

# Flatness measurement on metal plate, strip and sheet



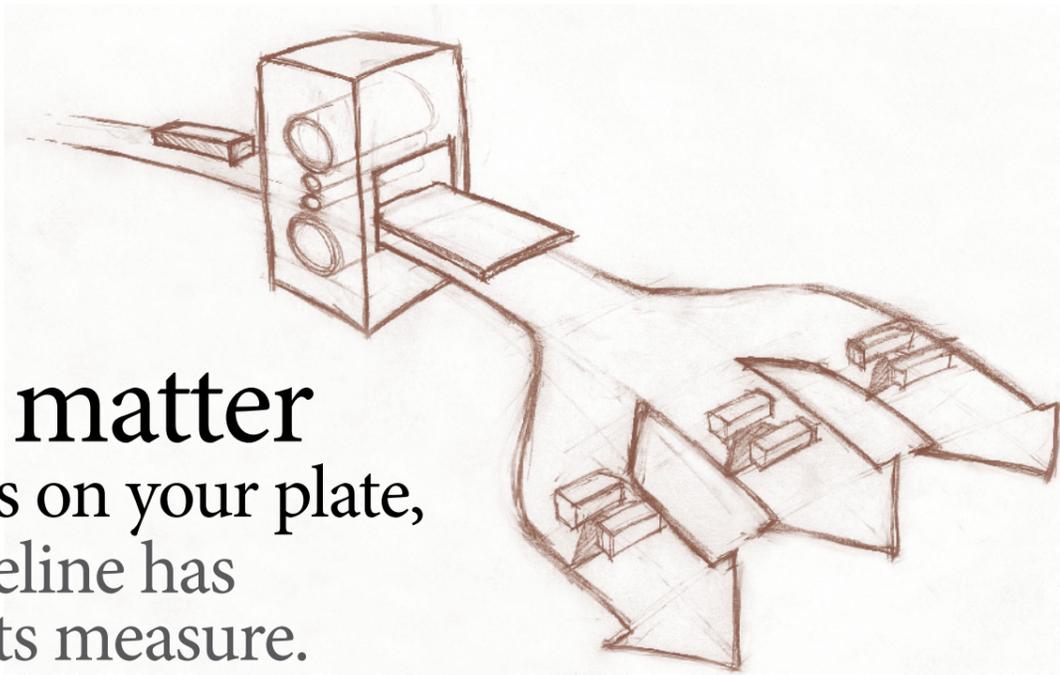
**FROM KOREA TO BRAZIL,** *from Chicago to Jokkmokk, a growing number of manufacturers are discovering how Shapeline contact free measurement technology is the answer to their quality control, process development and product verification problems for metal materials. Equipped with a unique, dedicated software system specifically developed for flatness measurement, Shapeline solutions calculate and evaluate parameters in the production process in plate and hot rolling mills, coating, hardening, processing and finishing lines around the world. The system's built-in flexibility allows adaptation to individual measurement requirements and the environments in which they operate, whilst a robust design and use of high-spec, easily exchangeable components ensure minimum maintenance and long service life. With the most advanced, flexible and comprehensive range of tools on the market, Shapeline can provide solutions for integration into virtually any production line in any industrial environment.*



PLATE MILLS

HOT ROLLING

**No matter what's on your plate, Shapeline has its measure.**

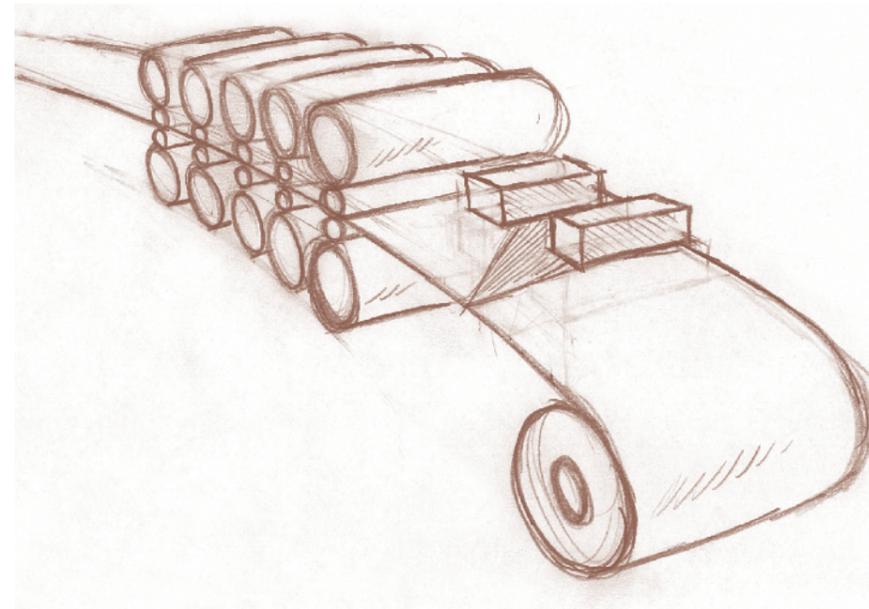


In a world where plates are getting wider, harder and thinner, precision flatness measurement is now a standard requirement in many parts of the metal industry. Accurate flatness measurement not only improves levels of quality assurance and customer satisfaction, it also ensures a faster time to market and a speedy return on investment.

Measuring flatness, width and other geometric features accurately in-line during the course of plate transportation and production is, be it in the rolling, quenching or levelling process,

easier said than done. But once the difficulties are overcome, significant benefits in terms of efficiency and higher yield are assured. Designed to resolve these difficulties, Shapeline Plate software provides the tools to locate and eliminate flatness irregularities and fine-tune the process. The versatility of the Shapeline system enables you to determine the levels of functionality and intelligence necessary to meet your specific demands, and facilitate their integration into your particular production environment. Better control, higher quality, lower operating costs and increased productivity are the outcome.

**When the going gets hot, Shapeline stays cool.**



The basic shape of the strip formed in a hot rolling mill remains constant throughout the entire production process. But the smoke, vapour, dust and air movement which result from temperature differences between sensors and the material in production, create an environment that makes the measurement process that much more difficult. High temperature steel combined with high speeds and forces test the systems to their limits.

Shapeline solutions for hot applications enable you to increase your knowledge of the product you manufacture and gain full control over the process you use to make it. The combination of hardware and modifying software algorithms used for the evaluation of data allows us to calculate reliable measurements even on hot-rolled steel.



## HOT ROLLING

Our systems are designed to alert you to changes in the flatness profile feedback that ensures unexpected events can be immediately identified, verified and corrected, thereby avoiding waste of valuable material and production downtime. Additional information relating to the temperature profile across the material enables the calculation of the product's flatness when cold. Furthermore, flatness data can be used for compensation of thickness profiles from multi-sensor gauges and subsequent mill control.

Built to endure the harshest of environments and improve the flow of the hottest production processes, integration of Shapeline non-contact measurement solutions results in higher productivity and greater efficiency.

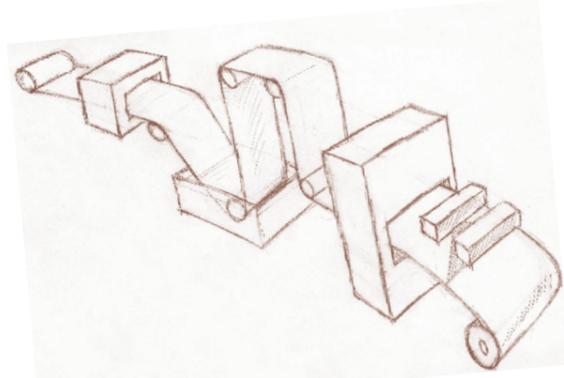


## GALVANIZATION, TINNING AND COLOUR COATING LINES

### Flatness in coating lines, Shapeline smooths the way.

The integrity of protective coating on steel and other metals is critical for the profitability of a steel works. With customer requirements of the finished product placing ever higher demands on the materials provided, it is essential that you are fully aware of what you are delivering to your customers. Not only must you be able to relate different qualities of your products to different applications, you must also ensure the traceability of the results for every individual coil or sheet of finished material.

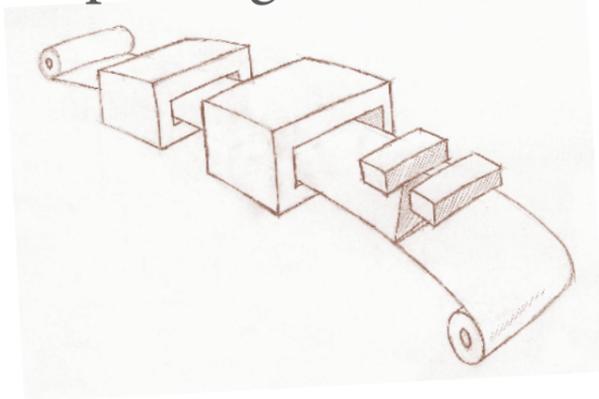
Shapeline has longer experience than most in coating lines as is reflected in its many reference installations around the world. Our profound expertise in this field allows us to offer a proven continuous measure-



ment technology that fulfils both the highest process control demands and quality assurance standards. Improved coating, faster line tuning and more precise and consistent levelling result in higher quality and shorter amortization of your investment. Shapeline systems provide you with the tools to raise your efficiency and performance levels.

## HARDENING LINES

### When steel gets hard, Shapeline gets to work.

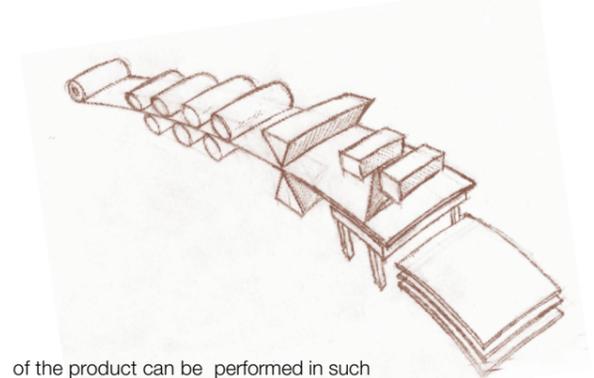


For an ever growing number of manufacturers, the ability to produce high quality products with well defined shape and hardness is no longer just an important competitive factor. It's an absolute must. More aware than most of how hardening lines have become a key element in this equation, Shapeline took on the challenge of resolving the problem of retaining the shape of material in the cooling stage. The result is a range of Shapeline solutions that optimizes the yield of your line regardless of material width. By detecting any problem in the line the moment it influences the product, our systems enable you to automatically classify every metre of the full strip in-line with real-time accuracy in the single micrometer range. This allows you to deliver the right quality grade to the right customer at the right price.

## CUTTING / FINISHING / LEVELLING

### When in finishing lines, think Shapeline.

Cutting, slitting and levelling are the parts of the finishing process which ensure that end products meet the dimensions and quality standards required by the customer. The role of Shapeline systems in finishing lines is threefold: input to levelling, to optimize the cutting/slitting operation and to document and certificate the delivered product. By virtue of the fact that providing information for levelling is a core business for Shapeline, we have longer experience than most and our solutions are the most advanced on the market. With our innovative, well-proven measurement solutions, you can create a flexible, customized control system where you define the parameters and standards of the delivered product. With the knowledge provided by the measurements obtained from the system – in the finishing line or from earlier production steps – the cutting or slitting

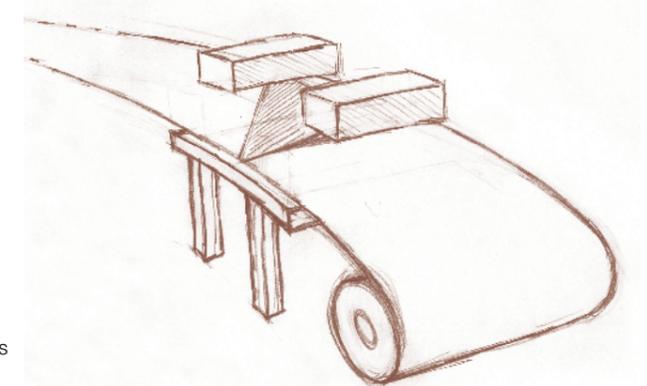


of the product can be performed in such a way as to meet varying customer requirements. These unparalleled levels of functionality give you the flexibility to create detailed, accurate and reliable geometric measurement data related to the end product. Apart from optimizing your finishing line and enhancing your logistics operation, you save time, money and attain better results.

## QUALITY INSPECTION

### Quality assurance? Be sure with Shapeline.

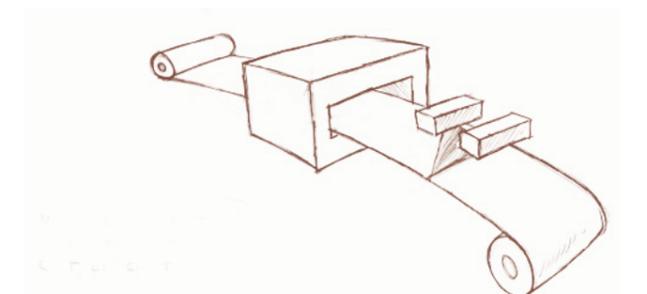
Shapeline systems have long played an integral role in numerous quality inspection lines and stations. But the development of quality theory and practice has now reached the stage whereby quality inspection is no longer one stage in the process, but where quality management permeates all aspects and levels of production operations. That this is possible is in no small way attributable to Shapeline technology. The capacity to influence and verify quality parameters throughout the manufacturing process qualify Shapeline systems as essential tools in the fulfilment of quality standards and specifications, thus rendering the need for special quality inspection lines unnecessary.



## OTHER PROCESSING LINES

### From a plane perspective, Shapeline measures up.

Annealing, pickling, quenching, slitting. Many processes can influence the flatness of your product in one way or another. Shapeline has gained extensive experience from applications in diverse types of lines, different industries and demanding environments across the globe. So far, we have always managed to find solutions. Measurement data is used to control processes - automatically or manually - to trim and develop the processes, as well as document your product for customer and market. Tell Shapeline about your flatness and measurement issues and let us propose a solution that meets your specific needs and requirements.

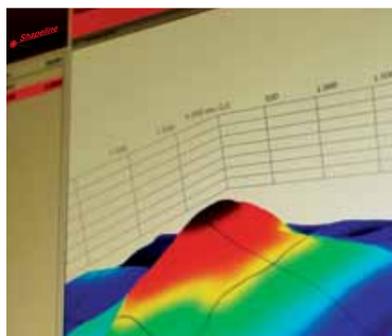


# Shapeline knows its business - and that's flat.

For more than a decade, Shapeline has devoted itself to the provision of solutions to flatness measurement problems. Over this period, we have emerged as a leading authority in this highly specialised field with a proven non-contact, precision technology that is being applied by an increasing number of manufacturers in a multiplying diversity of industries. From the outset, our motivation was the recognition and fulfilment of the requirements of industry's increasingly demanding customers to manufacture materials of quantifiable flatness which enhance their competitive edge. In providing our clients with cost-effective ways and means in which to carry out a large number of quality control and verification procedures in production

environments, we are achieving our goal as a key contributor to the production of ever flatter products around the globe.

Representing the ultimate in functionality and flexibility, our flatness measurement and control systems are suitable for a wide range of metal applications in the most demanding industrial environments. In-house development of the most advanced software on the market enables us to offer a variety of solutions with the flexibility to be integrated into virtually any production line in any industrial environment.



## The knowledge.

Shapeline systems use the laser line triangulation principle to project profile data of the surface in a single image. The double laser line approach allows local surface slope measurement in addition to 3D profiling which is used for material vibration compensation. This facilitates the automatic measurement of manifested flatness with high resolution on material that is moving on roller tables or subjected to severe vibrations in the lines. The results are robust, consistent, high precision measurements which are virtually surface independent and extremely accurate.

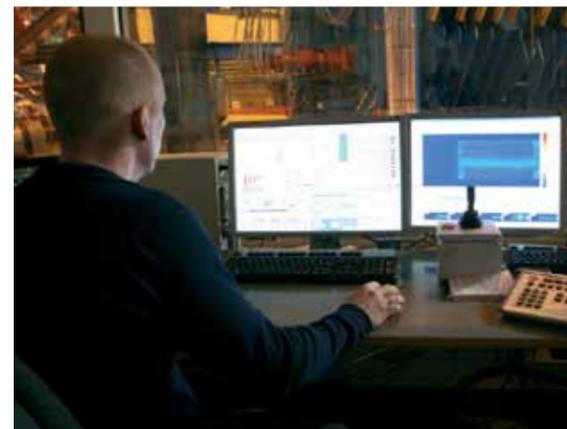
## The system.

Shapeline measurement systems are equipped with the most technically advanced, user-friendly software that permits adaptation to specific customer parameters relevant to measurement needs and requirements. Not only do they give you the competitive edge in terms of flexibility, control, efficiency, adaptability and performance potential, but also provide the operator the freedom to make and take fast decisions and avert costly production disruption. The highly robust, purpose-built hardware is designed for operation in the most demanding production environments in steel works.

## The support.

Shapeline commissions, services and maintains systems throughout the world – from Korea to Brazil, from Chicago to Jokkmokk. In addition to the provision of on-site service and maintenance facilities via our global network of partners and representatives, many problems can be swiftly monitored and resolved with the help of remote management tools.

# Our world is flat!



Shapeline contact free, precision measurement systems have been integrated into production installations throughout the world by many of the world's leading manufacturers of metal materials. We have built a reputation on providing reliable and robust solutions for demanding environments which deliver precise, quality measurement data cost-effectively. The fact that most of the systems we have commissioned to date are still in operation speaks for itself. A proven track record and long list of blue-chip international references qualifies us as one of the world's foremost and knowledgeable authorities in our field. Here's a selection of customers and installations:

## ArcelorMittal

At many locations in Europe and North America the world's largest steel company rely on Shapeline for measuring in – amongst other examples - galvanization and annealing lines, on strip and plate.

## ThyssenKruppSteel AG

At ThyssenKrupp the system is used to measure crossbow in an electro-galvanizing line. Amongst other benefits, data is used to fulfil the goal of verifying the shape before the material enters the galvanizing stage to avoid damage.

## Severstal

A width and flatness measurement system on the hot strip rolling mill. The data from the Shapeline system is used for width control and to correct thickness measurement of radiometric thickness gauge.

## Sandvik Materials Technology

One of Shapeline's oldest customers – renowned for the quality of its products – Sandvik has since 1999 been using Shapeline systems for ensuring the flatness of saw steel and other demanding products world-wide.

## Usiminas

A relatively new customer of Shapeline that made the decision of extensively measuring the flatness of steel plate in several locations on the production line.

## SSAB

Swedish Steel AB is more or less considered the benchmark for quenched, thin steel plate. An important factor behind the SSAB success is the reliance on Shapeline systems for operational control of quenching and levelling processes as well as creating knowledge about the impact of different production steps on the produced material.

## Posco

For the ever so important flatness of electrical steel, Posco of Korea is using Shapeline systems to ensure the process is well trimmed and that the manufactured material is up to Posco standard.

## Böhler Uddeholm

Together with several other manufacturers of saw and precision steel materials, Böhler Uddeholm uses Shapeline systems in Austria and Sweden to ensure that material is perfect after hardening.

*Combined with a worldwide support network of qualified distributors and representatives, Shapeline is a first choice partner for all matters in flatness.*

*Let us help you lower your profile.*

# Profit from a lower profile!



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