

IMPROFIL



Krah Homepage
New content and redesign of krah.net



Big in Japan
Krah AG has brought pipe production technology to Dainippon Plastics Co., Ltd.



Estonian Energy
Project report about relining existing pipelines

See also: **Ridgistorm: Krah electro-fusion jointing has proved its worth!**
ImProfil of: Jason Shingleton
The „Phoenix“-Project - A new pipe in the pipeline
Information: Current Market Prices for Commodities in Middle and Eastern Europe

Welcome to the second issue of ImProfil

Dear friends, customers, suppliers, investors an interested people in our pipe technology

It was always my dream to publish a kind of magazine and now I am proud to present the second issue of the Krah Community and Krah AG newsletter. At the beginning it was my idea only to supply constant information to my customer, but now my target is to inform all interested people about what is going on with the Krah machines and pipes in the world.

I'm really thrilled by the development of this project. Was it in the first issue 120 receivers, this time we submit the newsletter to more than 300 recipients worldwide. The readership is consists of Krah AG machine user, Krah pipe user and contractors, consultants and authorities. A print version (PDF) is available as well – if you would like to receive it, please do not hesitate to contact us.

Maybe you know someone who might be also interested in keeping up-to-date? Just let us know and we will add the email address – even competitors or “enemies” .

On the 21th of May 2011 the Krah AG will have an extraordinary shareholder meeting to take the decision about an increase the registered company capital. The main reason for this is to open the way for new developments in the pipe market. I am planning to present the results by the end of this year.

Whats new?

From now on we will publish a column called “improfile of”, which consists of interesting and important information about a person related to the Krah products – this time it is Jason Shingleton / Polypipe U.K. Moreover Issue No.2

includes coverages of pipe applications and related products. I am happy that our machine customers are supporting this project by providing very interesting reports about their own pipe applications. So please keep on doing that! Use this opportunity to communicate with your (potential) customers in an indirect way and so the reader will start out their day with a great impression of your company with a good reason to click through to your website.

I am looking forward to a steadily growing number of readers and a lot of interesting reports!

With kind regards

Alexander Krah / CEO of Krah AG ■



Big in Japan

Big in Japan – not only a song performed by Alphaville, but also the Pipe Production Technology for BIG pipes which Krah AG lately brought to Dainippon Plastics Co., Ltd. in Japan.



*Mr. Mitsuaki Tokiyoshi,
Project manager for this project*

It was in year 2007 when Ernst-Otto Muhl, Area Sales Manager at Krah AG responsible for the Asia/Oceania market, visited Dainippon Plastics at their head quarters in Osaka. He wanted to introduce Krah's Pipe Production Technology for Pressure Pipes (DR machine). At this time Dainippon Plastics was planning to install an additional pipe production line within the next 2 – 3

years, but was first focusing on a third KR Machine for its plant in Ako. Within a short period of time the management of Dainippon Plastics was basically convinced regarding this technology for PE-GF pressure pipes.

After having a very intensive market research and several feasibility studies as well as two visits to one of Krah's existing customers who also runs a KDR pipe production line, Dainippon Plastics had made their decision. Mr. Tokiyoshi, Project Manager for this project reviews: "we knew very fast that this technology would open a huge additional market segment for us and that we would be able to increase our output as well as our turn over significantly. We only had to decide which date we wanted to start the production of PE-GF pressure pipes."

At the end of 2009 the President of Dainippon Plastics, Mr. Hiroshi Kawaguchi and Mr. Ernst-Otto Muhl met in Osaka and after friendly negotiations the official purchase agreement for delivery of one DR700 Pipe Production Line was signed. It has been agreed that the acceptance test at Krah's plant in Germany should be executed by the end of 2010 and the final acceptance test at Dainippon Plastics' plant in Ako should take place by mid of February 2011.

These 12 months were used to implement the special requests of Dainippon Plastics for their new machine to fulfill special requirements of the Japanese market. Last but not least world's largest exhibition for plastics, K-show in Duesseldorf, took place during the final set up of Dainippon's new machine and a lot of Krah man power was needed to guarantee a good presentation of Krah at their exhibition stand.

Finally Dainippon Plastic's new machine got ready in time. Mr. Toshito Otani, responsible for pipe production at plant Ako, and his team came to Germany from 6th to 10th December 2010 to carry out the official acceptance test at seller's site. Machine was found in good shape and best quality and all tests including the production of several pressure pipes in different diameters were fulfilled successfully.



*Mr. Hiroshi Kawaguchi,
President of Dainippon Plastics*

After acceptance test at Krah's site all components were de-installed, packed into 4 containers 40' OT, loaded onto vessel just before Christmas and arrived Kobe port on 4th February 2011. Containers passed customs clearance without any problems and arrived Dainippon Plastics' plant in Ako just in time, so Krah technicians, Mr. Mike Klein and Mr. Nico Horn, could start installation on 8th February 2011. It took 9 working days for installation and from 21st to 23rd the final acceptance test at buyers' site took place. After successfully passing all test, the pressure pipe production line was officially handed over to Dainippon Plastics by Mr. Christoph Fitten, Mr. Ernst-Otto Muhl and by Mr. Sandro Vernillo, who stayed in Ako until 8th of March for training of machine workers.

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Last but not least a very impressive Official Opening Ceremony took place on 25th February, which Mr. Fitten, Mr. Muhl and Mr. Vernillo were invited to join as representatives of Krah AG. The new pipe production line was inaugurated and Krah AG hopes that the new machine will in the future be running smoothly, so

Dainippon Plastics is able to continuously increase its production capacity.

As per mid of May 2011 the pipe production line is running without any nameable failures; Dainippon Plastics has produced several sample pipes and a support team of Krah AG has visited Ako plant again to implement customer-related software changes and upgrades.



Ceremony members

Krah AG wishes Dainippon Plastics all the best for the future and will assure any possible support for their long term customer.

Also after 11th March big earthquake and tsunami, Krah AG would like to express their deepest sympathy to the Japanese Nation – Mr. Alexander Krah, CEO of Krah AG would has expressly said: “we as Krah AG are ready to give our outmost support for rebuilding of the affected areas.”

After Dainippon Plastics had been informed that this project report would be published, they asked to be able to address the following as epilogue:



Machine with priests

In the meantime we are starting to make PE-GF pipes as per Japanese quality and Japanese style with Krah’s new technology. Furthermore, on 7th April we held a big meeting and presentation for PE-GF pipes with all our sales staff. We are getting ready to start our new business with the support and cooperation of Krah AG.

Also Japan had a big earthquake and tsunami on 11th March 2011. We are very impressed about the fact that Krah AG was expressing their deepest sympathy to the Japanese Nations. Japan still continues to recover and stand up again – some people in Japan are working 24/7 hours with cooperation from all over the world. Dainippon Plastics Co. Ltd has a responsibility to build up in JAPAN with Krah’s new technology in the badly hit areas, by making pipes, too.

Estonian Energy - A relining project

Eesti Energia Narva Elektriijaamad (Estonian Energy Narva Power Plants) is the largest producer of electrical energy in Estonia and one of the most important power producers in Baltic region. The company is in constant development and renovation of its infrastructure. In 2010 the company started renovation project of its cooling water circulation pipelines located in Estonian Power Plant production facility.

Existing circulation pipelines were designed and built late 1960s early 70s. Due to constant exploitation and time factor these metallic pipelines are today in really bad condition – including rust, deformations of the pipeline itself, leaks etc. Solution was needed to renovate the existing OD1600 pipeline with optimal cost and guarantee its lifetime for minimum 30 years after the renovation works. Different solutions were considered, amongst them GRP, metal, different relining options, chemical treatment etc. The chosen option was the solution to use polyethylene pipes ID1400 produced by Krah Pipes OÜ and to install the pipes with different applicable techniques, including: Relining of the existing pipeline connected by electrofusion- (efusion) technology and open trench installation of bends and manholes.

Project description and Technical Solution The pipeline what should be renovated start in a pumping station and end in turbine room with a butterfly valve. The initial inspection showed, that the pipeline was highly corroded (corrosion approximately 4mm) and deformed in several places in both horizontal and vertical directions. The inspection also showed that the straight parts of the pipeline had displacement of approximately 20% on the longitudinal direction. The customer decided to change the corroded OD1600 metal pipeline with PE100 ID1400 pipeline.

The pipes should fullfill the requirements of international standards EN 13476-1,3 and DIN 16961- 1,2 and proper for the operating conditions. The pipes are homogenously produced and calibrated to inside diameter. The flexible production process based on the Krah helical extrusion process (www.krah.net) enables the pipe producer to manufacture tailor-made solutions for all dimensions up to DN 4000. The wall structure can be solid wall or profiled wall – depending on the requirements.

The designed lifetime for the new solution had to be minimum 30 years, but all designs are done based on a lifetime of 50 years. First the characteristics and setup of both pipelines were taken into account and head loss calculations made by Tallinn Technical

University. The results showed that taking into account all of the parameters, the existing pipeline generated head loss of 1,01m and the new proposed solution with smaller diameter 0,98m. Polyethylene has superior abrasion resistance compared to metal. In addition to that PEHD pipes do not suffer from possible corrosion. Also the surface roughness of PEHD pipes is much less compared to steel pipes. This is perfectly illustrated by being able to renovate the existing metal pipeline of OD1600 (ID1580) with ID1400 PE100 pipeline keeping at the same time the required flow parameters. For this project a high modern PE 100 material (Borealis HE3490-LS) was used. This material is a black, bimodal, high density polyethylene, classified as MRS 10.0. The durability of this material is confirmed and guaranteed by the supplier through long term tests and international standards ISO 9080 and ISO 12162.



Original pipelines exposed



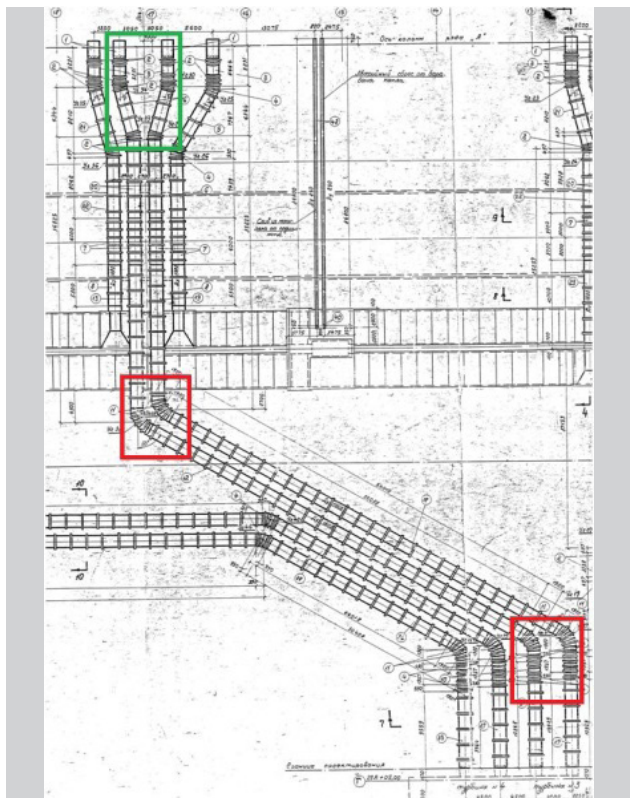
Inside surface of the original pipeline

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Project execution and pipe design

The first phase renovation was done on two parallel circulation pipelines totalling 260m in length. The work on the first part of the pipelines was started in September 2010 and finished already 2 months later in November 2010. During that time 260m of pipeline was renovated including:

- 160m of straight pipeline with e-fusion welding connections including pulling maximum of 60m long segments into existing pipeline;
- 60m of relining of pipeline with on-site inside existing pipeline extrusion welding of maximum 1,25m long segments;
- fittings:
 - 2 manholes for pressure application;
 - 8 tailormade horizontal bends of 15 and 60 degrees;
 - 8 tailormade vertical bends of 15 and 30 degrees;
 - 4 pressure flange connection DN 1600.



Pipeline layout drawing

The Renovated part of the pipeline was connected to the existing OD1600 network with flange connections. The original installation when the power plant was built of steel pipes OD1600 pipelines with original wall thickness of 10mm.

The pipeline consisted of straight sections with maximum length of up to 60 meters. All sections are connected by number of horizontal and vertical bends ranging from 15 degrees to 60 degrees and one manhole on each pipeline. One section of approximately 30 m is installed under a concrete baseplate for approximately 120 ton transformers.

On image 3 the place of the 60° bends are marked with red squares and the place of concrete baseplate, including horizontal and vertical bends is marked with green square.

The Working conditions for the pipeline are the following:

- Medium: river water
- Temperature: 4 – 25 degrees Celsius
- Volume: up to 5 m³/s
- Flow speed in the old pipeline: up to 2,55 m/s
- Flow speed in the renovated pipeline: up to 3,25 m/s
- Working pressure 0,5 bar, peaks up to 1 bar

Due the complex pipe system at the project three different options of installation were chosen in order to assure the fastest and most cost effective means of installation available for this certain project:

- Open trench installation for bends, manholes, all connected by e-fusion;
- Pipe relining for straight parts of pipeline by pulling the pre-welded pipes into the existing metal pipeline, connected by e-fusion;
- Part with horizontal and vertical bends under transformers was decided to do with prefabricated segments of 1250mm in length, connected by extrusion welding.

Specially the integrated e-fusion technology at the Krah-PE-pipes and the availability of combination with extrusion welding enable the contractor to join the pipes homogenously and 100% tight. The welding procedure is following the standards for welding of polyethylene (inter alia DVS 2205, DVS 2207-1,4).

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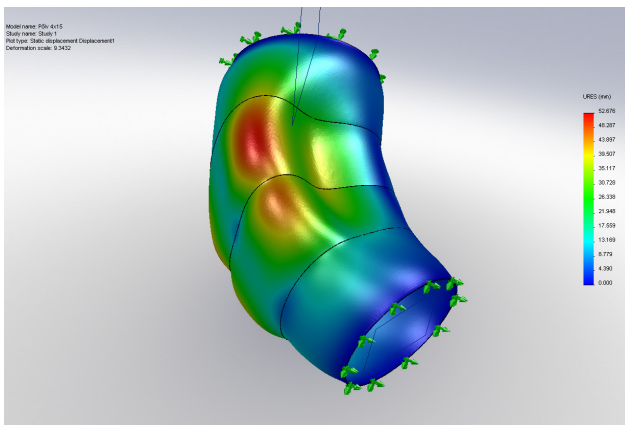


E-fusion connected pipe with integrated pressure manhole to the main pipeline

For each type of installation a different profile, suitable for the task, was designed. According to the requirements of the customer the base for each profile was 20mm solid wall pipe. The wall thickness was evaluated by the weakest part of the pipeline e.g. extrusion welded parts considering the maximum operating pressure of 1,25 bar.

The static calculation was done inter alia according the German ATV-standard and by FEM (Finite Element Method). FEM enable to consider the load distribution during installation and operating much more detailed .

But furthermore the design of wall structure, figure of profile and socket was very important for successfully run of installation and



Deformation analyses for the bends with FEM, Krah Pipes OÜ

relining. For bends and manholes special smooth outside profile was used to provide the most comfortable surface for welding segments inside and outside. As all other profiles used, also this one had base of 20mm solid wall, inside structure for sufficient ring stiffness and additional cover for smooth outside surface.

The Profile height was chosen to be at the same height with the socket's outside diameter for facilitating the relining process. The pipes that were pulled inside the existing pipeline also consisted of 20mm solid wall as a base and profiled outer surface for the purpose of being as close as possible to the inside diameter of the existing pipeline. The Design of the solid wall consider also the requirements due tension load during installation process.

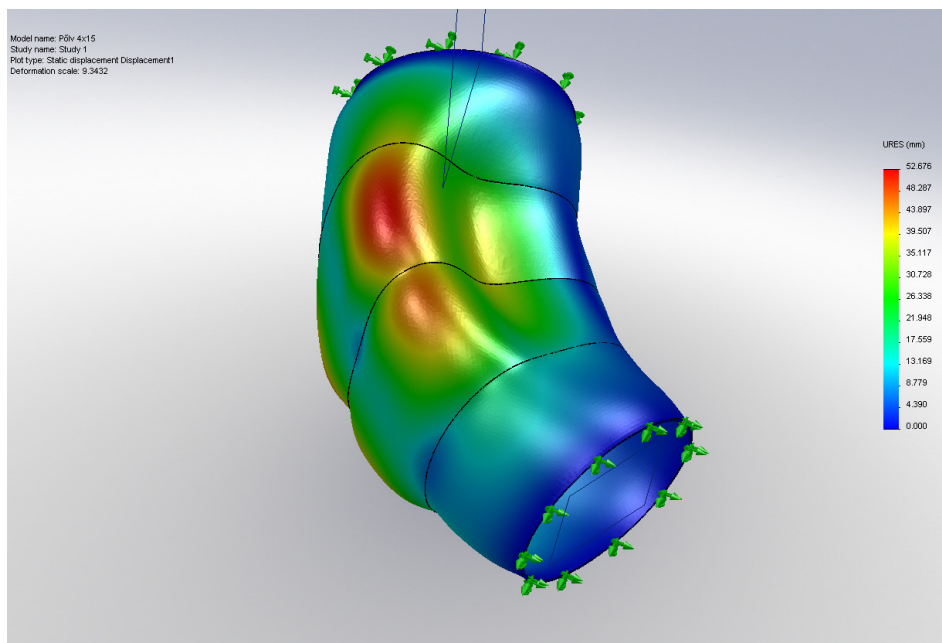


Start point of the relining, Krah electro-fusion welding and bentonite pipe installation



Stubs for anchoring the pulling ropes and spreading pulling loads

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*Deformation analyses for the bends with FEM,
Krah Pipes OÜ*

The open space between the new and old pipelines were filled with bentonite mix for additional support in case of collapsing of the old pipeline. The bentonite filling also works as an anchoring medium against longitudinal moving of the pipe.

Extrusion welded segments were designed also on the base of 20mm solid wall. Small outside profile was added for better anchoring of the pipeline in the bentonite filler material. Segments were installed piece by piece into the existing pipeline and connected by extrusion welding. The final evaluation for the design itself included calculation of forces needed for pulling the new pipeline inside the existing one and the stresses it generates inside the pipe wall. The calculations were done in cooperation with Tallinn Technical University. Also hydraulic calculations for bends were done in order to find out whether the design is sufficient to withstand the forces generated by moving water. The simulations were made without taking into account any backfilling or additional supports thus generating much worse conditions than the actual conditions after installation would be.

In order to assure safe working conditions for the whole designed lifetime of 50 years separate recommendations for installation

works were ordered from Merko Ehitus AS. For the safest exploitation during the whole lifetime concrete supports were poured at the bends to bear loads up to 32 tons, generated by the change of direction of flowing water stream. The installation works were carried out by Eesti Energomontaaž AS.

Testing and quality assurance

All pipes produced for the project were subject to thorough inspection after production. Main parameters like pipe solid wall thickness, profile height, profile width etc were measured on each pipe. Also socket and spigot parameters were thoroughly controlled before shipping out the pipes to the site. All records of the measurements were presented to the customer. For controlling

equipment like calibrated ultrasonic thickness gauges and measuring tapes were used.

All welds performed (both extrusion welding and e-fusion welding) were recorded in welding diaries according DVS standards. In addition to that all welding seams were later tested by using a spark tester. Testing protocols and welding diaries were presented to the customer alongside other documentation. Furthermore company Plaspitex GmbH from Germany was included as an external Consultant. The pipeline was tested under pressure before releasing it to exploitation. The pressure test was done using 1,25 times the maximum operational peak pressure. Before reaching the test pressure, the pipeline was hold under the operational pressure for 0,5 hours. When this was achieved, then the pipeline was held under the test pressure of 1,25 bar for 2 hours. After that the pressure should be dropped to the maximum operational pressure and held there for further 0,5 hours. The pipeline has passed the test without any leaks.

The exploitation started successfully November 2010 after two months from the start of installation.

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Installing of 1250mm segments into the closed pipeline under the transformers

Relining procedure with profiled polyethylene-pipes is an applicable and economically sound way for renovation of corroded, untight or damaged steel pipe systems. Even complex pipe isomeres and geometries can be relined, due the flexibility of production procedure and the different possibilities for

plastic welding and installation. The helical extrusion process provide the pipe producer the possibility to design in consideration of the requirements at the project a tailormade wall structure solution for pipes and fittings. Almost every wall thickness and every profile can be produced.

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Krah Technology /

www.krah.net ■

Krah electro-fusion jointing once again proved one's worth

Polypipe WMS re-engineers original specification for Northumbrian Water flood alleviation scheme based on Ridgistorm-XL's proven performance and Krah electro-fusion jointing



Instaling of 114 metres of Ridgistorm-XL pipe in 1050 mm diameter

Early involvement in a capital projects scheme in Peshaw, County Durham for Northumbrian Water enabled Polypipe Water Management Solutions (WMS) to work closely with consultant engineers Mott MacDonald and supply its Ridgistorm-XL large diameter pipe system – based on the Krah helical extrusion system. An alternative system was originally specified but this was re-engineered after

Polypipe WMS demonstrated the performance capabilities and electro-fusion jointing technology of the Ridgistorm-XL system.

114 metres of Ridgistorm-XL pipe in 1050mm diameter were supplied to the scheme, along with 1050mm elbow joints and two large diameter 1800mm manholes fabricated at Polypipe WMS's dedicated facility in Loughborough – the largest fabrications department for plastic drainage products in the UK.

Ridgistorm-XL's electro-fusion jointing method was a significant factor for Northumbrian Water, Mott MacDonald and contractors Seymour Civil Engineering as this eliminated the need for internal welding within the pipework.

Once on-site, the improved handling and quicker installation of the Ridgistorm-XL system compared to traditional rigid materials enabled Seymour to reduce the overall construction programme by two weeks.

In addition to the design and technical support provided by Polypipe WMS during the initial stages of the project, Seymour's on-site team were also trained on the electro-fusion welding of the Ridgistorm-XL system to aid in the rapid installation of the pro-

ducts. This offered further health and safety benefits as the need for working in confined spaces was reduced.

This project marks the first capital works scheme to use the Ridgistorm-XL large diameter pipe system, with all parties working closely together to trial the new technology. As a modern alternative to traditional rigid materials that provides unique factors such as electro-fusion jointing and bespoke, sitespecific design, Ridgistorm-XL can deliver tangible benefits in terms of reduced health and safety risks, improved pipeline performance through joint integrity and an overall reduction in the construction programme.

Paul Davidson, Project Manager for Northumbrian Water commented: "We were keen to trial the Ridgistorm-XL system to understand the specific benefits the product could offer over traditional solutions and we're very happy with the results. The feedback we've received from both Mott MacDonald and Seymour Civil Engineering Contractors has been encouraging and we would consider the use of the Ridgistorm-XL system for similar capital projects in the future."



Joining the 1050 mm diameter pipes by electro-fusion

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JASON SHINGLETON / Polypipe Civils UK

1. Since when do you work for Polypipe Civils?

I have worked for Polypipe Civils for over 12 years

2. What is your position in the company?

I am the Marketing and Development Director – responsible for Business and New Product Development

3. What exactly is Polypipe doing?

We have set about growing the Polypipe Civils business by positioning ourselves as market leaders in Water Management Solutions. This is in response to new legislation in the UK and Europe which requires governments to better control surface water flooding.

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

Polypipe Civils is the market leader in the UK in our sector (focussed on the Civil Engineering market) We are the only company to have a full range of water management solutions products and to be able to support them both commercially and technically.

5. Since when Polypipe is working with the Krah technology?

We installed our Krah line in Autumn 2008.

Jason personal

Family:

Wife (Suzanne) and 2 Sons (Joe and Ben) aged 3 and 9

In my spare time...

I like to Hunt and Fish, together with watching most sports, when the family allows.

I am just reading ...

The Newspaper. I tend to read current affairs, but with 2 young children reading books is pretty much out of the question.

I can laugh about..

Just about anything.

My english accent... You have to with Alexander about !!!

My personal role model:

I do not have a particular role model. I like to adapt as circumstances change.

My words to live by:

Live life to the full and enjoy yourself at work and at home, you are only here once.



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6. How did you learn about this?

I first approached Krah and met Alexander over 10 years ago. It took him all this time to get us to buy a line. I am sure Isabella would have been quicker!! Seriously, when we first met the time was not right for the UK market. When we decided to look again at introducing large pipes to our range I knew where to come.

7. Which Krah machines does Polypipe own until now?

One KR750

8. What do you call your „Krah pipes“? (brand name)

We call our Krah system Ridgistorm XL

9. How many projects you have been realized with these so far?

We have realised over 50 projects (large and small) so far and we are still growing

10. What is your experience retrospectively?

Given that we started with the Krah technology just as the financial crisis hit we have not made a bad start in the UK. The technology has proved reliable and flexible, the product we make is of good quality and the support from Krah has been very good compared to our other machinery suppliers. These are all reasons we chose Krah as our large diameter pipe partners. Where we have struggled a little is with the technicality of the commercial focus required for selling large diameter pipes. We have strong and experienced competition from KWH with Weholite and Aquaspira with steel reinforced pipes. To compete we have needed to differentiate ourselves and sell the unique features of the Krah solution e.g. Electrofusion joints. We are improving with this all the time.

**Thank you very much –
we wish you all the best and good luck for the future!**

The „Phoenix“ Project - A new pipe in the pipeline

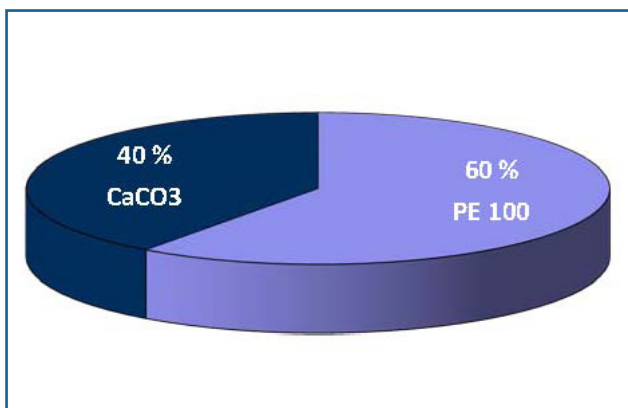
It has the ability to arise after several hundred years and from its own ashes, reborn anew to live again. But what are the benefits to keep this same appearance and properties over and over again while the given conditions and demands change steadily? Evolutionary? Probably not – It’s time for a new PHOENIX!

We are facing daily the necessity to adapt the environment also in our pipe business. The requirements for pipes on the market are changing quickly, driven by cost effectiveness, rise in prices of raw material and the needed properties of pipes. Thus the expectations for a pipe system are high: it should have a long life time; low maintenance costs, easy expandability, flexible for movements in the soil, 100% tight to avoid in- and exfiltration. Furthermore the complete range of fittings, manholes, special parts should be available, in all diameters, with short delivery time, high availability, it should be recyclable, saving natural resources, easy and safe to join and install, etc., but maybe the most important aspect are the investment costs of this pipe system.

Even if we are still really successful with our pressure pipe system, we will now focusing on the gravity system. It is time for a new evolutionary PHOENIX.

Our new RnD-pipeline - actually called “Phoenix” - is a pipe production line being able to produce profiled and solid wall gravity pipes with a higher stiffness and lower material costs than normal PE.

Not only in the field of pipes a change of material is occurring, but also more and more in further applications companies started



compound



to mix existing with alternative materials to produce a new compound. The mixture of materials can mainly have two different reasons. The first one is to add new properties to materials – for example carbon compounds in airplanes achieve higher stiffnesses, more flexibility, higher thermal resistance, etc.. The second one could be to keep the certain properties of materials (same quality level) while reducing the cost for this material.

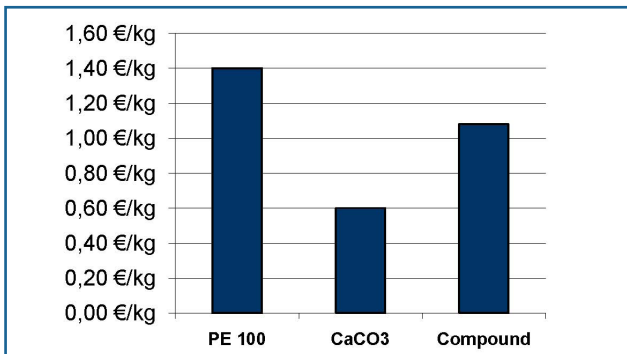
And of course a combination of both is possible – better material properties and lower prices. We as Krah have already developed for our large plastic pipe production a pressure pipe system which combines the strength of glass fibre with the flexibility of a thermoplastic (polyolefin). Instead of using a ready-made compound, we have developed a direct compounding/extrusion process for our pipes. With this production method the pipe producer is able to react very flexible on the product / material request and he can extrude directly a pipe out of a compound. One complete production step and profit step is skipped for the benefit of our machine user and/or the final customer of the pipe.

First test results of the new compound have shown, that we can reach an E-modulus of approx. 2.000 N/mm² (PE100, E-modulus = 1.000 N/mm²). The pure material costs can be reduced by 22,9% to a compound price of 1.080 EURO/Ton based on the following unit prices: PE100 = 1.400 EURO/ton and 40% CaCO₃ = 600 EURO/ton.

The „Phoenix“ Project - A new pipe in the pipeline Theoretically we can use 50% of the wall thickness to reach the same stiffness, with the new material. So, by using a direct extruded compound

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the total cost reduction will be 61,5%. In comparison: 1kg pipe (PE100) with a certain stiffness costs 1,40 Euro, now you need



*Comparison of material costs
(European materials / april 2011)*

only 0,5kg (compound) with the same stiffness the cost is 0,54 EURO.

A lot of different “fillers” are available on the market that can be used easily with our machine, so everybody can create his own pipe compound – to reduce the cost of production. Today the material costs are approx. 75% of the pipe costs. Just imagine how your profit will increase by keeping the same sales price level, or how big your pipe market is when you are able to reduce the pipe price by 40%. Other pipe materials like concrete and GRP will definitely be in long term trouble.

Currently we are developing the new production system including new profiles to find out how close we can come with our theoretical approach to a practical solution. During all our developments we are considering the requirements of the complete pipe system, like fittings, jointing, etc...

We are close to rebirth and we will keep you informed about the development...