KUNSTSTOFF VERBINDUNGS-TECHNIK

H.E.S.

The heated tool welding method

Horizontal and vertical heated tool welding machine

KVT®
BIELEFELD

KUNSTSTOFF-VERBINDUNGS-TECHNIK

The Heated Tool Welding Procedure „H.E.S."

A safe and reliable method of welding for all thermoplastics

In a system of partnership and cooperaton the plastics-processing plant is no longer solely a supplier of single components, but as a sub-supplier he is becoming more and more involved in finding a solution to complex tasks. Starting from the components, the sub-supplier is increasingly expected to be able to supply complete modules. In which case the specifications stipulated include construction, production and logistics.
In this chance offered to him to be accepted an equal partner there are at the same time risks for the plastics processor. If today the increasing trend is towards demanding system solutions, the plastics processor is not only expected to have experience and the application know-how, but also to bear responsibility even stretching as far as product liability towards the customer. This applies in particular to assembly and joining technology, which allow a large number of indívidual components to form into a functionable whole in the first place.

In its role as a partner for the plastic processing industry **KVT Bielefeld** has developed procedures and machines which greatly help to reduce the user´s risk to a minimum. The demand for procedural safety and quality assurance is fulfilled at **KVT Bielefeld** by fully-fledged machine constructions and the consistent application of modern controller electronics.

Heated tool welding which is one of the oldest joining methods used in the plastics sector was originally developed for connecting semi-finished goods which were of non-adhesable polyethylene. In the meantime this proven welding procedure has achieved such a sophisticated standard for all thremoplastics which is far removed from the beginnings of this joining technology. Major contributions to this development were made by the rapid advance in the development of electronic controlling and regulating systems and the consistent deployment of this same equipment.

Today all heated tool welding machines made by **KVT Bielefeld** are exclusively controlled by microprocessors which guarantee maximum procedural safety and reproductionability of the procedural sequence.

Heated tool welding machines made by **KVT Bielefeld** are to be found in use today in many areas of the plastics processing industry.

For example in the manufacture of:

- Vehicle lights
- Domestic appliances (white goods)
- Vacuum cleaners
- Housings for pumps
- Sanitary articles
- Toys and gift items-
- Technical pre-forms of all kinds
- Accumulators
- Containers for brake fluid
- Activated charcoal filters
- Medical engineering items
- Measuring and controlling equipment
- Free gifts and consumer goods

The procedure:
Safe and reliable because of the maximum welding factor

The heated tool welding procedure **(H.E.S.)** is a tried and tested method of joining for all thermoplastic preforms. In comparison to other welding procedures, in the case of heated tool welding, the joining surface areas are selectively warmed conform to the particular workpiece. In connection with a precise joining sequence this is the safest and most reliable welding process for all thermoplastics.

In contrast to other welding procedures workpieces with three-dimensional or filigree joining zone geometry can also be reliably joined by heated tool welding. There are virtually no limits to the dimensions the pieces to be welded may have.

Basically one can differentiate between two operational sequences:

1. The single phase operational sequence (Flow presses).

By this method plastic preforms are formed or joined by the simultaneous effect of heat and joining force, for example in the case of riveting, flanging, stamping, sealing or embedding non-thermoplastic workpieces as well as welding foils and coated laminates, metallic materials, fleeces and textiles.

2. The two-phase operationa sequence (H.E.S.)
(Heated tool welding and thermo forms)

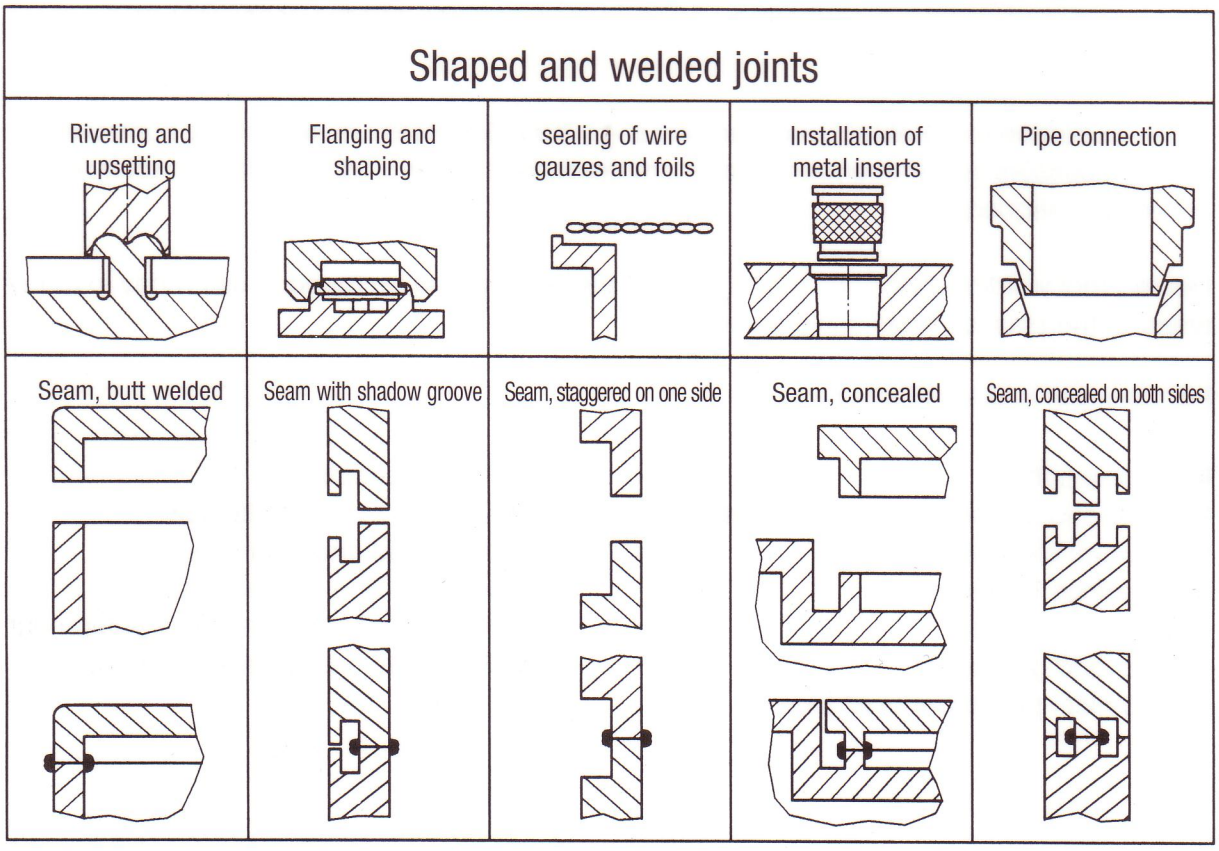
The pieces to be joined are clamped in a correspondingly adapted receptacle device. In the first phase of the operational sequence an electrically heated tool or radiator is driven between the joining surfaces of the plastic parts and the joining zones are plastified by contact or radiated warming.
Once the joining surfaces are fused the source of the warmth is removed.

Now the second phase begins in which the joining surfaces are pressed together and held until the melt solidifies into its defined final form.

Thus the defined joining of the plastified workpieces results in an inseparable and waterproof welded joint. With corresponding seam forming of the joining zones it is possible to achieve strengths of more than 100% of the wall thickness.

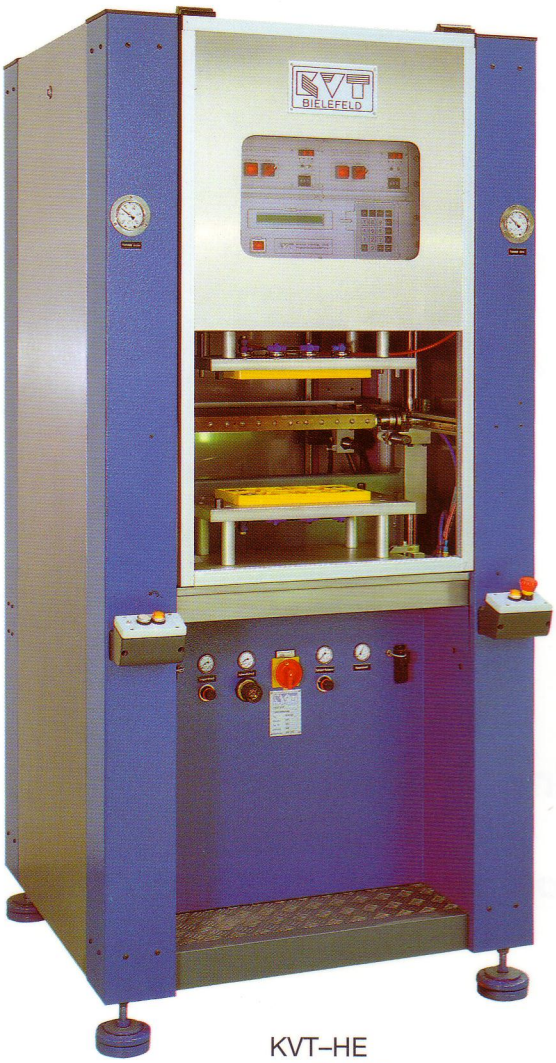
„H.E.S." Joining-zone geometry for different applications

Some examples



Vertical heated tool welding machines
Four columns for vertical press guide

The heated tool welding machines of the KVT-HE series were developed, constructed and manufactured state of the art taking the requirements concerning environmental protection, conservation of energy, manufacturing safety and economic efficiency into consideration.
The consistent application of internationally recognised standard parts, high-quality specially-constructed guiding elements and reliable pneumatic components together with proven microprocessor technology guarantee a high degree of reliability and precision.
The 4-column press design forms the basis for an extremely compact method of construction at the same time providing maximum stability and guiding accuracy.
The machines may be used optionally as a manual workstation or fully automatic with horizontal parts transfer. The machines are also available alternatively as vertical double presses.
One particular feature of these models is the range of welding temperatures which may be used. It ranges from welding with contact warmth (approx. 200-300 degrees C) to high-temperature welding at a max. of 600 degrees C.
The multitude of special features make these machines first-class products of welding technology for use in industrial plastics processing.



KVT–HE
81/36/300

The performance features:

- Environmentally friendly and operationally safe on account of the protective casing of high-grade steel which is accessible on all sides.
- The compact protective covering on all sides hinders external influences on the welding process.
- Low power consumption because the heating power is distributed among several feedback control systems.
- Economically efficient on account of the short welding times due to faster machine movements and an optimized operational sequence.
- Quick movement sequences due to the application of pneu matic drive elements in connection with hydraulic dampers.
- Maintenance-free high-performance and precise guiding for all moved machine parts.
- Compact construction makes for easy transport and fast change of location with a small amount of space required.
- Energy saving on account of the additional heat insulation from the heated tool and the side walls. (Up to 60% less energy consumption).
- Safe operation guaranteed by microprocessor controller with text display: for user guidance and quality assurance.
- Misalignmet-free joining and/or welding through the 4-column vertical press with precision ball-rolling guiding elements.
- Illuminated insertion area allows manual fast exchange of parts.
- Fast worktool change and short setting-up times on account of hinged front door and allround access.
- Alternatively a standing or a sitting work station on account of the space for knees and the adjustability of the machine.

Options:

- Prepared for the extraction of welding fumes in the case of high-temperature welding.
- Additional heat insulation of the heated tool in the pauses between welding because it is guided into the insulation pocket (80% insulation).
- Quality assurance of the welding tolerances by fixed stops and operational monitoring.

Abstract from the HE Program

Heated tool welding machine type KVT-HE	Art. - No.	Press stroke in mm	Effective welding surface in mm	Compres-sed-air connection	Connected loads, 50 Hz	Tempera-ture control	Prompting	Width in mm	Depth in mm	Height in mm
HDP 81/36/300	4501	300	550 x 300	8 bar	230 V/400 V	PID	Cleartext display	1000	960	2100
HDP 95/44/300	4511	300	700 x 350	8 bar	230 V/400 V	PID	Cleartext display	1200	1050	2100
HDP 111/36/300	4521	300	850 x 300	8 bar	230 V/400 V	PID	Cleartext display	1350	1120	2100
HDP 110/74/300	4531	300	850 x 650	8 bar	230 V/400 V	PID	Cleartext display	1350	1750	2100
Further models and special designs on request										

Horizontzal Heated Tool Welding Machines
Double presses with decisive advantages

Heated tool welding machines of the **KVT-HDP** series provide an alternative to the vertical welding machines. They offer the advantage of a large opening width with good accessibility for feeding the tools. One differentiates between manual feeding and automatic worktool feeding from above by handling units such as those which are used by preference on injectionn moulding machines.
The construction of these machines allows automatic ejection of the finished pieces onto a transport system underneath the working level.

Because of the use of heat insulation pockets and top coverings with extraction these machines can also be used for high-temperature welding.
A stable machine base together with highly precise guiding elements guarantee misalignment-free welding joints.

This machine design is deployed preferentially in such cases where several preforms are to be welded on to a base preform simultaneously and on both sides using two heated tools.

KVT-HDP
Horizontal double press with 4 heated tools

The performance features:

- Large press opening width on account of double horizontal pressing movement.
- The protective hood which is closed on all sides hinders external influences on the welding process.
- Economically efficient on account of the short welding times due to faster machine movements.
- Quick movement sequences due to the application of pneumatic drive elements in connection with hydraulic dampers.
- Maintenance-free pneumatic guiding, controlling and moving elements.
- Safe operation guaranteed by microprocessor controller with text display and user guidance.
- Exact electronic temperature control (PID-controller).
- Good accessibility through the impact-resistant polyglass doors.
- Fast worktool change and short setting-up times on account of good accessibility.

Options:

- Prepared for the extraction of welding fumes in the case of high-temperature welding.
- Additional heat insulation of the heated tool in the pauses between welding because it is guided into the insulation pocket (80% insulation).
- A heated tool which can be swivelled for quick changing or service work.
- Quality assurance of the welding tolerances by fixed stops and operational monitoring.
- Synchronised operation of the feeding units.

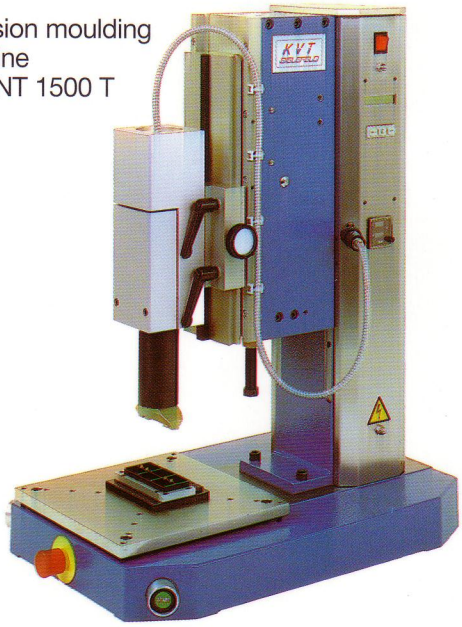
Abstract from the HDP Program

Heated tool welding machine type KVT-HDP	Art. - No.	Day-light opening in mm	Effective welding surface in mm	Compressed-air connection	Connected loads, 50 Hz	Temperature control	Prompting	Width in mm	Depth in mm	Height in mm
HDP 20/20/200	4611	200	200 x 200	8 bar	230 V/400 V	PID	Cleartext display	1540	1050	1500
HDP 30/30/200	4621	200	300 x 300	8 bar	230 V/400 V	PID	Cleartext display	1480	1550	1900
HDP 37/37/200	4631	200	370 x 370	8 bar	230 V/400 V	PID	Cleartext display	1480	1650	1900
HDP 50/37/200	4641	200	500 x 370	8 bar	230 V/400 V	PID	Cleartext display	1480	1550	1900
HDP 75/50/250	4651	250	750 x 500	8 bar	230 V/400 V	PID	Cleartext display	2200	2200	2100
Further models and special designs on request										

The GIGANT Vertical Welding Machines
Flow presses - the single-phase operational sequence

When thermal flow presses are used it is possible to permanently change the form of plastic parts by applying heat and pressing strength simultaneously. In so doing the flow temperature is much lower than the melting point of the particular thermoplast to be processed. Pressing strengths may be up to 200 N/mm_. As a result of the high pressing strength material tension and the "memory effect" are reduced. The particular advantage of this procedure lies in the usually very short cycle time of less than 5 seconds. Practically all thermoplastics can be riveted, flanged or formed in this way. The same mechanical construction can also be used for thermal sealing and hot stamping. In such applications a pressing strength of 100N/mm_ is entirely sufficient.

Extrusion moulding machine
GIGANT 1500 T

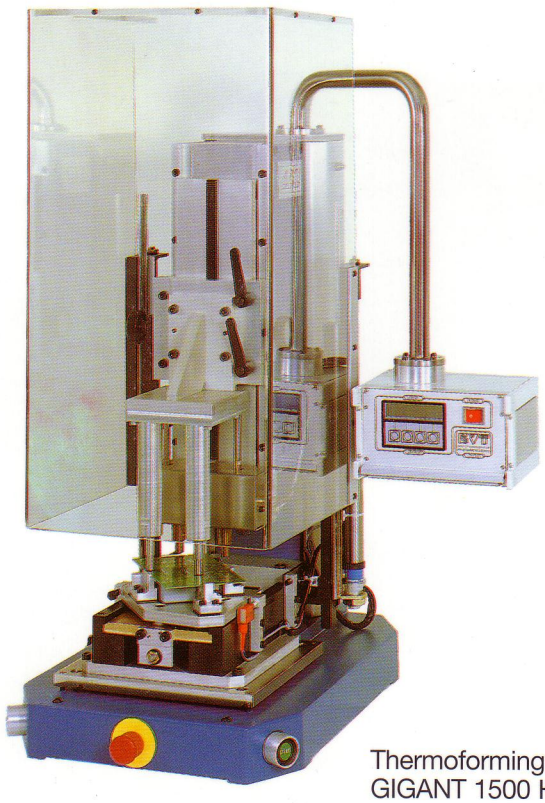


The fields of application:

- Thermal riveting and flanging
- Heat-sealing and embossing
- Bedding of threaded inserts
- Welding of foils and coated laminates
- Fixing of wire gauzes, fleece materials and textiles

Abstract from the GIGANT Program

Welding machines series GIGANT	Art. - No.	Press stroke in mm	Press power in mm	Tool clamping surface mm	Adjusting height mm	Compressed-air connection max.	Standard connected loads, max. 230 V/50 Hz	Cleartext display control Standard	Optional		Weight excluding tool
Extrusion moulding machine GIGANT											
GIGANT 1500 T	4111	80 (50)	1,5 kN	296 x 296	260 x 320	8 bar	4 x 0,9 kW	29 S	19 S	Monitor	95 kg
GIGANT 2500 T	4112	100 (80)	2,5 kN	296 x 296	330 x 320	8 bar	4 x 0,9 kW	29 S	19 S	Monitor	120 kg
GIGANT 4000 T	4113	160 (100)	4,0 kN	296 x 296	420 x 500	8 bar	4 x 0,9 kW	29 S	19 S	Monitor	150 kg
GIGANT 6000 T	4114	200 (160)	6,0 kN	296 x 296	420 x 500	8 bar	4 x 0,9 kW	29 S	19 S	Monitor	150 kg
Thermoforming machine GIGANT											
GIGANT 1500 HES	4121	80 (50)	1,5 kN	296 x 296	260 x 320	8 bar	4 x 0,9 kW	29 S	19 S	Monitor	95 kg
GIGANT 2500 HES	4122	100 (80)	2,5 kN	296 x 296	330 x 320	8 bar	4 x 0,9 kW	29 S	19 S	Monitor	120 kg
GIGANT 4000 HES	4123	160 (100)	4,0 kN	296 x 296	420 x 500	8 bar	4 x 0,9 kW	29 S	19 S	Monitor	150 kg
GIGANT 6000 HES	4124	200 (160)	6,0 kN	296 x 296	420 x 500	8 bar	4 x 0,9 kW	29 S	19 S	Monitor	150 kg
Higher heating output with external control devices											



Thermoforming machine
GIGANT 1500 H.E.S.

Thermoforms - the two-phase operational sequence

The plastics welding machines of the KVT GIGANT H.E.S. series are being increasingly deployed whenever thermoplastic parts are
to be formed or joined with components of other materials in an
economic, permanent and reliable manner. In the two-phase operational sequence the thermoplastic components are heated first of all by a heated tool and then brought into the desired form by a cooling element.

Applications which have already been realised:

- Riveting electrotechnical components
- Riveting front panels with supporting frames
- Riveting toy components
- Sealing toner cartridges and packaging
- Attaching treble loudspeaker diaphragms
- Fastening components in communication equipment
- Sealing loudspeaker protective covers
- and many others


MIELE
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HIGH-TECH FROM BIELEFELD

Heated tool welding

Ultrasonic welding

Thermoforming machine

Electromagnetic resistance welding

Rotation friction welding

10/01

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