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Method for Installation of PEHD Manholes

A technical report with 29 self-explanatory Figures



Forbes opened new Kelso Krah facility



ImProfil of:
Lee Forbes / Forbes Technologies Ltd.

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Don't be a "ME TOO" BE UNIQUE!
Krah pipes go crazy apps beside the applications
Segmented fittings fabricated from large diameter polyethylene pressure pipes
Pontis we bridge the office and the machine
World largest drum, made by Krah
This is Kalli
Companies introduce themselves - Forbes Technologies Ltd.
Krah Calendar 2014



This Issue of „Improfil“

Every three years the most important event we take part in is the K-show in Düsseldorf, Germany. The No. 1 trade fair for plastics and rubber worldwide. This year we are pleased to present you our latest developments like the software "PONTIS", an IR-Camera for quality control, new profiles, higher outputs, customized machines (tank production) and much more. Additionally, we will inform you about the newest pipe applications, like large outfall pipelines (see picture of Isidro Sierra and Alexander visiting an outfall pipeline in Peru).

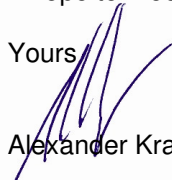
I am very excited and looking forward to this approaching event as nearly all our existing and many potential new customers will come. Certainly we will offer daily fresh food and nice drinks to all our friends who are very welcome to have a rest at our booth. Within the scope of the K show we will arrange an unforgettable party night to welcome our Krah-Community members. The motto of the special event: – "Undead rising". So be curious about it!

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Here we will also present the first photographs of our collection "Girls and Big Pipe Technology" a calendar for the year 2014. Again: Be curious about it! ☺

I hope to meet you on the show...

Yours



Alexander Krah

Method for Installation of PEHD Manholes - a technical report with 29 self-explanatory Figures -

1. HDPE Manhole & Chamber Design

PEHD Manhole and Chamber design stipulates various manufacturing configurations dependent upon actual site conditions. A number of factors including water table height, depth of cover and backfilling materials have significant impact on base configurations.

Where PEHD Manholes and chambers will be installed in areas with high ground water levels, a double bottom construction is recommended, which has to be filled with liquid concrete at the job site. In the case of the double bottom type there are two openings in the upper bottom one is for the filling of the liquid concrete and one is for the venting during the filling process. These openings need to be closed after filling and hardening of the concrete with covers. When installing the manholes up to 1200 mm diameter in ground water, for lift-retention reasons, a backfilling width of at least 50 cm is to be maintained outside and a concrete filling of the benching may be necessary.

1.1 Base Configurations:

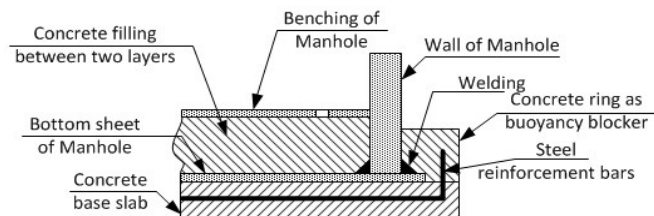
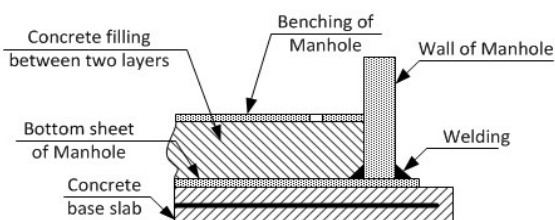


Figure 1: Manhole with double bottom construction, for high ground water



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Figure 2: Manhole with double bottom construction, for no/low ground water

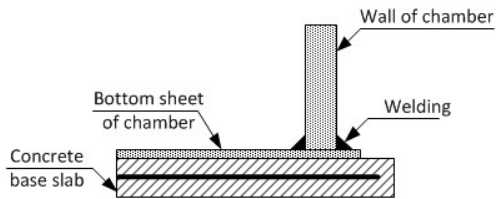


Figure 3: Inspection chamber or valve chamber. Single bottom construction

1.2 Benching Configurations:

Manhole/Chamber benching conforms to the Client's general specifications. The Benching is fully fabricated and integrated into the Manholes/Chambers forming a complete system ready for installation.

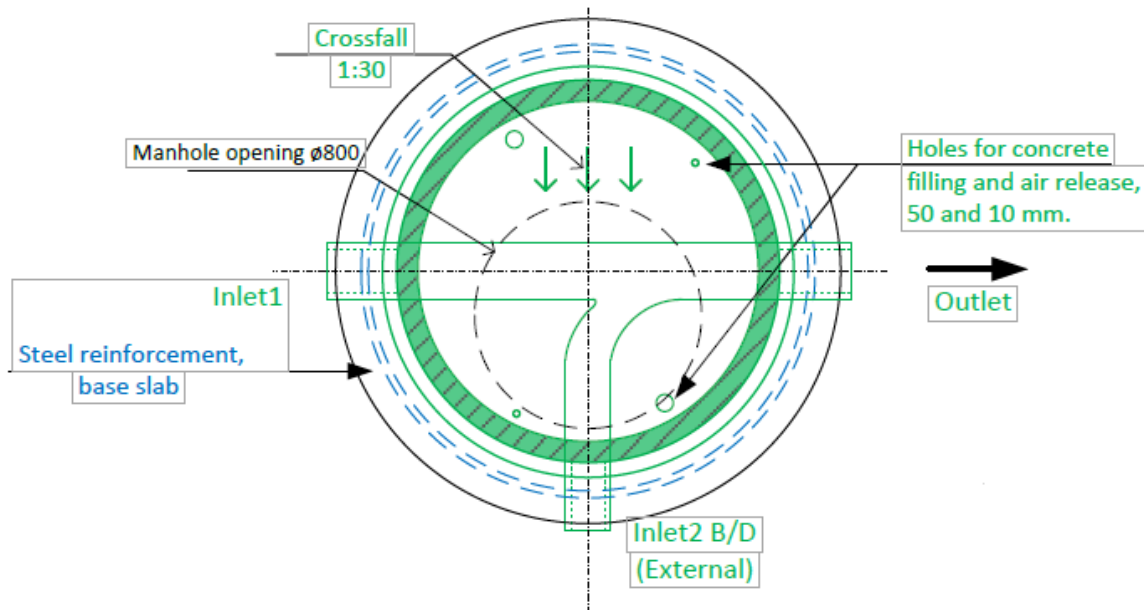


Figure 4: Example of Typical Manhole/Chamber Benching Configuration:

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1.3 General Design and Structural Calculation:

All Manholes and Chambers are designed in “Cylindrical” shape. Reducing cones are not required and eliminates a potential “Fail Point” in very deep excavations. Manholes and Chambers are designed to take full highway traffic load (HLC60) where the reinforced concrete top plate rests directly onto the Manhole/Chamber vertical wall.

For design purposes, information is collected from each site in order to provide the “Strongest & Safest” product for each individual application. Information gathered for input includes:

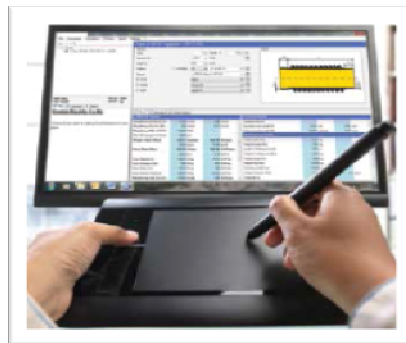


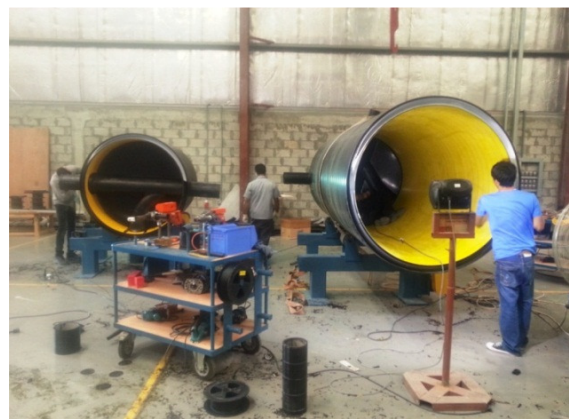
Figure 5: Krah Software

This information, once confirmed, is then inputted into the Krah Manhole / Chamber Design Software resulting in the most appropriate product for each site and its conditions.

2. Krah HDPE Manhole/Chamber Fabrication:

The Fabrication/Manufacturing process begins after collation of the following information:

- Design Recommendations – Direct result of input data.
- Benching Configuration – From Client.
- Invert Levels – From Client
- Connection Types & Sizes (Upstream/Downstream/Backdrop) – From Client



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Figure 6: Krah Bahrain – HDPE Manhole Production

3. Quality Control:

Krah Bahrain is ISO 9001:2008 certified and thorough inspection and testing procedures are in place before, during and after. Some tests include:

- Hydrostatic: Each manhole/Chamber is tested for 24 hours (full of water)
- Fabrication: QA/QC Inspected
- Raw Materials: Each incoming batch
- Finished Goods: QA/QC Inspected

Each Manhole/Chamber delivery is inspected by the Contractor/Client before dispatch.



Figure 7: Krah HDPE Manholes at Hydrostatic test

4. The Installation Process of HDPE Manhole/Chamber:

4.1 Pework Requirements – For Safe & Fastest Installation Results.

- Trenching is open.
- When a water table is present, dewatering must remain constant and in place until the Manhole/Chamber is at least 80% backfilled and Top Slab is positioned.
- Precast Base Slab in accordance with Client/Krah Bahrain's specifications.
- Precast Top Slab in accordance with Client/Krah Bahrain's specifications.

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4.2 Installing Blinding & Base Slab

- After trench excavation, install 50mm thick concrete “Blinding” in the base of the trench below where the base slab is to be constructed.
- Prefabricate the concrete Base Slab in accordance with the client’s specification. Where an “Upturn Beam” is required, a steel ring is to be cast into the base slab in order to “Key” into the “Upturn Beam”
- Position the Base Slab on top of the cured “Blinding”

Figure 8: Krah HDPE Manhole positioned on top of precast base slab (note steel ring for “Upturn Beam”)



4.3 Positioning of Manhole/Chamber onto the Base Slab

- Position Manhole/Chamber onto precast base slab. Use lifting hooks for easy placement and align all connections.

Figure 9: Krah Bahrain HDPE Manhole- Positioned onto Base Slab



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4.4 Connecting Upstream/Downstream Pipes & Backdrops

Krah HDPE Manholes and Chambers are fabricated to suit each installations requirements. All connections are made via Solid Wall HDPE pipe (in various sizes) that are fabricated into the benching of the manhole in the factory. Each connection is designed to accommodate joining to various pipe materials such as PVC, Concrete, GRP and Vitreous Clay.

- Once aligned, connect all Upstream and downstream pipes.
- Where UPVC connections are required, simply push the coupler over HDPE spigots. The rubber rings in the socket of the UPVC pipes match the OD of the HDPE spigot connections provided by Krah Bahrain.
- Where GRP connections are required, specially fabricated connectors are readily available and are also compatible with the HDPE spigot connections.



Figure 10: HDPE to uPVC, including "Rocker Section"



Figure 11: Krah HDPE Manhole – External Backdrop Connection with Grip Rings



Figure 12: HDPE to GRP, including test unit

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4.5 Casting “Upturn Beam” (when required)

- Construct formwork in order to cast “Upturn Beam”, holding the HDPE Manhole/Chamber firmly to the Base Slab. This is generally required when there is a high “Water Table” present and/or as recommended by Krah Bahrain.



Figure 13: Formwork for “Upturn Beam”



Figure 14: Cast “Upturn Beam”

4.6 Concreting “Benching” Internally (When Required)

- In cases of high Water Table areas, Krah Bahrain may specify “Internal Concreting” of the Benching.
- In these cases, “Access Holes” are fabricated into the benching allowing wet concrete to be poured into the internal cavity of the Benching. The “Pour Holes” will then be closed by Krah Bahrain” technicians on site. Smaller holes are provided for air release.

Figure 15: Access holes for pouring of liquid concrete (as required)



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4.7 Casting in “External Backdrop” (When Required)

- Krah Bahrain HDPE Manholes/Chambers are supplied with “Grip Rings” specifically for keying/securing the concrete casting of the “Backdrop” to the main body of the Manhole/Chamber.
- Setout footing and formwork for the casting of the backdrop.
- Pour concrete and cure.



Figure 16: Cast in “External Backdrop”

4.8 Backfilling and Compaction of Krah Bahrain Manholes/Chambers

- No concrete is required in the Backfilling and Compaction process.
- Start backfilling in 300mm layers (unless specified otherwise) until reaching 80% of ground level.
- Backfilling and Compaction should, at all times, should comply with the Clients specifications and in consultation with the Krah Bahrain.



Figure 17: Backfilling & Compaction to 80% of Ground Level

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4.9 Placement of Top Slab onto the HDPE Manhole/Chamber and Final Levels.

The precast Top Slab shall be lined with a "T Rib" PE liner forming a seamless transition between the Manhole/Chamber wall and the interior of the Top Slab, including the Inspection Chamber. The PE liner is fabricated in one section to suit the dimensions of each Top Slab.

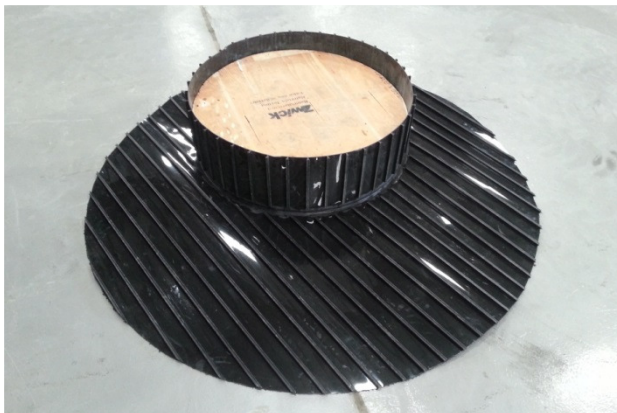


Figure 18: PE "T Rib" Liner for casting into Top Slab



Figure 19: Casting PE liner into Reinforced Top Slab



Figure 20: Lined Top Slab

A "Non Curing" mastic sealant is then applied to the top of the Manhole/Chamber body in preparation for the PE Lined Top Slab to be positioned.

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Figure 21: Applying mastic sealant to Manhole Top



Figure 22: Positioning Top Slab

The Top Slab is then positioned onto the top of the Manhole/Chamber body and forms a seal between both parts.



Figure 23: Top Slab positioned onto Manhole



Figure 24: View into Manhole

Final backfill and compaction to pavement level can now be applied.



Figure 25: Ready for final road leveling



Figure 26: Backfilled to pavement level

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5. Testing

- All “On Site” testing shall be conducted in accordance with the Client’s requirements.
- Krah Bahrain provides QA/QC test results with each delivery.
- Krah Bahrain invites the Clients representative to inspect each delivery prior to dispatch.

6. Handling:

- Each Krah Bahrain Manhole/Chamber is supplied with lifting lugs on either top side. Nylon Bands are recommended for lifting. Metallic Chains and Wire Ropes are NOT.
- Manholes/Chambers shall be transported laying down and fully secured using Nylon Bands and NOT Metal Chains or Wire Rope.



Figure 27: Handling at site



Figure 28: Transport

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7. Storage:

- All Manholes/Chambers are to be stored on level ground and spaced appropriately enough in order to avoid being damaged.
- Krah Bahrain Manholes/Chamber can be stored externally for an unlimited time as the raw materials used in production contains "Carbon Black" giving them excellent UV protection characteristics.



Figure 29: Storage at site



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Forbes opened new Kelso Krah Facility

Forbes Technologies Ltd, UK's leading manufacturer of tanks, scrubbers & other chemical plant in thermoplastics & glass fibre composites opened the latest automated KRAH production plant for large capacity tanks in thermoplastics in August 2013.

On 6th August Michael Moore MP, the Secretary of State for Scotland opened the new production facility at Forbes Technologies Ltd in Kelso in The Scottish Borders.

The facility enables the automated production of tanks & towers up to 4 meters diameter and up to 100,000 liters in thermoplastics. It is sited on 1.7 acre site alongside their already large production facility & incorporates lifting capacity for the production process of 32 tons.

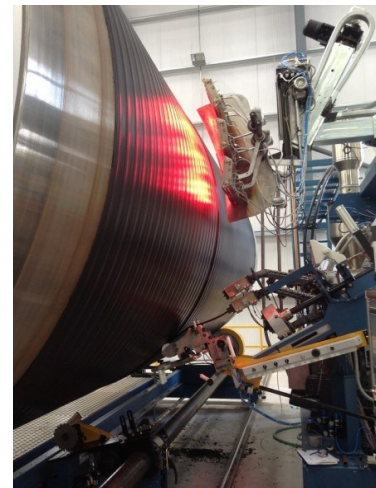
Forbes Technologies have already taken a number of substantial orders for their new helix spirally wound thermoplastic tanks, known as their HVT range.



First major order

The Forbes have received their first major order for the supply of six off 80,000 liter nominal capacity tanks from world-leading electronics firm NXP Semiconductors for their Manchester production facility.

The six tanks will be used for the storage of filtered water used during the manufacture of a wide variety of semi-conductor solutions for products as diverse as mobile phones & tablet computers to car immobilizers and set top boxes.



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The new tanks are manufactured using PE100 HDPE (High Density Polyethylene) material and are designed to meet the requirements of both BS EN 12573 & the more stringent German DVS 2205 standards. Each of the tanks, being 4M diameter and over 7M tall are fitted with full peripheral hand railing with built in kick plates, access ladders and walkways to connect the tanks.

From their Kelso tank production facility Forbes can produce thermoplastic tanks of up to 100,000 liters capacity using the latest Krah automated equipment to produce high quality tanks at competitive prices.

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ImProfil of: Lee Forbes

Part 1:

10 Questions for Lee Forbes / Kenneth Forbes

1. When did you found the Forbes group?

I founded the company in 1960 with my father Kenneth Forbes (deceased 1990) who had retired from the RAF in 1957. The business started in our garage & quickly grew. In the early 60's plastics were not used in industry. HDPE was just becoming available & polypropylene did not come to the market until 1962. We were the first company to build free standing circular tanks in polypropylene. I was the technical guy & my Father was administration. The company has grown over the years and employs eighty people between Norfolk & Kelso sites. The group had the addition of the Pall Ring Company (www.pallrings.co.uk) in 2005 which carries out injection moulding & thermoplastic design & fabrication of scrubbing tower internals. This recent addition is also expanding, the main markets being export throughout the EU & the Middle East.

2. What is your position in the company?

I am Chairman & Technical Director.

3. What did you do before running your own company?

I was at college in Cambridge.

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4. Please tell us about your product range?

We are the largest manufacturer of custom designed tanks in thermoplastics, glassfibre composites & dual laminates with inner shells of thermoplastic / fluoroplastics in the UK. The products range from small thermoplastic tanks to tanks up to 200,000 litres capacity for chemical storage & processing, plus gas scrubbers & other equipment used in the chemical & water treatment industries.

5. What are the characteristics of the company compared to the competition?

With the addition of the Krah "Solid Tank" machine, unlike other companies, we are now able to offer the full range of materials & designs for tanks & are able to select the most suitable combination of materials & type of construction for the customer's application.

6. When did Forbes start working with the Krah technology?

Forbes have been interested in developing larger & thicker wall tanks in thermoplastics for a number of years. Having looked round the market we decided to approach Krah in April 2012. We met Alexander in Spain to see a machine in operation. Following further discussions with Alexander we place a contract in July 2012 for a "Solid Tank machine.

7. Which Krah machine does Forbes have working?

We ordered our first Krah "Solid Tank" machine (not sure of the exact specification – please ask Krah) with mandrels sizes of 4000mm 3500mm & 3000mm diameters with a production length of 7 metres to manufacture vertical tank shells up to 80mm thick. We intend to order further mandrel sizes to extend our range.

8. What is in your opinion, the most valuable competitive advantage of the Krah Technology?

Tank Shell Production - Being able to manufacture large capacity tanks in PE 100 & polypropylene. The Krah "Solid Tank" machine in combination with automated welding systems we can manufacture a tank very quickly. The quality & lack of welded seams makes the one piece shell extremely robust & durable with a long life. We are able to design & manufacture very large thermoplastic tanks conforming to DVS 2205 & EN 12573.

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9. Where do you see yourself/the company in 5 years?

I hope to be in the same chair & desk helping the Forbes team to continue to grow & maintain Forbes as No 1 in the UK market for tanks, gas scrubbers & other chemical process equipment.

10. Please tell us more about your current most interesting projects.

Not only do we build tanks, we also design & build gas scrubbers, degassing & stripping towers, salt saturators. Over the past couple of years we have supplied large gas scrubbers to China in ECTFE reinforced with FRP. These where 3m diameter x 30 metres high & 4 metres diameter x 10 metres high to withstand very high vacuum. The weight of one unit was 12 tonnes – all FRP. Also we have supplied large ammonia strippers & scrubbers to Saudi Arabia & Scotland. Our largest production is for tanks for the chemical industry. We have just completed a contract for 20 tanks 150,000 litres in vinylester glassfibre laminate for chemical storage. One of our largest tank contracts was the supply of 45 tanks 3.5m diameter x 9m high in FRP to Kazakhstan.

It has been a delight to work with the “Krah Team” and to become part of the “Krah Family”. We look forward to many years of cooperation.

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Part 2: Lee personal

Family:

Married with a son & daughter and four grandchildren between 15 years & 9 years old.

In my spare time...

Do not have much spare time as my main hobby has always been my business. We have our main manufacturing site at Kelso on the borders of England / Scotland which I visit regularly – almost as good as a holiday! A beautiful part of the country. Very interested in aircraft & used to fly various single engine aircraft including old aircraft such as 1930/40's Tiger Moths. Enjoy cricket as a member at Lords Cricket ground London. Also collect & refurbish cars to Concourse level such as Austin Healey 3000 (1963); Porsche 911 (1989) – last of the real Porsche 911!

What do I read ...

Always read non-fiction – usually about aircraft, history & development of various engineering projects. Currently reading about the development of German jet aircraft such as ME 262 (in service 1944) Arado 234 (1943/44) Also recently read more stories about the USAF "Blackbird" SR 71.

What makes me laugh:

I enjoy the company of my grandchildren & always laugh with them.

My favorite Food:

Difficult as I enjoy most foods & I am always looking for a different dish to sample.

My favorite holiday destination:

Do not take many holidays – I always look at life as one big holiday!! (a bit sad!!) Very occasionally I go to Portugal. Enjoy days out at cricket with friends & have a few days in Scotland visiting old friends & relations. Days out with the grandchildren are great fun.

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Don't be a "ME-TOO" – BE UNIQUE!

During the crisis in Europe a lot of pipe producers have been facing big problems in marketing the standard pipes, because there is a huge surplus on the markets. Because of the cutthroat-competition the pipe producers are under high pressure to reduce their costs and to find new markets and applications.

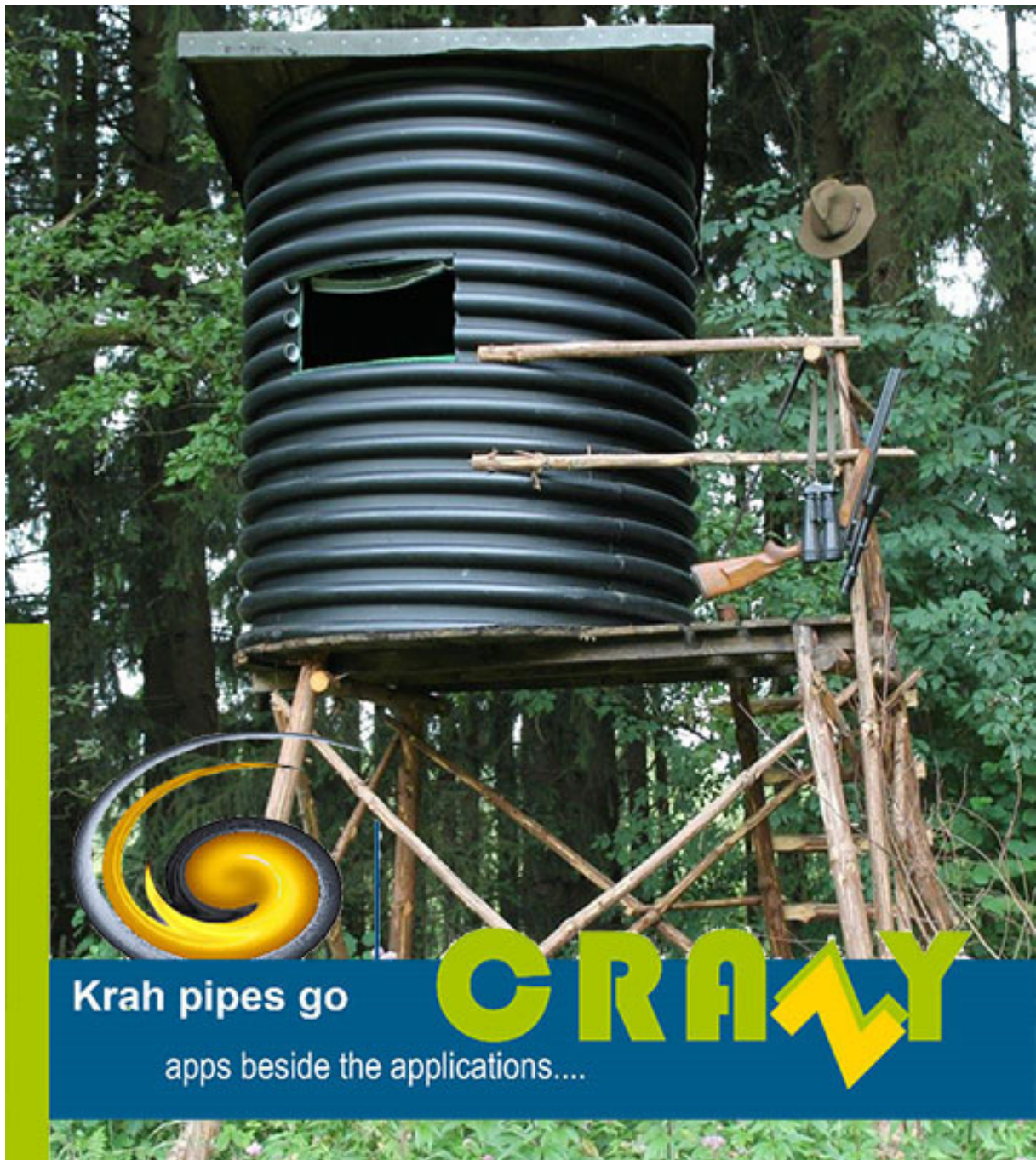
The consequence is that some of the pipe producers are using more and more low-cost and recycled material to reduce their costs. This critically affects the quality of plastic pipe systems and their reputation in general. A lot of companies have to escape from their home markets or are forced to shut down their production completely.

All producers of standard commodities are facing this situation and low market prices. Only companies with the individual solutions are still able to survive and to receive orders by supplying high quality products. So, it is not anymore the best solution to be a "me2". Today a pipe producer should have his individual USP (unique selling points) and not only marketing-USPs.

We, the Krah AG, are helping customers to design their own products, like outfall pipelines, slurry pipes for mining, large storage tank with integrated leakage control, ventilation pipe system, pipes with fillers just to name a few. At the same time we are prepared to grant our customers some kind of exclusivity for their region and the product.

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Krah Pipes go crazy



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Segmented Fittings Fabricated from Large Diameter Polyethylene Pressure Pipes

General:

Segmented Fittings are state of the art for large diameter polyethylene pressure pipe systems. The maximum injection molded bends and T-pieces are until OD 500 available, injection molded stub-ends until OD 630. In larger diameters segmented fittings are the first choice. To guarantee the required homogeneity, stability and strength it is most important to use a high quality pipe and a proper welding-technology.

Segmented fittings are used for gravity and for pressure application as well. Direct extruded and helical extruded pipes can be used, but especially the helical extruded pipes are preferred by many manufacturers, because the wall thickness can be increased easily. An increased wall-thickness is necessary to compensate weakening-factors for welding and shape of the segmented fitting.

The most elegant solution for joining segments is the butt-fusion-process. The necessary butt-fusion-machines are available for PEHD-pipes until 2500 mm OD and in special cases until 3000 mm. For butt-fusion the requirements of the standard DVS2207-1 must be considered. Furthermore for big wall thicknesses the welding parameters must be extrapolated, because the current issue of DVS 2207-1 stops at 70 mm wall thickness.

In each case it is recommended to remove the internal welding-bead to reduce the hydraulic loss.

But there are also aspects in favor of manually joint by Extrusion-welding. For example for T-branches, with Extrusion-welding it is not necessary to cut the complete main pipe. For stability and strength, it is very advantageously that only maximum 50% of the main pipe is cut and the rest of the pipe remains untouched.



Pic1: Butt-fused T-piece with increased wall thickness



Pic 2: Extrusion welded T-branch with partially increased wall thickness

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For all segmented fittings the influence by welding has to be considered. In DVS 2205 the welding factor for short- and long-term load are mentioned:

Welding-procedure	Welding-factor	PEHD
Heated Tool Butt Welding (HS)	fz (short-term)	0,9
	fs (long-term)	0,8
Hot Gas Extrusion Welding (WE)	fz (short-term)	0,8
	fs (long-term)	
Hot Gas Welding (W)	fz (short-term)	0,8
	fs (long-term)	

Table 1: welding-factors acc. DVS 2205

The loss of strength by welding and shape of segments can be compensated by a higher wall-thickness. In the Helical Extruding process (KRAH-PIPE-TECHNOLOGY), it is possible to increase the wall thickness only partly, so that the area of the branch and the welding is homogenously reinforced.

In the standard DVS 2210 are details mentioned about design of segmented fittings, especially for segmented bends. For T-branches often a finite element calculation is chosen for getting detailed results. An orientation for the weakening-factor in the area of the branch is given for example also by the German "AD-Merkblatt N1 and B9", but it must be considered, that the equations for branches are made for not flexible pipes. So at the end, many fabricators make their design according to their experience and do pressure-tests to verify the quality.

The Pressure Test procedure for PE100 segmented fittings is described in ISO4427.

The part 2 of ISO 4427 is specially made for fittings.

Test parameters

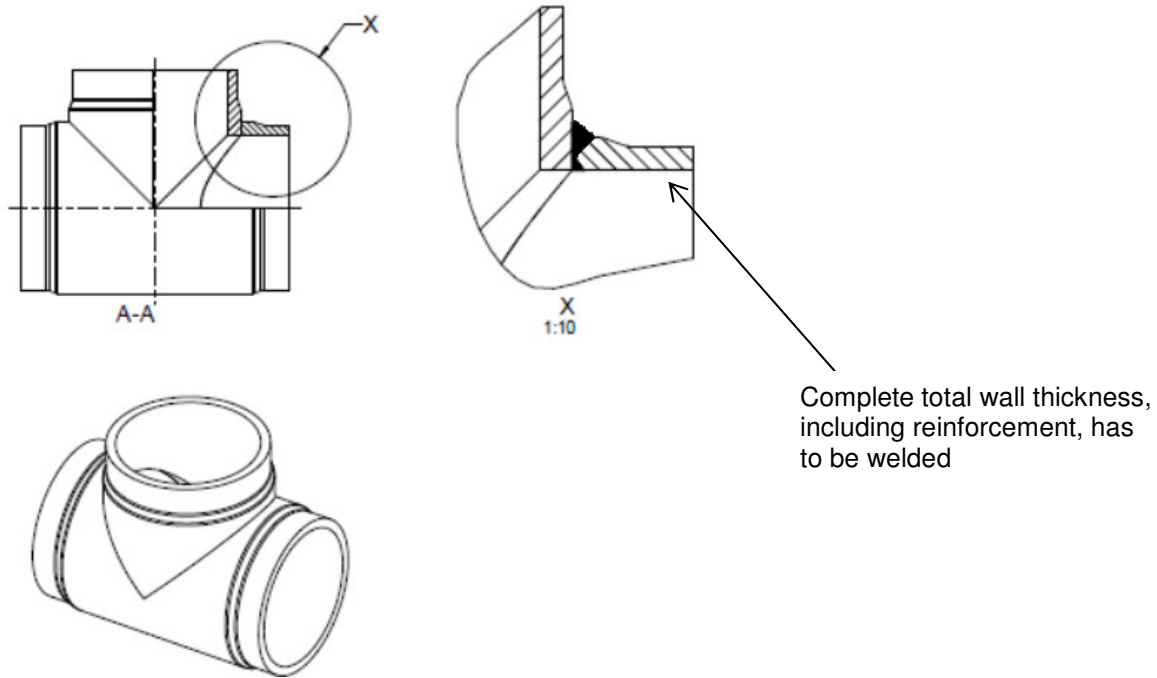
Temperature = 80 °C
 Stress = 5.4 MPa
 Time = 165 h
 Test pressure for fittings = Test pressure pipes

Temperature = 80 °C
 Stress = 5.0 MPa
 Time = 1000 h
 Test pressure for fittings = Test pressure for pipes

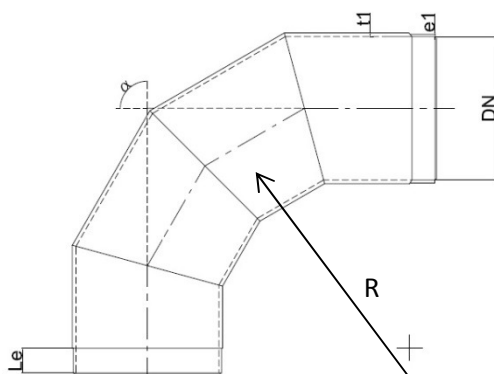


Pic.3: Tank for hydrostatic pressure tests of large diameter pipes and fittings at UGPM Oman

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Pic.4: sketch of T-piece extrusion-welded



Pic.4: sketch of segmented bend 90° with increase wall thickness

$e1$ = standard wall thickness

$t1$ = increased wall thickness

Le = necessary length for joining-process with pipes

R = Radius

The number of segments affect the hydraulic-properties and should be chosen according E DIN 16917-1:

$\leq 30^\circ = 2$ segments

$30-60^\circ = 3$ segments

$> 60^\circ = 4$ segments

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Design of Bend wall thickness in 3 steps:

Step 1: general

Choice of: type of bend, radius, raw material (PE80 or PE100) and especially of the welding-procedure / production-procedure

Type of bend	R	Radius of bend			
		1,0 x OD	1,5 x OD	2,0 x OD	2,5 x OD
Seamless bends	f_{Bi}	1,27	1,22	1,15	1,12
	f_{Ba}	0,92	0,93	0,95	0,96
Segmented bends	f_{Bi}	1,59	1,50	1,44	1,40
	f_{Ba}	1,15	1,16	1,19	1,20

Table 1: weakening-factor acc. DVS 2210

Because of the very high radius at bends with angle up to 30° very often the weakening factor will not be considered for bends until 30°. For bends with angle $\geq 30^\circ$ typically a weakening factor of 1.25 will be chosen.

Step 2: calculation of design strength

$$\sigma_{zul} = \frac{\sigma_{A_{1,3}} \cdot f_s}{A_2 \cdot A_4 \cdot S_f}$$

σ_{zul}	design strength	[N/mm ²]
$\sigma_{A_{1,3}}$	strength value, taken from creep rupture curves, include already influence of chosen temperature and life service time	[N/mm ²]
f_s	long term welding factor	[-]
S_f	Safety factor	[-]
A_2	reduction ratio (chemicals)	[-]
A_4	reduction ratio (notch impact strength) [-]	

Step 3: calculation of needed wall thickness

Bend inside:

$$s_{min} = \frac{p \cdot OD}{20 \cdot \sigma_{zul} + p} \cdot f_{Bi}$$

p	inner pressure	[bar]
OD	outside diameter pipe	[mm]
σ_{zul}	design strength	[N/mm ²]
f_{Bi}	design factor for bend inside	[-]
f_{Ba}	design factor for bend outside	[-]
s_{min}	minimum wall thickness	[-]

Bend outside:

$$s_{min} = \frac{p \cdot OD}{20 \cdot \sigma_{zul} + p} \cdot f_{Ba}$$

p	inner pressure	[bar]
OD	outside diameter pipe	[mm]
σ_{zul}	design strength	[N/mm ²]
f_{Bi}	design factor for bend inside	[-]
f_{Ba}	design factor for bend outside	[-]
s_{min}	minimum wall thickness	[-]

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UGPM Oman is one of the leading plastic pipe producers in the Middle-East and provides polyethylene pipes and fittings until ID 4000 mm. The fittings are manufactured under high quality aspects and Extrusion-welding as well as Butt-fusion will be used. The butt-fusion machines UGPM has installed are able to weld fittings until ID 2000 mm!



Authors:



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Managing Director
United Gulf Pipe Manufacturing Co.LLC
Sultanate of Oman
*UGPM is one of the leading producer of thermoplastic pipe systems in Middle East
Diameter range: 40 mm until 4000 mm*



Dipl.-Ing. Stephan Füllgrabe
Managing Director
Plaspittec GmbH
Cologne, Germany
Plaspittec is an international operating Consulting and Engineering Company for Large Diameter Plastic Pipe Systems

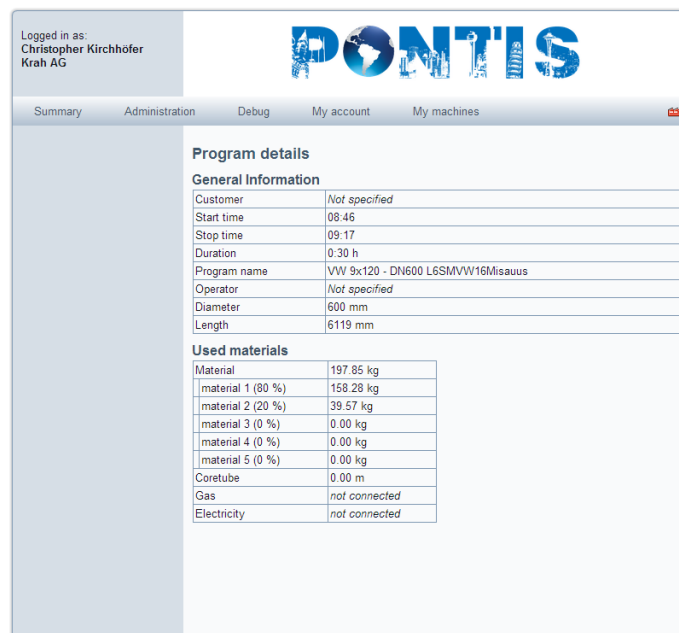
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Pontis – we bridge the office and the machine

Pontis is a software package to monitor your KRAH machine from almost everywhere, from the view of a production manager or the general manager. It is not showing boring data or screen shots of the control panel but Pontis is nearly sending real-time production data, which are necessary to run a plant. Reports which have been previously made manually are now being produced without any manpower and nearly in real-time. The information can be received everywhere where internet access is available and without any special software but your standard internet browser on your computer, tablet or even your smartphone will provide you with the complete information.

You will know directly the downtime and the reason why the machine is not running (not making pipes and money). Also the numbers of produced pipes and the output in kg/hr will be shown.

Every time a pipe is produced (manually or through a program), your machine will save the collected data with the help of our Pontis server, where you can access the results 24/7. Pontis can handle up to 8 machines for each customer. No high investment is needed, the customer pays the use only.



Logged in as:
Christopher Kirchhöfer
Krah AG

PONTIS

Summary Administration Debug My account My machines

Program details

General Information

Customer	Not specified
Start time	08:46
Stop time	09:17
Duration	0:30 h
Program name	VW 9x120 - DN600 L6SMVW16Misauus
Operator	Not specified
Diameter	600 mm
Length	6119 mm

Used materials

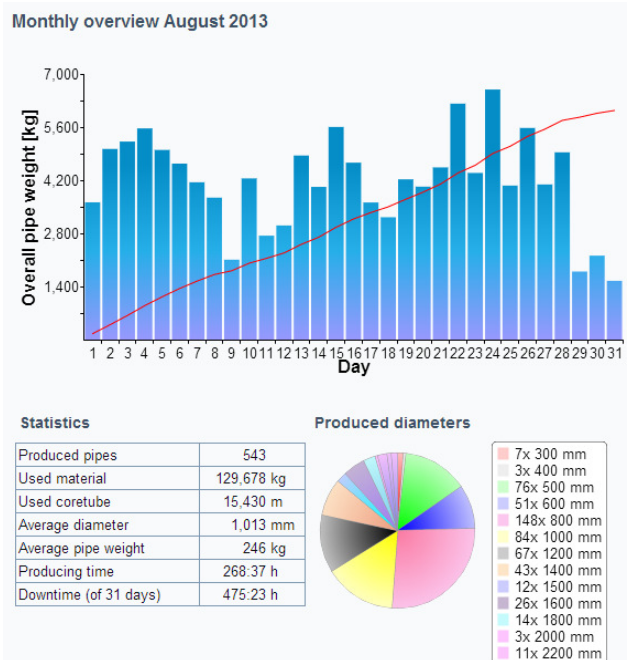
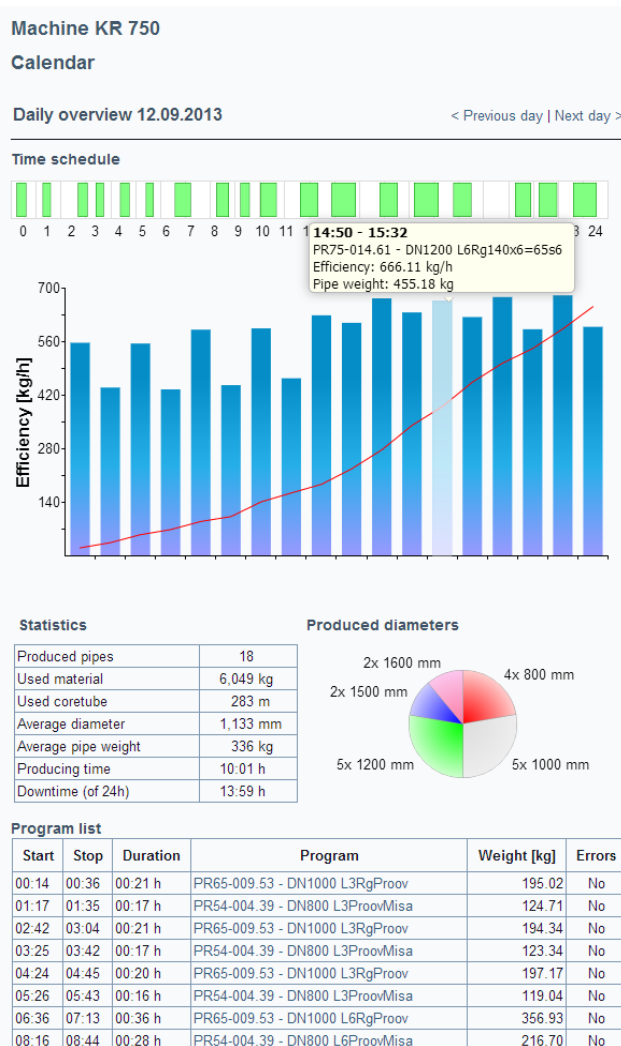
Material	197.85 kg
material 1 (80 %)	158.28 kg
material 2 (20 %)	39.57 kg
material 3 (0 %)	0.00 kg
material 4 (0 %)	0.00 kg
material 5 (0 %)	0.00 kg
Coretube	0.00 m
Gas	not connected
Electricity	not connected

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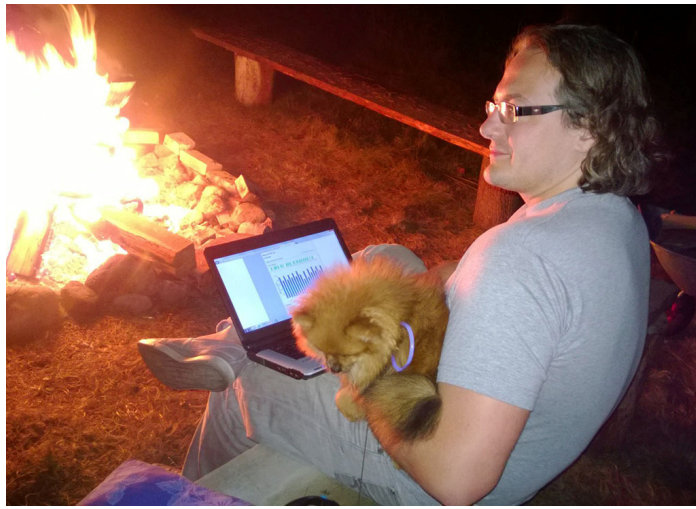
The following reports will be available:

- Annual report
- Monthly report
- Daily report
- Report per pipe



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During the complete development process, Krah Pipes OÜ in Tallin, Estonia was involved. Mr. Peeter Kirtsi (CEO of the company) was interviewed lately by Christopher Kirchhöfer (programmer of Pontis, Krah AG).



Mr. Kirtsi, at the beginning when you agreed to support the development of the Pontis software, you were skeptical about the program. Why?

Sceptical would be a little too much to say. I was hesitant what more could you get from the system that we do not know already. We prepare different statistics every day, week, month and thought we had all we could imagine. So I was just questioning the idea to support us again with the stuff we already know, just in different form and way.

What did your employees and workers say about the program?

At the beginning not much. In the development process only me and our production manager were involved, questioning everything. Today also the employees have the right statistics on what they have done during the past days. Some might not be happy about it, but if you consider it you learn from it and improve yourself.

How often are you using the program at the moment?

Me, every day, usually several times a day. Our production manager with the same intervals. Every day we are posting the printouts with the statistics of the previous day on the bulletin board in the workers restroom. And they always have statistics for 2 days there.

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Do you think that you have a cost advantages by using the program?

Yes, definitely. If not now and directly, then indirectly we will have them. Mainly because of two things: we now actually see what happens in the production. We get the real data of stop and run times, unfinished pipes, production statistics basically online. All this helps us to focus on the right processes and also production teams. The statistics we get are honest and uncompromised. All the data we collected ourselves gave us much information, but unfortunately it did not help us to analyze processes operatively and see behind the scenes.

What do you think is the main advantage of the program?

For me it is simply the fact that I can have the operative data on what has been produced and how and it does not matter where I am. No calls, no information from any person – the data comes from the machine itself, so it records what has really been going on. This quick data helps me to react on the problems as soon as they emerge. It also gives me valuable data for the production planning and addressing the issues there – with stoppage times, with shift production capacities etc. Also, as we present this data openly in our company, it helps our workers to see the same I do. It raises questions and people now understand what I am talking about when asking some “stupid” questions.

What would be a good improvement in the next version?

We do quite a lot of special profiles manually, so it would help to get also the extruder run time separately into the program. Currently it records only program starts and stops. Also for the future the software could be linked to production and quality management – e.g. to plan the production and follow the pipes through the production process including the quality control. In this case this tool would work for everyone as the main tool in planning, controlling, product traceability and also for just understanding your production with its accomplishments and problems.

Thank you very, Mr. Kirtsi, I hope you will join the next developments of Krah AG too.
Of course, we will, thanks to you!

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World largest drum, made by Krah

On the 10th of August 2013 the beautiful town of Tõrva (Estonia) hosted it's yearly spell casting festival Tõrva Loits. This is the sixth time Tõrva Loits is held, bringing to the audience great performances, leading musicians and exciting spectacle in a lovely natural setting.



The highlight of the evening was the unrivalled open-air spectacle "The Greatest Hits of Kalevipoeg". Directed by Mart Koldist, choreographer Märt Agu.

Featuring popular bands and singers such as Jaan Tätte, Tanel Padar & The Sun, Päär Pärenson, 300 dancers, 200 choir singers **and world's biggest drums** the collective performed best bits of the Estonian national epic "Kalevipoeg". The world's biggest drums were made specially for the festival a few years ago from Krah pipes by our partner Krah Pipes Estonia and have been used for several other events since.



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Despite the pouring rain, over 4500 visitors came to see and listen to the music. This time the festival was held on the shores of the river Veskijärve, the surroundings of which offer alongside with breathtaking views much greater possibilities for fire and water shows and bring even more mystery to the spell casting. All this combined with the legends, pouring rain and fantastic performances gave such unforgettable positive emotions to participants and visitors that the festival ended just before midnight.



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This is Kalli...

This is Kalli, Kalli is an engineer at the Krah AG. He is already retired since a few years, but now he came back with his mission to explain Krah technology in a very simple way to nearly everybody.

To present and underline his explanations he is using video, so that also everyone else can use his videos through www.youtube.com (you can find it on the channel of **Krah AG**, you just have to subscribe the channel and you will be always up to date for any new videos) in the internet or from the Krah AG home page (www.krah.net).

His idea is to make the video in several languages. The first videos, that will explain the **Krah Pipe System** and the **Production Process** is available in English and German. Other languages will follow by the end of this year.

Kalli will also be very happy if schools, universities and other authorities will use his videos to bring the Krah technology closer to the people.



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Companies introduce themselves

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STRONGER**

We all know that helix structures are important.

What you might not know, is that using a helix winding process to build large thermoplastic tanks is more efficient than sheet welding and makes for a reliable structure.

Presenting the all new, helically wound HVT range, with up to a huge 100,000 litre capacity.

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Krah Calendar 2014

