oxyfuel is a more economical solution than plasma cutting. Initial investment costs, consumables and operating costs are all lower than plasma cutting.

Manual tweaking

The operator can control the flow of the cutting gasses at any time during the cutting process. This allows fine tuning or tweaking of the programmed cut for maximum quality.

HGG's cutting compensation (oxy fuel or plasma)

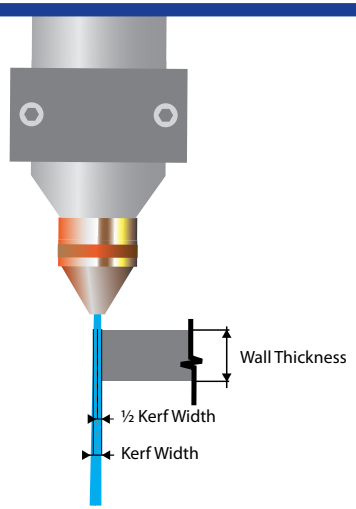


Figure 1 Kerf width compensation

Kerf With Compensation

The width or kerf is dependent on the plasma source, voltage, and amperage based on the wall thickness. To ensure an even better accuracy, this kerf is compensated by HGG's control software. This compensation is typically half of the kerf width.

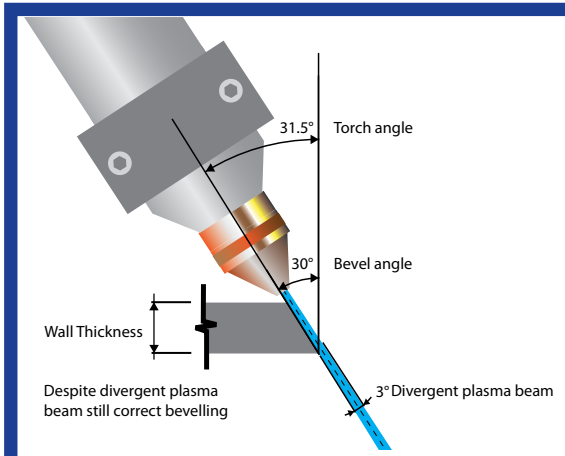


Figure 2 Divergence compensation

Divergence Compensation

In most cutting conditions the plasma beam is divergent; this divergence can vary depending on the plasma torch and nozzle. To make sure the cutting angle is accurate the divergence compensation can be reprogrammed into the machine as an offset. As an example, if the divergence of the beam is 3 degrees and the required bevel of 30 degrees, the cutting angle is has an offset of 1.5 degrees. Consequently, setting torch is 31.5 degrees compensating the divergence.

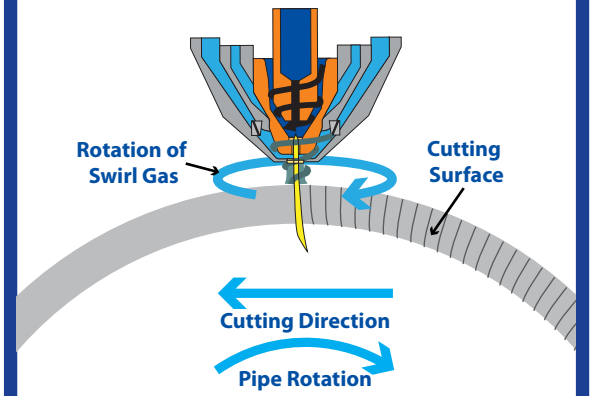


Figure 3 Optimized cutting direction

Optimized cutting direction

Plasma cutting uses a swirl to focus, stabilize and protect the beam firmly. In order to get a straight cut on your production pieces you must travel in the proper direction. The "good side" is on the right as the torch is traveling away from you. To maintain the most accurate cut, HGG uses this knowledge and adapt their cutting routines.

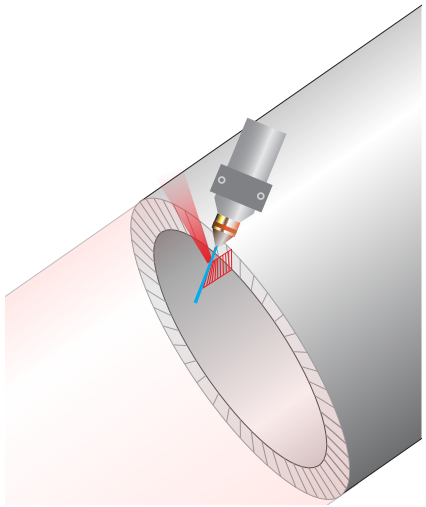
Plasma cutting

Plasma cutting is a high speed cutting technology developed to cut electrically conductive materials. Since 1994 HGG has distinguished itself as a pioneer in CNC plasma cutting. For almost two decades HGG has supplied plasma cutting technology incorporated into over 150 3D profiling machines worldwide. HGG is constantly innovating to stay on top of the latest developments in this technology.

The basics

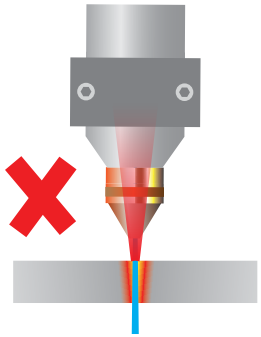
Plasma cutting can be used on any electrically conductive material. Materials such as stainless steel for example, can only be cut by plasma cutting because no oxidisation occurs prohibiting the use of oxy fuel cutting. The pipe and chuck (In a chuck type machine) or the clamped pipe (in case of a roller bed type) are earthed. The gas that comes through the nozzle carries a charge. The plasma nozzle also emits a protective gas around the cutting gas which twists to concentrate the beam (fine focus), if the protective gas has a contra swirl to the cutting gas it produces an even more concentrated beam (high focus). When the cutting gas beam approaches the earthed material it arcs forming ionised gas (plasma) which reaches extreme temperatures, vaporising the material rather than cutting it.

Depending on the selected plasma equipment, the cutting gases can vary between air or optionally oxygen, hydrogen nitrogen or argon. Also dependent on the cutting gasses the shield gases can vary between air or optionally nitrogen.

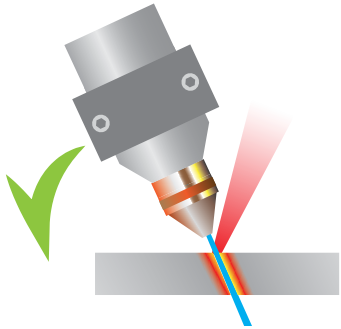


3D view Angled Piercing

Perpendicular; spray bespatter nozzle



Anglular; spray does not bespatter nozzle



Angled Piercing

Characteristics

Versatile

Plasma cuts through any electrically conductive material, allowing the cutting of a wide range of materials from mild steel to exotic alloys.

Fast

In the wall thickness range up to 25 mm, plasma cutting outperforms oxy fuel cutting. The exothermal process of oxy fuel cutting limits the cutting speed to between 350 and 800 mm/min. whereas plasma cutting can reach speeds of up to 3000 mm/min. with smaller wall thicknesses. Because plasma cutting requires no pre-heating, even more time is saved on each individual cut.

High quality

Plasma cutting delivers a superior surface result than oxy fuel when cutting thinner material. Plasma also has a smaller heat-affected zone resulting in less distortion of the material's microstructure.

Plasma costs

Initial investment costs are higher for plasma than for oxy fuel. This is because, apart from the plasma source, a complete exhaust system with filtering unit is required. The cost of monthly consumables is also more expensive than oxy fuel but this is compensated by the higher cutting speed increasing production.

"HGG supports both Kjellberg as well as Hypertherm, two well experienced and industry leading choices."

"Plasma is Versatile, fast and gives a High Quality result."

for marking options with plasma see appendix 'marking' or ask your HGG representative.

HGG's unique plasma features

HGG's machines and software allows for the following compensations of plasma characteristics which are unique to the industry and only available with HGG's machinery, made possible due to the fact that all software is developed by HGG in-house:

Torch to material distance control

The dynamic, constant measurement of the distance between the torch and material (directly or using measuring routines). This helps to prevent cutting head collisions, deviation in the fit length and ensures a constant beam.

Angled piercing

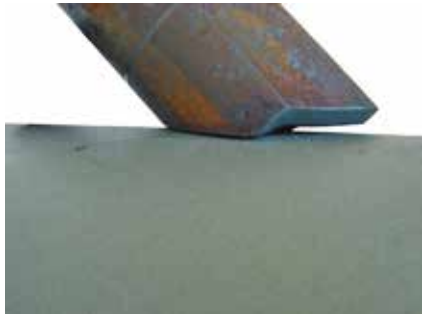
The piercing routine is carried out at an angle to maximize consumable lifespan by protecting the nozzle from the spatter zone during piercing.

Kerf width compensation

Kerf width compensation is included in all CNC cutting routines, this compensates for the thickness of the beam ensuring that the cut is accurate (see figure #).

Stainless steel

Aluminium



PJP saddle

Divergence compensation

The greater the wall thickness of the pipe, the more the divergence of the beam can influence the accuracy of the cut. This is an angular compensation to correct inaccuracies due to beam divergence.

Melting correction

In the case of negative bevels there is a danger of rounding caused by melting of the fit line. This is a distance correction to compensate for the melting effect ensuring ease of fitting and welding.

Specific plasma cutting macro's

The maximum cutting angle is usually 45°. When a normal macro requires a steeper cutting angle HGG offers a number specific macros that are adapted to overcome this restriction, regaining design freedom. These specific macros still maintain the constant, pre-set welding opening and therefore do not compromise welding accessibility or require additional grinding. Examples of these cuts are; partial butt welds and strainers.

Marking

Pipe cutting machines produce a collection of individual parts for a construction. It is the fitter his job to assemble all the parts based on drawings. It will be necessary to identify the parts, the distance and orientation between them and the interconnections. To this purpose, HGG offers several marking solutions. Parts can be marked with text to identify the part or material used. Some design system can also generate footprints, markings which identify the position where one part will be fitted to another. Depending on the requirements, a choice can be made between permanent and non permanent marking.

Text reference marking

ID printing

The unique 'ID name' used in CAD drawings can be printed on the part, additional information can also be added if required, such as project title, job number etc.

Miscellaneous text

Any text or directions that are not part specific, for example 'This way up', weight or storage information.

Reference lines

Reference lines are lines on the pipe that help to orientate measure or assemble the different parts of the construction. These lines can also be crossed making reference points.

Footprint marking

A footprint is a form that indicates the position where another part is to be attached.

Welded attachment footprint

This marks the contour of an attachment to be welded to the part. This may be a predefined shape such as a circle, ellipse or square. It can also mark the position of the actual attachment of another part (extracted from the CAD information) with the option of adding the ID name of the attachment next to the footprint.

Bolted attachment marking

This marks the positions of holes or bolts that will be used to join parts. The position of the holes are printed with cross-hairs markings.

Miscellaneous mark lines

This refers to any lines or circles that are not directly linked to an attachment. Such as 0° or 180° reference lines, 'short point and long point' and frame lines.

"The extra step to further reduce fitting costs"

Footprint marking triple saddle

Footprint marking double saddle Ink-jet

Text reference marking Ink-jet

Ink-jet marking system

Plasma dedicated marking system

Marking techniques

Ink-jet/ marking

This option is a non permanent marking technique and has no influence on the material characteristics of the pipe. Ink is used to record the plotted marking on the pipe, these markings will not be visible after blasting or painting.

Punch/ marking

This is a permanent marking technique and will affect the material characteristics. A pneumatically operated needle 'punches' the marking into the material with a constant, pre-set pressure. The marking remains visible.

Plasma marking/ single integrated torch

HGG can supply plasma cutting torches that are also capable of permanent marking. This saves on the initial cost of a dedicated plasma torch and on maintenance costs (this option is only available with the HiFocus 160i and 280i plasma unit).

Plasma marking/ dedicated marking torch

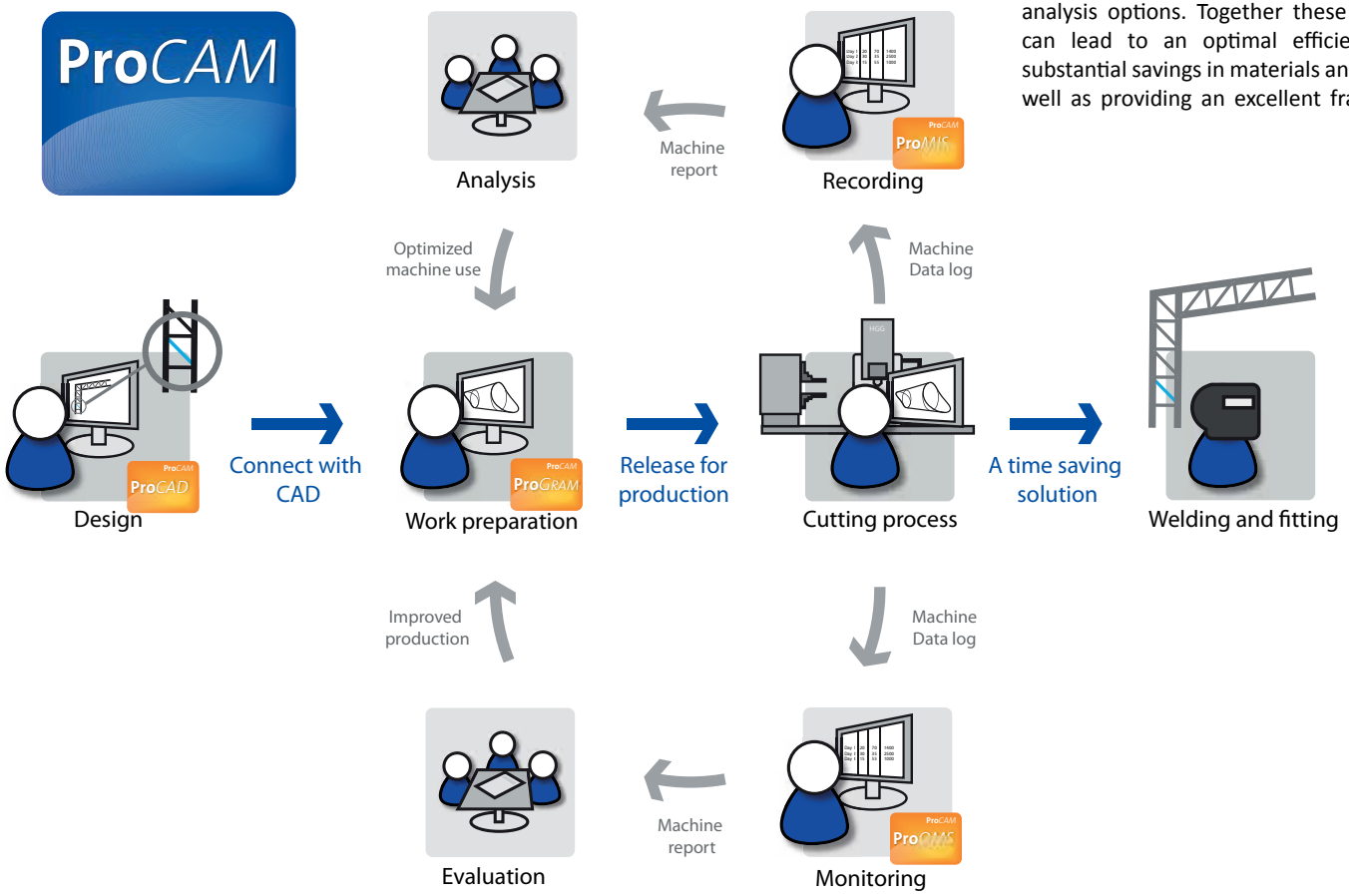
The dedicated plasma marking torch is an extra torch that can be supplied along with the cutting torch. If the HiFocus plasma unit is not required this extra torch can save on costs. This is an excellent option when the cutting is to be done with oxy fuel and plasma is only used for the marking.

HGG's marking solutions	Inkjet marking	Punch marking	Plasma marking (single torch)	Plasma marking (dedicated marking torch)
Effects material characteristics	*No*	*Minimal*	*Minimal thermal affected zone*	
Non permanent marking	*Yes*	*No*	*Possible*	
Permanent marking	*No*	*Yes*	*Possible*	
Combines with the use of oxy fuel torch	*Possible*	*Possible*	*Possible*	*Possible*
Note.	*Fast marking of text*	*The system is noisy*	*Only applicable with Hi Focus 160i or 280i*	

Four different marking options and their characteristics

ProCAM Framework

Cutting data is needed to cut parts by use of the cutting machine. There are two distinct methods of generating the data required to cut parts. Manually by using the MDI module or automatically by using one of HGG's CAD-CAM connections. HGG's ProCAM software is the key to prepare the cutting data easily by use of predefined profiling shapes. Like holes and saddles with several weld preparation features.



The Framework

ProCAM is constantly expanding and evolving to incorporate advances in technology and effectively respond to the wishes of the users. This feedback is very useful to optimise production processes and enables various useful analysis options. Together these features can lead to an optimal efficiency and substantial savings in materials and time as well as providing an excellent framework on which to base effective calculation, estimation, planning and quality control. In combination with the Manual Data Input, Nesting and 3D Viewer modules, optional modules like Analysis and 3D Work Preparation forms the perfect framework for all aspects of structural design and preparation of materials for the cutting machines.

Software innovations inspired by close communication with our valued customers and our own steel service cutting centres offers you:

- Unique combination of products and services;
- Invaluable analysis and efficiency features;
- Manual data input;
- Constant evolution and adaptation to advances in technology and the industry due to the experience from large quantities of machines delivered;
- Loading files directly from CAD, no re-programming required;
- Integration in data network and easy loading;
- 3D viewing of profile and defined profiling shapes;
- Nesting a single pipe, whole batch or multiple groups.

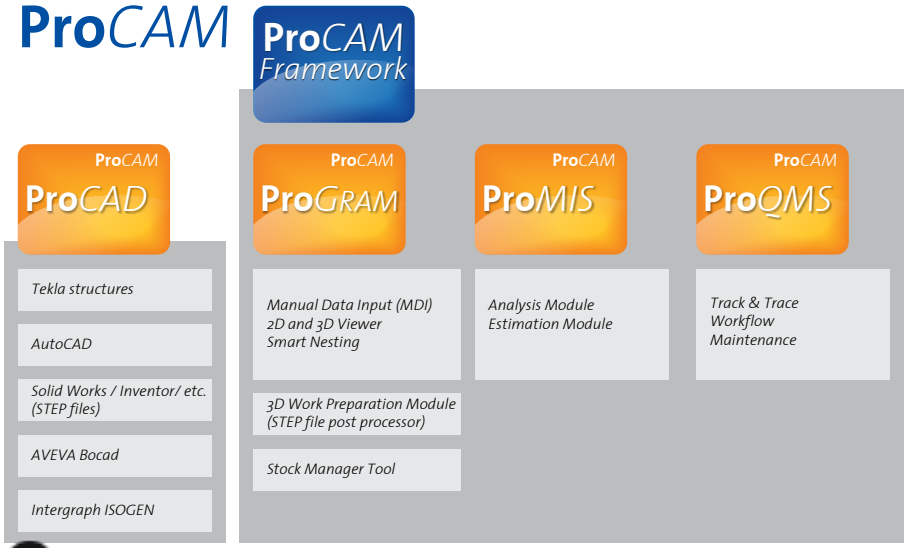
ProCAD

ProCAM provides the ideal interface for the export and conversion of entire structures modelled in a wide variety of CAD packages into CNC data files for the cutting machine without the need for further processing. The current trend is toward BIM (Building Information Model), the enrichment of information through standardisation of all aspects of the industry from design to production. HGG is proud to be a leading player in this trend towards greater collaboration within the industry, an approach that coincides so well with it's own company philosophy. The various ProCAD connections link the existing CAD-CAM design systems to ProCAM providing unique extra functionality and editing capabilities, vital for the generation of the necessary cutting data for the machine.

ProGRAM

With this comprehensive package it is possible to design parts by manually entering data and program profiling information (MDI), view all the designed parts (3D Viewer) and divide them efficiently into the available raw materials (Nesting).

Optional extra tools are available like the Lobster Back and the Stock Manager. Stock manager is an interactive tool who enables the addition of raw materials and rest material to the manufacturing database. Detailed information about these and other available modules is provided upon request or included with the price quotation.



ProMIS

ProMIS is the optional, database-driven Management Information System. ProMIS is designed to utilise factual information (logged by the cutting machine during production) to provide a series of reports. The information can be imported into ProMIS and using a variety of filters, reports are generated showing everything from a general overview of the process to finely specified details.

ProMIS analysis and estimation offers you:

- Familiar, intuitive interface with the 'Windows' look and feel;
- Generate reports containing information on the cutting process. Like timing, amounts, errors, etc.;
- Activity log;
- Calculate the estimated cutting time;
- Actual feedback directly taken from the cutting machine.

ProQMS

ProQMS is the optional Quality Management System. ProQMS will enable manufacturers to be able to 'see' every stage of the production process giving them the freedom to make on the spot decisions and changes, adapting effectively to problems and the development of unforeseen circumstances. Features such as 'Track & Trace' will allow batches of specific materials to be closely followed through the production process. Predefined regular checks can be carried out to maintain quality requirements.

More information?

Detailed information about the individual software options is available on request. If the software is included in the price estimate, a detailed description will be provided by HGG.

ProGram

"Inhouse developed desktop application for intuitive programming"

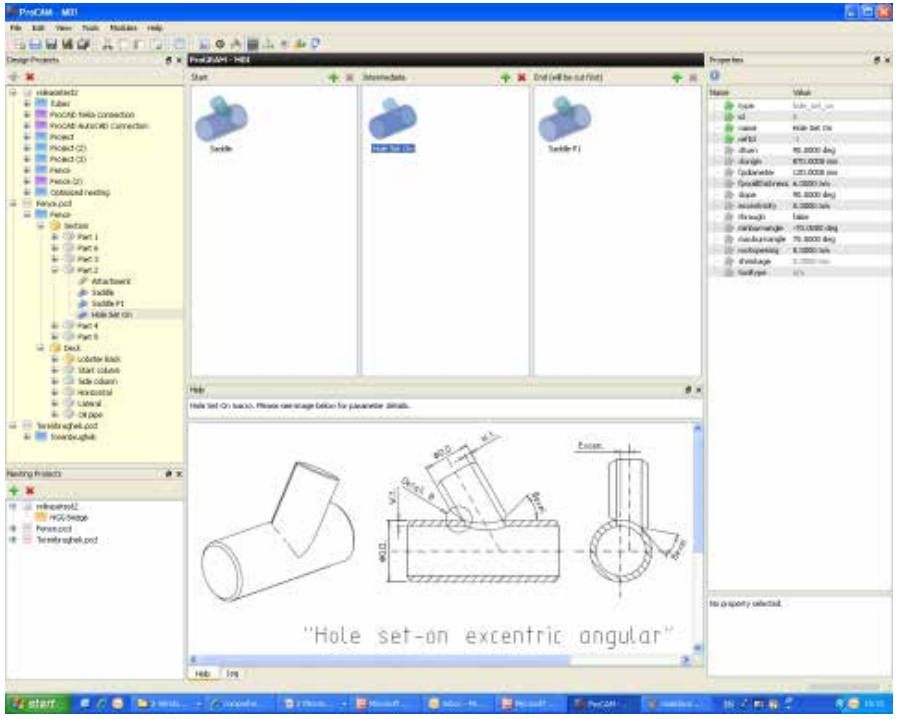
ProGram is the name of the standard set of software included with the machine. With this comprehensive package it is possible to design parts and program cutting information (MDI), view all the designed parts (3D Viewer) and divide them efficiently into the available raw materials (Nesting).

Manual Data Input (MDI)

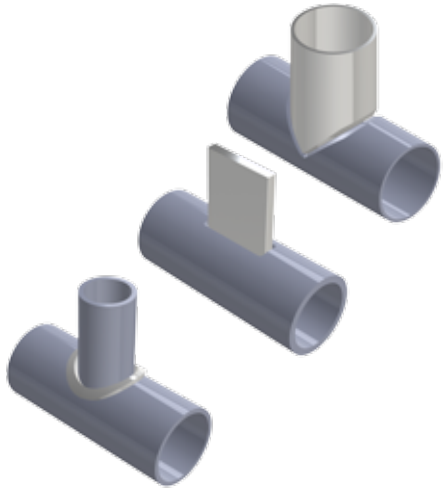
This versatile module provides the opportunity to program individual parts with all the necessary parameters. The intuitive interface makes the programming of profiling shapes simple and accurate.

Material shapes and sizes

The MDI module allows the definition of default shapes and dimensions, speeding up the whole design process. If you regularly use pipes with a certain diameter and wall thickness, define them in the settings to allow fast and easy part creation.



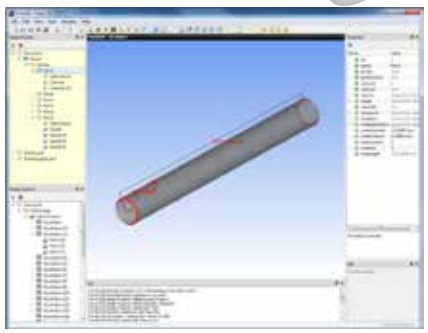
MDI module



Profiling shapes

HGG has selected a set of the most commonly used profiling shapes and this standard set is included in the software. There are many more profiling shapes available, some are industry specific, some are customised for specific production requirements. If new, customised profiling shapes are required, HGG will develop and supply these upon request.

Each profiling shape has a help image showing and explaining the parameter measurements and the information button in the properties pane provides a short description of the selected parameter. If a part is not valid, a warning is shown with an explanation of the problem enabling fast and efficient corrections.



3D viewer

3D Viewer

The unique 3D Viewer allows the visualisation of a three dimensional model of the input data including exact representation of the welding preparation. Generating the image using the same data as for the cutting files, this provides an extremely useful real time programming check before release for production. If a part is invalid for any reason (insufficient data, contradictory data, incorrect parameters etc.) it cannot be represented in the viewer. The image can be measured, rotated, moved and magnified in the viewer allowing close examination of every detail of the part.

Nesting Module

This module ensures optimal, cost-effective placement of parts in the available raw materials, reducing waste and ensuring maximum efficiency. Including many useful features for subdividing production processes, adhering to quality requirements and also providing worksheets for the machine operators enabling dimension checks and material checks. The flexibility of the nesting module allows the allocation of individual parts to selected raw material, automatic stock addition according to predefined raw material dimensions.

Stock Manager (optional)

The Stock Manager tool enables the addition of raw materials and rest material to the manufacturing database. This tool selects the stock items automatically which matches the requirements of the selected nest job. The tool can only be used in combination with a database.

ng module

Batch reports

A batch is a selection of nested parts the purpose of which is to efficiently divide a nest job into stages. Once the parts have been assigned, a batch report can be printed which may serve as a check list for the machine operator. The batch report contains details of the job, the shape and dimensions of the stock item and the number of parts. The name of the part(s), the weight, control length and actual length are shown in table form. The table also contains columns for the operator's signature and the date.

Batch report

Nesting report

Group reports

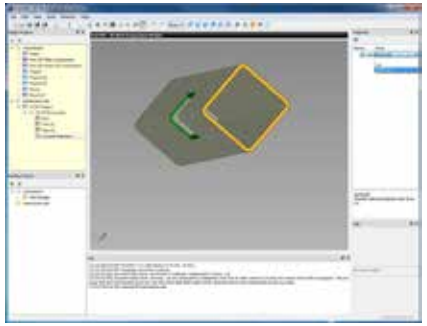
A group is a set of nest parts selected for efficient production or post production purposes. This can be useful for transportation planning or to group parts that require the same subsequent action, for example welding or assembly. Once a group has been set, a report can be printed. Group reports show the individual weight of the part and the total weight of the sum of the parts.

3D Work Preparation Module (optional)

The 3D Work Preparation Module is an innovative extension to the compatibility that HGG is always striving for within the industry. This module specifically addresses some of the problems encountered when small adjustments are necessary to existing designs. To avoid having to redesign complex projects for the sake of a few minor additions or exclusions, this optional module allows individual parts or complete structures from 3D design systems in STEP format to be opened in ProGram. Here a 3D model is created allowing adjustments to be made without going back to the drawing board and starting from scratch. Features present in the external design such as drilled holes, markings, sawn plates, which require no cutting can be tagged in this module to exclude them from generating cutting information when the file is exported.

The user is free to add bevels to end cuts and intermediate cuts. It is also possible to program initiation operations to all cuts. This instructs the machine to pierce the material at a short distance from the cut (lead in) ensuring high quality cutting by avoiding inaccuracies that may be caused by the start up procedure of the cutting tool.

- Interactive 3D editing of imported STEP file;
- 3D measuring tool;
- Addition of lead in and lead out values;
- Addition of bevel angles for weld preparation;
- Allocate a 'do not cut' value to imported contours.



3D Work Preparation Module

"ProCAD offers rapid and fault free data import"

ProCAD

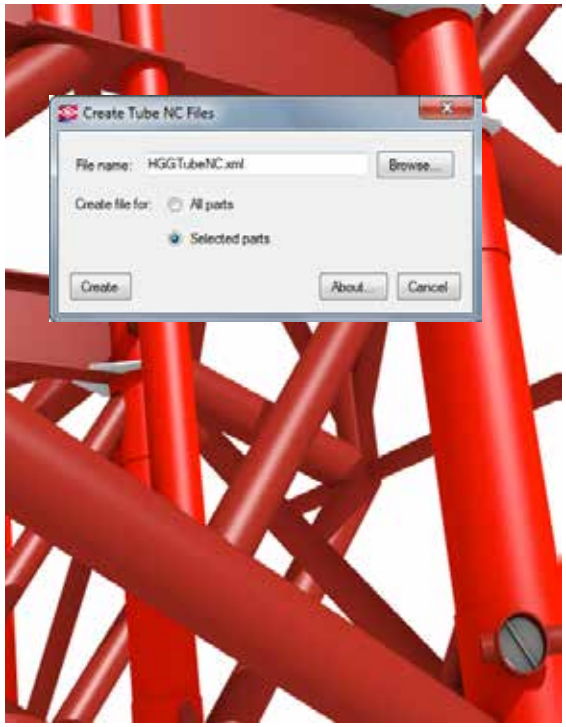
Whereas it is possible to program all cutting shapes using the Manual Data Input module of the software, in the case of large, complex projects involving many combination cuts this can be time-consuming and error sensitive due to the complexity of the calculations. ProCAD makes it possible to export the design from a range of CAD applications and import it into ProGram accessing editing features and ProGram's nesting module to optimise the use of raw materials. From ProGram the cutting files can be generated for the machine.

ProCAD Tekla Structures

Tekla is one of the industry's most widely used design systems. Indicative of HGG's vision of the future is the close cooperation with Tekla in the design and development of the first integrated solution for the modelling and manufacturing of tubular steel structures. This valuable connection gives users the freedom to directly generate cutting files from the 3D drawing board, increasing performance, eliminating error sensitivity and substantially reducing work preparation time. HGG is proud of its alliance partner status with Tekla and is proud of the result: ProCAD Tekla Structures.

Export window

By using Tekla Structures and applying the specialised HGG pipe to pipe connections, the user can export the CNC data (with all cutting geometry and weld preparation) directly to the workshop and interface with their HGG Pipe Profiling machine via ProGram without the need for any further editing or manual entry.



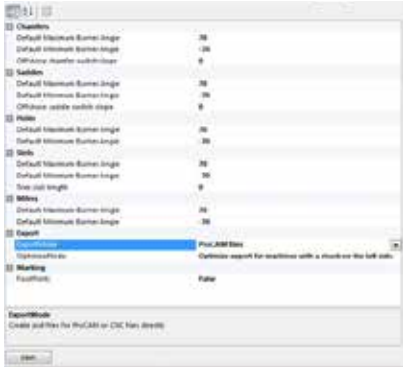
ProCAD Tekla Structures export window

Log window

Here a view of all exported parts is shown with the results of the export. Errors (if any) will be reported here and clicking on a part will provide extra information including a 2D view of the part.

Connection window

In the connection window the properties of pipe connections in the structure can be modified.



Settings window

Tekla Offshore Extension Plug-in (Optional by HGG)

Can grouping

It is possible to select a 'brace' in Tekla (a group of connected parts) and export the entire group to ProGram allowing extra editing of the begin and end profiling shapes and the addition of intermediate profiling shapes such as holes or slots.

Wrap around

This allows a tube to be selected and a plot created. The printed plot can be 'wrapped around' the tube to provide a stencil for manual cutting.

Welding volume

One or more parts can be selected and the welding volume calculated in cubic centimetres.

Export

Direct export to ProGram allowing nesting, 3D viewing of parts and generation of plots. Part files can also be exported directly the machine, with or without special profiling shapes for the offshore industry (Tekla Offshore Extensions).

Switch slope

In the settings menu a chamfer or saddle profiling shape can be directly converted to the offshore equivalent if this option is available on the machine.

Optimised mode: adapts the export according to the side of the machine where the chuck and main drive are located. For example: ensuring that x-bevels are cut first, profiling shapes with the steepest slope first etc.

Marking of footprints

If a marking unit is available, footprints can be activated and the export will automatically insert footprint shapes on the main member of saddle connections to facilitate fitting.

AutoCAD Plug-in (Optional by HGG)

HGG has also developed an AutoCAD plug-in which can be installed as a separate layer on the existing AutoCAD system. This adds an extra toolbar allowing the user to tag all centrelines of the structure and add essential extra data like HGG's profiling shapes. The generated files can be imported in ProGram for further processing like nesting.

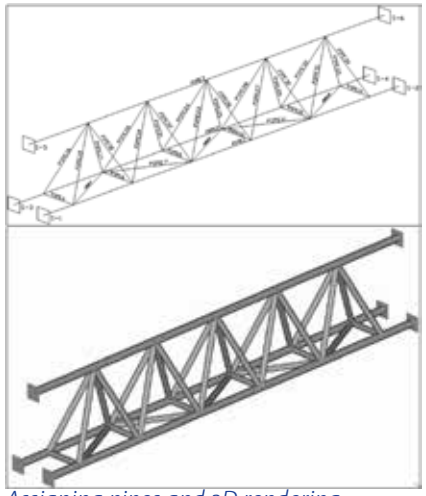
DNC connection

The DNC (Direct Numeric Control) connection to AutoCAD is a plug-in and allows the creation of pipes, connections to other pipes or surface.

Work preparation

The process can be divided into 4 stages: firstly the DNC drawing is created, a centreline drawing of the part or structure. Secondly, all pipes and surfaces are defined, giving them an unique name and property values such as diameter, wall thickness etc. Thirdly, all the connection information is defined, how and where the pipes are connected, and welding parameters. Finally, the export files are generated.

AutoCAD centreline drawing



Assigning pipes and 3D rendering

Defining pipes and surfaces

From the original 2D drawing all centrelines can be defined as pipes and the parameters entered. In the same way, plates can be defined as surfaces (for chamfer cuts at the connection).

Assigning parts and defining connections

Once all pipes and surfaces are defined, all of the connection information can be entered to complete the drawing. Once this has been done, the drawing can be rendered in 3D. This view is very helpful for checking the dimensions and connections of the structure. In the 2D, centreline drawing it can be difficult to detect mistakes, whereas in the 3D rendering they are much easier to see. For example, in the images above: if the wrong diameter has been entered for one of the pipes in the structure this will not be visible in the 2D representation. However, once the 3D rendering is visible it will immediately be obvious that one pipe is larger (or smaller) than the rest.

Editing default values

It is possible to edit the default parameter values for each cutting shape and choose a format to export the file. Parameters such as minimum and maximum cutting angles, the weld preparation angle and welding compensations (root opening and shrinkage) can be defined at this point.

Generating data

Once the DNC drawing has been satisfactorily completed, the data can be generated for the project. All parts in the structure are selected by default but it is possible to select parts by using the available filters.

Marking

If a marking unit is available, mark lines and mark text can be added to the DNC drawing.

ProCAD offers you:

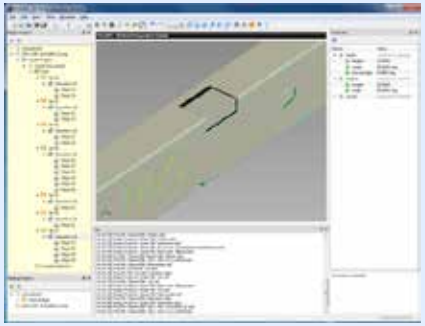
- Easy conversion of existing designs into cutting information for the range of HGG machines;
- Enrichment of information opening new possibilities for saving time, money and resources;
- Exclusive additional features avoiding time-consuming adaptation of complex projects;
- Trendsetting opportunities in Building Information Modelling (BIM) ensuring progress and growth through cooperation.

ProCAD Post processors

There are many different CAD systems for pipe and box section designs. HGG possesses the knowledge and skills to provide post processors for any system that contains the parameters of the object to be constructed. The systems supported includes BoCAD and Intergraph ISOGEN (Alias/Spoolgen).

ProGram 3D Work Preparation for STEP files

The optional 3D Work Preparation Module in ProGram allows the import and editing of STEP files. This module can import files from most design systems that can save or export designs in STEP (STP) format. The 3D Work Preparation Module builds a three dimensional model from the data and allows editing and the creation of cutting files. For more information about the 3D Work Preparation Module refer to ProGram.



3D Work Preparation Module

"Fine tune the fabrication process with analytics on production reports"

ProMIS

ProMIS, the Management Information System, has been created as a direct result of sharing knowledge and information with existing customers. ProMIS is designed to utilise factual information (logged by the cutting machine during production) to provide a series of reports. The information can be imported into ProMIS and using a variety of filters, reports are generated showing everything from a general overview of the process to finely specified details.

Analysis

During production the actual machine data is logged recording all events which occur, from the cutting of individual parts to the times during production that the machine was inactive. This information can then be imported into ProMIS to provide a range of reports.

Amount report

An 'Amount' report provides information about lengths and weights of production with the option to introduce a variety of filters allowing analysis ranging from a complete job to an individual part.

Idle report

An 'Idle' report provides details of all the time the machine was not running, with a reason for the inactivity and a short description.

Timing report

The 'Timing' report accounts for all the time that has passed during production including total production time, cutting time, marking time (if applicable), idle time. This provides an excellent planning tool, enabling realistic estimations of production times which can be synchronised with post production or transportation planning.

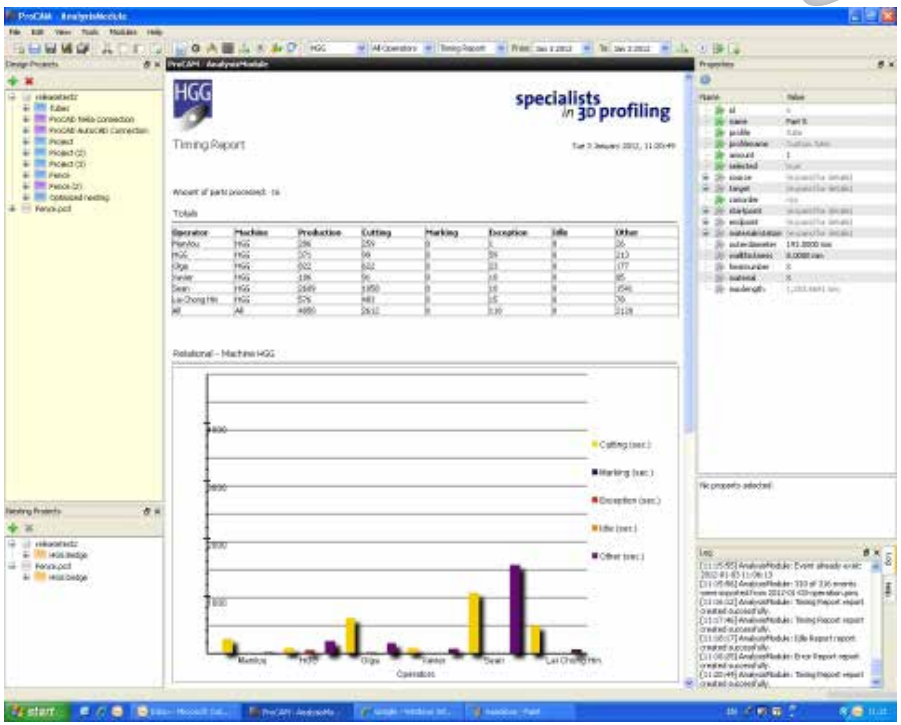
Error report

There is also an 'Error' report outlining all the errors that may have occurred during production, with a short description of each error.

Estimation

The Estimation module enables the estimation of the cutting time for an entire project down to a single cut. Also generated from actual cutting information retrieved from the machine, this module provides an accurate report of the total cutting time, subdivided in table form for each individual part.

Time Estimation Report



Timing report

It goes without saying that this can be extremely useful for planning purposes, enabling manufacturers to accurately gauge production times ranging from the smallest job to the largest project.

ProMIS offers you:

- Database information storage, a permanent record of production experience;
- Inspired by customer feedback providing detailed analysis of actual information;
- Generate clear and informative reports. Use the various filters to home in on specific details;
- Improved planning capabilities with the cutting time Estimation Module;
- Compare estimated production times with actual times.

"One step more then just logging machine data"

ProQMS

Quality Management System

This system is specifically developed to provide possibilities directly requested from within the industry. This management tool was primarily designed to give a comprehensive overview 'at a glance'. The system will include a 'Track & Trace' feature on material as well as digital documentation of accuracy measurements. With quality as the underlying consideration of ProQMS, it will provide a wide selection of standard reporting tools and a database feature for individual reporting.

Track & Trace

This module will allow the monitoring of all the programmed parts providing digital documentation of accuracy measurements. Operators will log in with an unique user name, regular measurements can be made, prompted by reminder screens on the operators control panel. These measurements will be entered and logged to ProCAM's database in order to safeguard quality requirements and provide a permanent record of machine performance.

Operator checking maintenance schedule

Workflow

The Workflow module will provide a graphical depiction of the complete production process showing exact positions of individual parts or batches at any moment in time. This will enable better planning and the identification of bottle necks in the production process and facilitating accurate time estimations. In the display a colour-coded, complete overview of the process, including raw material ready to be processed, nested material on the machine being processed and completed, processed material will be available. This can be used, for example, to facilitate a reorganisation of the production order per part, batch or project to optimise the workflow and efficiency.

Maintenance

In order to achieve the highest quality standards and an efficient production process it is vital that the machine is running smoothly and efficiently. The Maintenance module will provide a continuous safeguard to trouble free operation. Regular maintenance reminders will pop up on the machine's remote control. It will also provide check lists for the operator ensuring regular care and replacement of consumables avoiding unnecessary damage to the machine or reduced performance. All data will be logged to ProCAM's database and can be presented in a report providing a record of what maintenance has been performed, when and by whom. It will also keep a record of the machine hours and indicate upcoming maintenance operations.

Pipes in the yard

ProQMS offers you:

- Detailed monitoring of the production process;
- Track and trace feature, from entire project to individual part;
- Wide selection of reporting tools and accuracy measurements, guaranteeing quality;
- Time and volume reports for welding further improving the many efficiencies and savings already incorporated;
- Machine maintenance, lubrication schedules, renewal of consumables to ensure perfect results time after time.

ProCAD; Tekla Interface (optional)

In fact, your CAD model contains a lot of information about the parts to be cut. So why programming again to cut the parts? Programming again belongs to the past with ProCAD, an interface between CAD software and cutting machine.

Detailing

This page introduces the new time-saving and flawless way to define parts to be cut with Tekla. With Tekla's detailing module it is possible to specify the profile to be cut on the pipe including weld preparation. To fit an intersection for instance. This specific profile and weld preparation is called a 'profiling shape'. The defined profiling shapes including the part dimensions form the model creates a fully defined part.

Design Data Export

After detailing, the model contains all data needed and is ready for export to ProGram for further processing. The export of design data is in conformity with HGG's file format definition.

The interface supports also:

- Tekla features 'Line Cuts' and 'Fittings' to define cuts manually on pipe ends by lines;
- text marking (for serial ID's or notes).

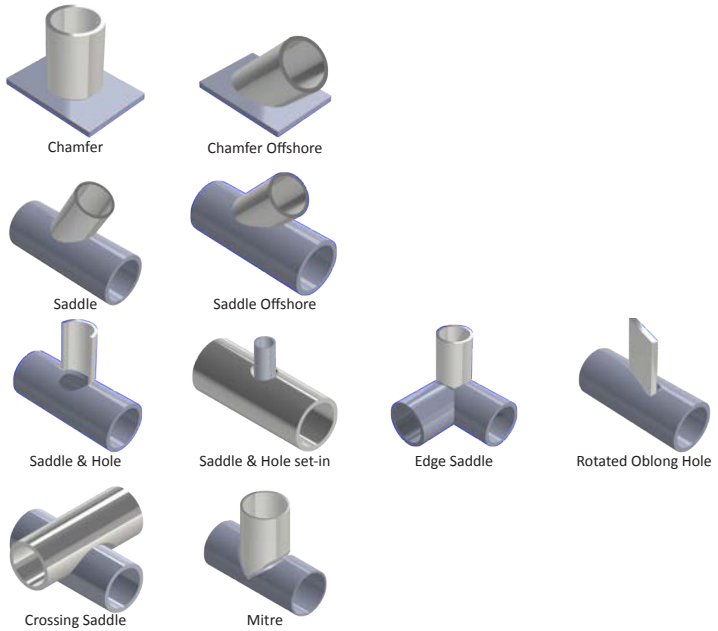
Note

The interface between Tekla and HGG's ProGram has been successfully integrated many times before. But don't forget to:

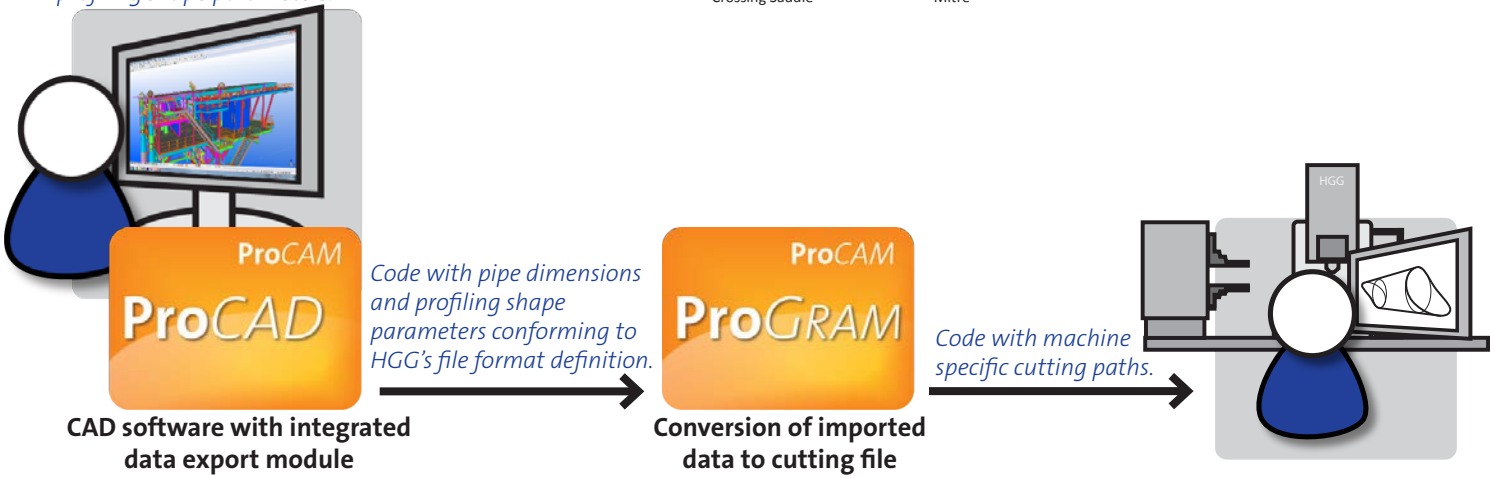
- contact your Tekla supplier and verify that all your ProGram profiling shapes are supported;
- verify that the export conforms with HGG's file format definition;
- configure profiling shapes on parts before exporting.

Please contact HGG for support of other features.

Selection of profiling shapes supported by Tekla for ProGram to process the imported code.



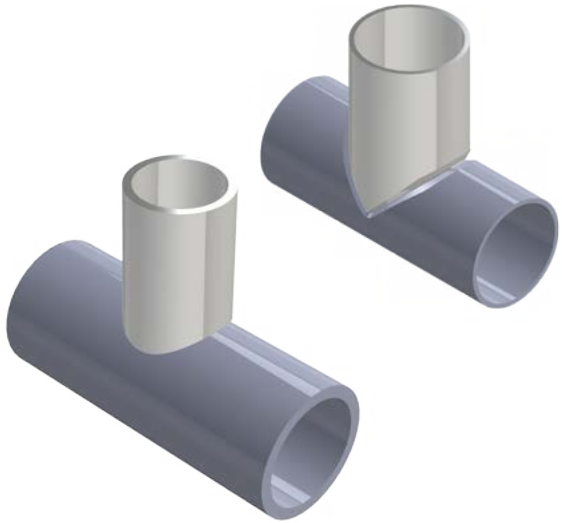
Created CAD model with specified profiling shape parameters.



CAD software with integrated data export module

Conversion of imported data to cutting file

Welcome to the world of
Profiling Shapes



Profiling shapes are created by software based tools to calculate cutting paths to profile a saddle connection for example. By entering parameters the predefined profiling shape will create a virtual cutting path which can be cut by HGG´s cutting equipment. This document will explain which features the profiling shapes have and something about their application.

All profiling shapes have their own specific features depending on intersection, loads, weld requirements, cutting machine and application specific characteristics. HGG's profiling shapes are based on AWS, API and ASME standards.

Please contact HGG for more information about shapes and our in-house custom shape development for many different applications.

info@hgg-group.com

Technical data SPC 500-1200 PT

SPC 500-1200 PT

- Pipe trolley
- Main drive 3 Jaw chuck
- Cutting trolley

Control Unit

- Motion control supplier: Deltatau
- Electronics and motors supplier: Control Techniques
- Remote bus IO supplier: Wago
- Equipped with air conditioning
- Computer: solid state PC and drive

Environment

- Admissible ambient temperature: metric 5°C/40°C, imperial 41°F/ 104°F (exceptions on request)

	Min. Outer Diameter Ø		Max. Outer Diameter Ø		Max. Pipe weight		Max. Pipe length	
	Metric	Imperial	Metric	Imperial	Metric	Imperial	Metric	Imperial
SPC 500 PT	48 mm	2”	510 mm	20”	8 t	17637 lbs	6 m/12 m*	20’/40’*
SPC 600 PT	48 mm	2”	610 mm	24”	8 t	17637 lbs	6 m/12 m*	20’/40’*
SPC 800 PT	48 mm	2”	815 mm	32”	8 t	17637 lbs	6 m/12 m*	20’/40’*
SPC 1000 PT	48 mm	2”	1020 mm	40”	8 t 12 t	17637 lbs 26455 lbs	6 m/12 m*	20’/40’*
SPC 1200 PT	48 mm	2”	1225 mm	48”	8 t 12 t	17637 lbs 26455 lbs	6 m/12 m*	20’/40’*

*Any length possible adding increments of 2 m (± 6’)
PT = Pipe Trolley

Machine Accuracy

	Positioning	Repeatability
	Metric	Metric
Main drive rotation Ø 1200 mm	0.5 mm	0.25 mm
Torch tilting	0.5 °	0.25 °
Torch rotation	0.5 °	0.25 °
Main drive up/down movement	0.5 mm	0.25 mm
Cutting trolley longitudinal movement	0.5 mm	0.25 mm
Torch/material distance	0.1 mm	0.05 mm

Note: Machine accuracy does not concern the accuracy of the cutting process.

Controls

- Touch screen
- Industrial keyboard
- USB drive for the purpose of loading files

Load

PT Pipe Trolley 3t

	Metric	Imperial
Max. load per pipe trolley	30 kN	6744 lbf
Min. diameter Ø	48 mm	2 ”
Max. diameter Ø	1225 mm	48 ”

PT Pipe Trolley 5t

	Metric	Imperial
Max. load per pipe trolley	50 kN	11240 lbf
Min. diameter Ø	48 mm	2 ”
Max. diameter Ø	1225 mm	48 ”

RG Rollerball Gutter (optional)

	Metric	Imperial
Max. pipe weight per meter	340 N	76 lbf
Max. total pipe weight	2.5 t	5512 lbs
Min. diameter Ø	48 mm	2 ”
Max. diameter Ø	510 mm	20 ”

Main Drive 3 Jaw Chuck

Main Drive 1200

	Metric	Imperial
Min. outer diameter Ø	48 mm	2 ”
Max. outer diameter Ø	1225 mm	48 ”
Exact hole Ø of chuck	615 mm(1)	24.2 ”(1)
Max. rotation weight	8 t(2)	17637 lbs(2)
Min. scrap length	300 mm	12 ”
Min. scrap length (using long jaws)	50 mm	2 ”

1. Use a safety margin in case of oval pipes.
2. 12t / 26455 lbs optional.

Marking (optional)

To mark text or reference lines.

	Marking speed
Punch marker	1.5 m/min
Ink-jet marker*	1.5 m/min
Plasma marker	1.5 m/min

*Ink-jet is the quickest marker for text because of the single line movement.
Max text height is 67 mm.

Cutting Trolley

Cutting wagon

	Metric	Imperial
Preset pressure on the pipe	250 N	56 lbf

Patented Biaxial Cutting Head

	Degrees
Tilting angle min.*	-70°
Tilting angle max.*	70°
Rotation	540°

Cutting Technology Range

Cutting Holes

- Minimal hole size : 1.5 times the wall thickness with an minimum of 8;
- above 40 mm hole size no wall thickness dependency.

Oxyfuel Proportional Piercing (optional)

- Recommended for large wall thickness;
- safe about 4 minutes pre-heating time compared with standard piercing;
- less affected material;
- less spatter to extend nozzle life time;
- no need of knowledge about the complex piercing process.

Oxyfuel Cutting

	Max. cutting length		Min. cutting wall thickness		Max. cutting wall thickness for 3D profiling[1]		Max. bevel angle
Valves[2]	Metric	Imperial	Metric	Imperial	Metric	Imperial	Degree
Normal volume	150 mm	6”	3 mm	1/8 mm	50 mm	2”	70°

1. Max cutting wall thickness for 3D profiling = cosines ‘max. bevel angle’ x ‘max. cutting length’.
2. High volume valves on request.

Note: The max piercing wall thickness is equal to the maximum cutting wall thickness for 3D profiling.

Plasma Cutting Kjellberg (optional)

Mild Steel

	Max. cutting length[3]		Min. cutting wall thickness		Max. cutting wall thickness for 3D profiling		Max. bevel angle
	Metric	Imperial	Metric	Imperial	Metric	Imperial	Degree
S45W[4]	30-45 mm	1.2” - 1.8”	3 mm	1/8”	20 mm	0.8”	45°
FineFocus 450	35-45 mm	1.4” - 1.8”	3 mm	1/8”	25 mm	0.9”	45°
FineFocus 800	60-80 mm	2.4” - 3.2”	3 mm	1/8”	40 mm	1.6”	45°
HiFocus 161i	38-50 mm	1.5” - 2”	3 mm	1/8”	30 mm	1.2”	45°
HiFocus 280i	50-70 mm	2” - 2.8”	3 mm	1/8”	40 mm	1.6”	45°

Note: The max. piercing wall thickness is equal to the maximum cutting wall thickness for 3D profiling.

3. These values are depending on the materials to be cut, their compositions and cutting speed. It is not related to the maximum piercing wall thickness.
4. Cutting current (A) is fixed on 45/85/130.

Plasma Cutting Hypertherm (optional)

Mild Steel

	Max. cutting length[5]		Min. cutting wall thickness		Max. cutting wall thickness for 3D profiling		Max. bevel angle
	Metric	Imperial	Metric	Imperial	Metric	Imperial	Degree
Powermax 125	38 mm	1-1/2”	3 mm	1/8”	25 mm	0.9”	45°
HPR130XD	38 mm	1-1/2”	3 mm	1/8”	27 mm	1.1”	45°
HPR260XD	64 mm	2-1/2”	3 mm	1/8”	38 mm	1-1/2”	45°
HPR400XD	80 mm	3.2”	3 mm	1/8”	50 mm	2”	45°

Note: The max. piercing wall thickness is equal to the maximum cutting wall thickness for 3D profiling.

5. These values are depending on the materials to be cut, their compositions and cutting speed. It is not related to the maximum piercing wall thickness. Halve this value (approximately) to achieve a dross free cut.

Cutting Technology Accuracy

Cutting Technology Accuracy

- All accuracies are according to ISO 9013;
- cut values based on clean mild steel material without deviations;
- sufficient training by HGG is required to obtain the mentioned accuracies;
- cutting paths with sharp corners may influence tolerance;
- cutting accuracy does not concern the torch positioning accuracy.

Oxyfuel Cutting Accuracy

Oxyfuel						
	Acetylene			Propane		
Tilt Angle in degrees	0°	45°	70°	0°	45°	70°
Cutting length						
5-15 mm	0.5 mm	0.8 mm	1.0 mm	0.5 mm	0.8 mm	1.0 mm
15-30 mm	0.5 mm	1.0 mm	1.3 mm	0.5 mm	1.0 mm	1.3 mm
30-50 mm	0.5 mm	1.0 mm	1.5 mm	0.5 mm	1.0 mm	1.5 mm
50-75 mm	1.0 mm	1.5 mm	2.0 mm	1.0 mm	1.5 mm	2.0 mm
75-100 mm	1.0 mm	2.0 mm	2.0 mm	1.0 mm	2.0 mm	2.0 mm
100-150 mm	1.0 mm	2.0 mm	3.0 mm	1.0 mm	2.0 mm	3.0 mm
150-200 mm	(*Y)	(*Y)	(*Y)	(*Y)	(*Y)	(*Y)
200-250 mm	(*Y)	(*Y)	(*Y)	(*Y)	(*Y)	(*Y)
250-300 mm	(*Y)	(*Y)	(*Y)	(*Y)	(*Y)	(*Y)

(*Y) On request

Plasma Cutting Accuracy

	Kjellberg FineFocus / Hypertherm Powermax		Kjellberg HiFocus / Hypertherm HPR	
Tilt Angle in degrees	0°	45°	0°	45°
Cutting length				
5-15 mm	0.5 mm	1.0 mm	0.5 mm	1.0 mm
15-30 mm	0.8 mm	1.5 mm	0.8 mm	1.5 mm
30-50 mm	2.0 mm	3.0 mm	1.5 mm	2.5 mm
50-75 mm	3.0 mm	-	2.0 mm	-

Note: Max. cutting capacity depends on type of plasma source.

Mains Connections

These pages contains all connection specifications and values about the machine's gas and power consumption. The connected load will differ depending on the offered machine configuration.

Remarks for Built-up

- Over length of cables and hoses must be 5M from the back side of the foundation;
- flour must be horizontal +/- 10mm;
- the separated earth pin required Rmax=0.5Ω.

Other Connections

- For network and internet connection a RJ45 female port is needed (8 pins).

Power Requirements

- Power supply: 3Ph N / PE
  Main AC voltage +10% -5%
  Main frequency ±1Hz
  Recommended fuses are based on 400V;
- the given pressure, flow rates and power consumption of the plasma supplies are maximum values.

Machine Consumption

	Power	Gas
Cutting trolley	5kVA fuse 3x16A slow	Air* 7 bar & 3000 Ndm³/h

Exhaust (optional)

	Power	Gas
DFPRO 3/4 exhaust	4kVA fuse 3x8A slow	Air* 7 bar & 16200 Ndm³/h
DFPRO 6 exhaust	7,5kVA fuse 3x25A slow	Air* 7 bar & 16200 Ndm³/h
Exhaust ventilator	4kVA fuse 3x8A slow	-

Note: Outdoor output strongly recommended.

Marking Unit (optional)

	Power	Gas
Plasma marker unit Kjellberg	6kVA fuse 3x16A slow	Air* 7 bar & 3000 Ndm³/h Argon 6 bar & 420 Ndm³/h
Plasma marker unit Hypertherm	2kVA fuse 3x8A slow	Air* or H5 (5%H,95%A) 6.9 bar & 1680 Ndm³/h Air* 6.9 bar & 8460 Ndm³/h
Punch marker unit	-	Air* 7 bar & 7000 Ndm³/h
Inkjet marker unit	-	Air* 7 bar & 3000 Ndm³/h

*Filtered 5/0.01 µm, dry not greased

Oxyfuel Cutting

Valves	Compressed combustible gas	Combustible gas connection	Compressed oxygen	Oxygen connection
Normal volume	1.5 bar & 1500 Ndm^3/h	By clamps	9 bar & 16000 Ndm^3/h	By clamps

Plasma Cutting (Hypertherm)

Source	Gas controller	Electrical load	Connectable plasma and swirl gasses	Gas connection
Powermax 125		27.4 kVA fuse 3x60A slow	Air(1) 6.6 bar & 7363 Ndm^3/h	G 9/16"
			Nitrogen (99.9%) 6.6 bar & 7363 Ndm^3/h	G 5/8"
HPR130XD	Auto Gas XD	21.5 kVA fuse 3x40A slow	Air(1) 8 bar & 7080 Ndm^3/h	G 9/16"
			Oxygen(2) (99.5%) 8 bar & 4250 Ndm^3/h	G 9/16"
			Argon (99.996%) 8 bar & 4250 Ndm^3/h	G 5/8"
			Nitrogen (99.9%) 8 bar & 7080 Ndm^3/h	G 5/8"
			H35 (35% H, 65% Ar) 8 bar & 4250 Ndm^3/h	G 9/16"
			F5 (5% H, 95% N_2) 8 bar & 4250 Ndm^3/h	G 9/16"
HPR260XD	Auto Gas XD	51.6 kVA fuse 3x90A slow	Air(1) 8 bar & 11330 Ndm^3/h	G 9/16"
			Oxygen(2) (99.5%) 8 bar & 4250 Ndm^3/h	G 9/16"
			Argon (99.996%) 8 bar & 4250 Ndm^3/h	G 5/8"
			Nitrogen (99.9%) 8 bar & 11610 Ndm^3/h	G 5/8"
			H35 (35% H, 65% Ar) 8 bar & 4250 Ndm^3/h	G 9/16"
			F5 (5% H, 95% N_2) 8 bar & 4250 Ndm^3/h	G 9/16"
HPR400XD	Auto Gas XD	90.6 kVA fuse 3x175A slow	Air(1) 8 bar & 11330 Ndm^3/h	G 9/16"
			Oxygen(2) (99.5%) 8 bar & 4250 Ndm^3/h	G 9/16"
			Argon (99.996%) 8 bar & 4250 Ndm^3/h	G 5/8"
			Nitrogen (99.9%) 8 bar & 11610 Ndm^3/h	G 5/8"
			H35 (35% H, 65% Ar) 8 bar & 4250 Ndm^3/h	G 9/16"
			F5 (5% H, 95% N_2) 8 bar & 4250 Ndm^3/h	G 9/16"

References: Hypertherm Instruction manuals 2011

1. Filtered 5/0.01 µm, dry not greased.
2. Filtered 40/0.01 µm plasma

Plasma Cutting (Kjellberg)

Source	Gas controller	Electrical load	Connectable plasma gasses	Plasma gas connection	Connectable swirl gasses	Swirl gas connection
PA-S45W	PZ-S45W-1	34kVA fuse 3x50A slow	Air(1) 4-6 bar & 1600 Ndm³/h	G 1/4"	none	none
			Oxygen(2) (99.5%) 4-6 bar & 1600 Ndm³/h	G 1/4"		
PA-S45W	PM-S45W	34kVA fuse 3x50A slow	Argon (99.996%) 5-6 bar & 1600 Ndm³/h	G 1/4"	none	none
			Hydrogen (99.95%) 5-7 bar & 185 Ndm³/h	G 3/8" Left		
			Nitrogen (99.9%) 5-7 bar & 1600 Ndm³/h	G 1/4"		
FF450	PGE1	34kVA fuse 3x50A slow	Air(1) 7 bar & 1700 Ndm³/h	G 1/4"	Air(1) 7 bar & 5400 Ndm³/h	G 1/4"
			Oxygen(2) (99.5%) 5-6 bar & 1500 Ndm³/h	G 1/4"	Nitrogen (99.9%) 5-6 bar & 5400 Ndm³/h	G 1/4"
FF450	PGE2	34kVA fuse 3x50A slow	Argon (99.996%) 5-6 bar & 1600 Ndm³/h	G 1/4"	Nitrogen (99.9%) 5-6 bar & 5400 Ndm³/h	G 1/4"
			Hydrogen (99.95%) 5-6 bar & 185 Ndm³/h	G 3/8" Left	Nitrogen (99.9%) 5-6 bar & 5400 Ndm³/h	G 1/4"
			Nitrogen (99.9%) 5-6 bar & 575 Ndm³/h	G 1/4"	Nitrogen (99.9%) 5-6 bar & 5400 Ndm³/h	G 1/4"
FF800	PGE 1	83kVA fuse 3x125A slow	Air(1) 8 bar & 2800 Ndm³/h	G 1/4"	Air(1) 8 bar & 2800 Ndm³/h	G 1/4"
			Oxygen(2) (99.5%) 8 bar & 2800 Ndm³/h	G 1/4"	Nitrogen (99.9%) 6 bar & 1200 Ndm³/h	G 1/4"
FF800	PGE 2	83kVA fuse 3x125A slow	Argon (99.996%) 6 bar & 2100 Ndm³/h	G 1/4"	PGE 2 adjusts plasma gasses only	
			Hydrogen (99.95%) 8 bar & 400 Ndm³/h	G 3/8" Left		
			Nitrogen (99.9%) 6 bar & 500 Ndm³/h	G 1/4"		
HF 161i(3)	PGC1	33kVA fuse 3x50A slow	Air(1) 12 bar & 1400 Ndm³/h	G 1/4"	Air(1) 12 bar & 1800 Ndm³/h	G 1/4"
			Oxygen(2) (99.5%) 12 bar & 3500 Ndm³/h	G 1/4"	Oxygen(2) (99.5%) 12 bar & 1800 Ndm³/h	G 1/4"
			Argon (99.996%) 12 bar & 1200 Ndm³/h	G 1/4"	none	
			Hydrogen (99.95%) 12 bar & 1200 Ndm³/h	G 3/8" Left	Forming gas (N_2/H_2) 12 bar & 1900 Ndm³/h	G 3/8" Left
			Nitrogen (99.9%) 12 bar & 1500 Ndm³/h	G 1/4"	Nitrogen (99.9%) 12 bar & 1800 Ndm³/h	G 1/4"
HF 280i(3)	PGC3	76kVA fuse 3x125A slow	Air(1) 12 bar & 3500 Ndm³/h	G 1/4"	Air(1) 12 bar & 6000 Ndm³/h	G 1/4"
			Oxygen(2) (99.5%) 12 bar & 3500 Ndm³/h	G 1/4"	Oxygen (connected via plasma gas)	
			Argon (99.996%) 12 bar & 3600 Ndm³/h	G 1/4"	none	
			Hydrogen (99.95%) 12 bar & 600 Ndm³/h	G 3/8" Left	none	
			Forming gas (N_2/H_2) 12 bar & 1800 Ndm³/h	G 3/8" Left	none	
			Nitrogen (connected via swirl gas)		Nitrogen (99.9%) 12 bar & 6000 Ndm³/h	G 1/4"

References: Kjellberg Finsterwalde Instruction manuals 2010 - 2012

1. Filtered 5/0.01 µm, dry not greased.
2. Filtered 40/0.01 µm plasma
3. High pressure requirements. Pressure booster might by needed.