

25 years of innovation 1983/2008

The pioneers of
the lap-welded
multilayer pipe

Optimized machine technology | New production methods for
increased product safety | Technology adaptation to new materials
development of new testing units | Documentation of all stages of
production | We point the way from the start | Competence
covering everything from the technology to the system approval
Quality means investment in the brand name | Highest requirements,
continuous production | Gaining through research: responsibility
and competitive advantage | Water requires a new way of
thinking | Development of molecular structures | Shifting the material limits | Improved
life cycle assessment due to new techniques

mittl. Innendurchmesser (Y)

mittl. Wandstärke (Z)

2008: THE LIMIT REDEFINED

PROJECT:4500+
LOAD CAPACITY HIGHER
THAN 4500 HOURS

LONG TIME
RUPTURE
TEST
95°C
30BAR

WRW
PROJECT
4500+

WRW
DUGW

HOURS
5000

4000

3000

2000

1000

500

0

ADHESION IN %
100

75

50

25

0

UNLOADED
WRW PROJECT:4500+
WRW
DUGW
LOADED
WRW PROJECT:4500+
WRW
DUGW

Using our competence, we repeatedly redefined the limits of possibility for multilayer pipe production in the past. Now we have reached a new dimension again.

In our research **project:4500+** we succeeded in increasing the performance limits for multilayer pipes by far due to new materials. In the future, this head start in performance will offer simple assessment criteria to determine whether a product is state of the art.

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Gerhard Auental, Sales and Marketing

Quality by WRW

The high quality of a WRW multilayer pipe rests in the continuity of the production. For instance, all products are produced and tested in accordance with the criteria of serial production. Special samples for testing are there only for the inspection of pre-series products. Thus variations in the process and changes of material characteristics due to varying thermal loads in processing do not occur.

project: 4500+, new standard

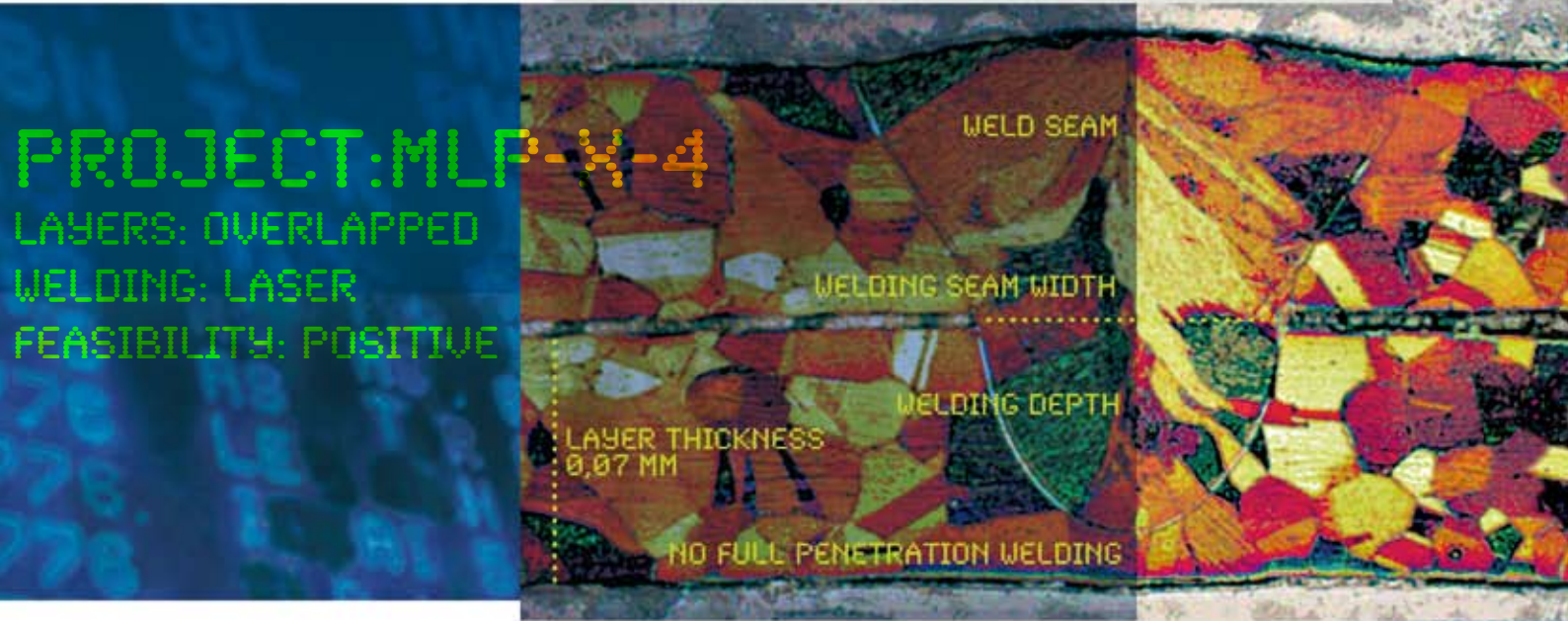
In the **project:4500+** we were able to increase the rupture strength of our pipes by a factor of 10 by utilizing new materials. The target was to expand the resistivity in the long time rupture test to over 4500 hours. Test samples reached a new dimension in the load capacity of multilayer pipes with a maximum of 4973 hours at 95 °C and 30 bar. For the user and his daily work, the results of the long time rupture test bring forth a safety unknown up to know.

Differentiation changes the market

For our customers, the **project:4500+** represents a clear differentiation from competitors who cannot offer such a material quality. Out of date machine technology and process shortcomings render such results impossible. With development, WRW as a system provider created the opportunity to clearly stand out against the bulk of average qualities.

2008	Creep test, dimension 16 mm 4973 hrs at 95 °C/30 bar, expansion to dimension 75 mm
2007	First multilayer pipe with CE-ETA approval, expansion to dimension 63 mm
2006	Dimension 11.5 mm, 40 mm and 50 mm, system approval granted
2005	The standard program covers 16 mm to 32 mm
2004	Formation of WRW with their own machine technology, setup of production
1997	Introduction of PE-RT, now standard in multilayer pipe technology
1989	Increase in machine performance from 1 - 2 m/min to 15 m/min.
1983	Development of machine technology Series maturity in accordance with Nadia Patent is reached

2008: NEW TECHNOLOGIES



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The future of the multilayer pipe is the core subject for the **project:mlp-x-4** in WRW's research and development. Besides the process optimization in **project:4500+**, here the focus lies on the basic technical definition of process technology.

All methods in multilayer pipe technology used today are based on methods which have remained nearly unchanged during the past 15 years. Therefore, WRW developed **project:mlp-x-4** and searched for new possibilities in welding technology. In a globally unique test setup we developed lap welding by laser beam.

First results certify a high potential in safety and in the application purposes for the process.



Edmund Pilarski, Research and Development

project:mlp-x-4

The use of a special laser for welding the overlapped aluminium layer meant basic research first. Optical characteristics, performance and the inclusion in the production line had to be determined. The test setup, however, quickly revealed the real advantage of the process: a safe control of the welding was possible. The overlapping aluminium layer leads to an exact guiding of the laser.

No thermal load

The next step was the examination of the welding intensity. The test showed the high reliability of the laser intensity. Due to the feasibility of keeping the laser at a constant level, full penetration welding could be avoided. This effect could be adhered up to a layer thickness of 0.05 mm. This excludes thermal damaging of the plastic material as well as the damaging of the oxide film on the metal. Thus, the metal offers no corroding surface for the medium due to the diffusion.

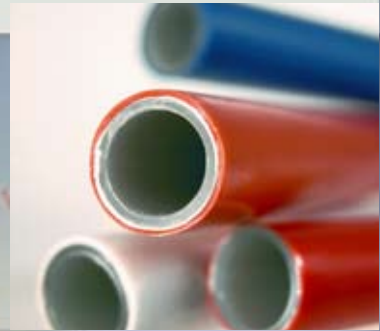
High material and energy savings

As a result of the reliable welding of extremely thin metal layers not only approx. 20 % of the metal can be saved, but also energy consumption can be reduced by up to 25 %. Apart from economic aspects, the environment is considerably relieved. As to the loading capacity, it has turned out that the weld seam with a welding factor of nearly 1.0 virtually shows the same load capacity as the raw material does.

2008	First results from welding tests are analyzed. The suitability of the process for series production is tested
2007	Development of a project plan for the innovation of the welding technology
2006	Parameter alignment for new dimensions and optimization of raw materials
2005	Parameter alignment, comparison with previous machine technology Evaluation of the output data
2004	Formation of WRW Conception on machine dimensioning regarding the planned projects
1998	Increase in production line speed to 30 m/min under production conditions
1996	Material development with PE-RT Creep tests and pressure resistance tests
1995	Material tests for adhesive and PE. Tests with second extruder for the separation of inner and outer layers
1983	Improvement of ultrasonic welding

2008: ABSOLUTE CONTROL OF THE PROCESS

PROJECT: 4500+
STEP 1: NEW MATERIAL
TARGET: PARAMETER TEST
STEP 2: TEST PRODUCTION RUN



No one else knows the processes better than we do, because we in our team have lead the machine technology from the patent specification to the present state of the art. In the course of the years we collected an enormous expertise on the high number of production parameters, which we realized in the conception of our machine technology.

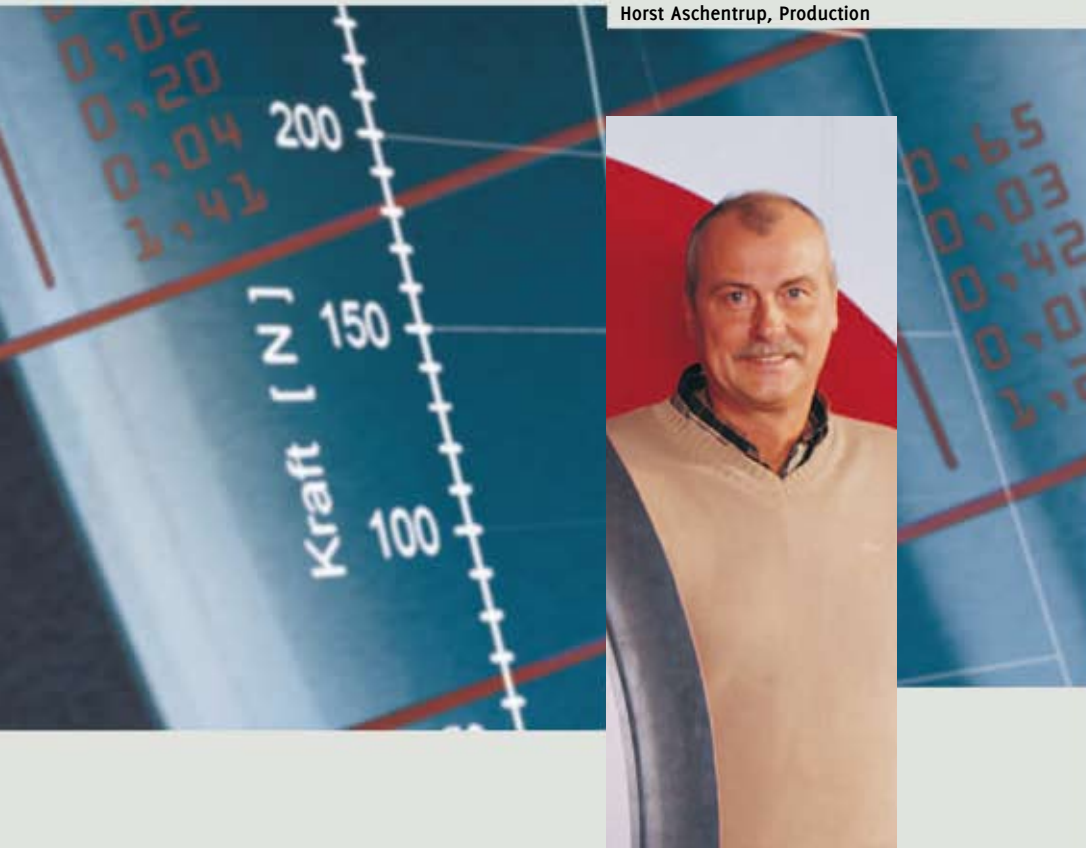
Today we are the development partners of renowned material suppliers and developers, who use our know how for their work. Thus we are actively embedded in the international development trends of the industry. This implies the advantage for our customers that they always belong to those bringing improvements as innovations on the market.

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history



Horst Aschentrup, Production

From the pioneering work ...

The realization of the Nadia patent into a machine technology ready to go into production represented the start of a work which has considerably shaped the market up to now. The basic structure of the technology contributed to the fact that all the phases of the developments in the small team have been present until now. A situation unique in this field. The independence from superior structures and regimentations is now offering the new team the opportunity to use their knowledge according to their own ideas.

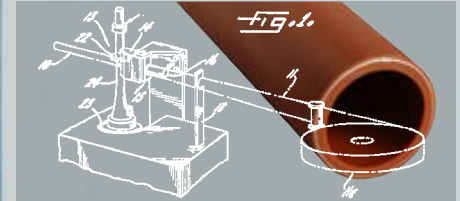
... to the state of the art

With every new production line we prove the state of the art: From the delivery of the components to the serial production only 6 weeks pass by. Only a perfect control of all parameters can guarantee such a short period of time. Special extruder screws, vibration decoupling, material characteristics, material feed depending on pressure and temperature, everything is done in line with exact specifications.

Highest flexibility

The high flexibility in all fields proves that such a complex knowledge pool at WRW is used not only theoretically. In production, for example, the changeover time and initiation time could be reduced to a minimum. This allows the production of small units and is highly appreciated by our customers.

1983



With the first machine, - in 1983 -, the development work started for the lap-welded multilayer pipe, which was not yet ready for series production. Still very compact performance data with 1 - 2 m/min and a total length of 5 m.

1989



Machine performance was increased to 15 m/min; and the SP Verbundrohr GmbH gained Unicolor Rohr-systeme GmbH as a sales partner. The materials, too, were optimized. In 1995, Unicolor developed its own machine technology, the SP Verbundrohr GmbH went into liquidation. Core team and Nadia patent went on to Unicolor.

1997



In 1997, their first, own innovation: the cooperation with a material manufacturer resulted in the use of PE-RT. Unicolor, as the first manufacturer, used the new material, which renders cross-linking unnecessary. Today this is standard in the choice of materials.

2001

Apart from the extension of the dimensions covering dimensions under 10 mm and up to 110 mm, the production possibilities were enlarged. In 2001 Unicolor merged with a Finnish group.

2004

In 2004, the Finnish group released the competence of the location by a closedown. This cleared the way for offering the competence now to a wide clientele. In August 2004, Westfälische Rohrwerke GmbH was established.



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