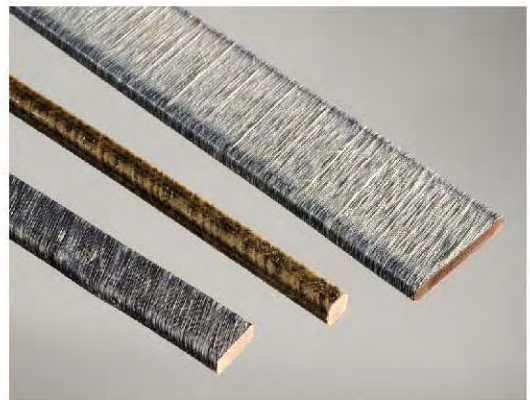
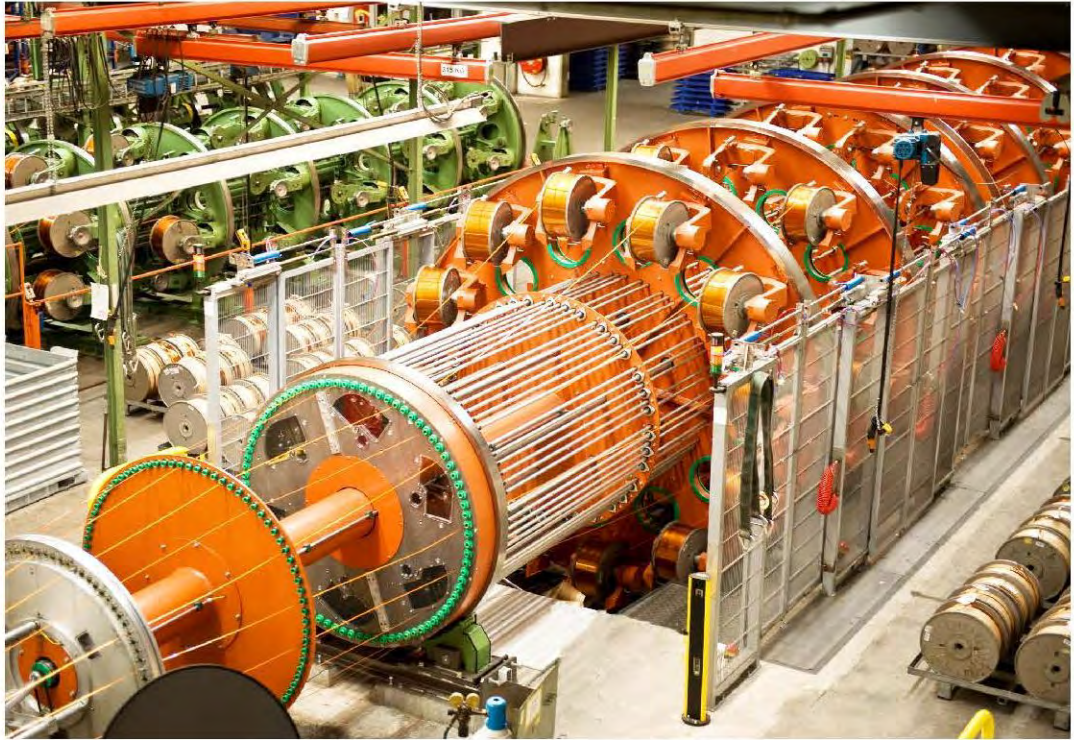


# SMIT DRAAD





## Our business

Smit Draad is recognized for its high quality rectangular winding wire for the capital goods industry.

**The main product groups are Continuously Transposed Conductors (CTC), enamelled wire, glass-fibre wound wire and single or multi paper covered wire.**

The special cable CTC is our largest product group in volume and turnover. CTC is used, together with single or multi paper covered wire, in the manufacture of power transformers.

Enamelled wire and glass-fibre wound wire are used in the manufacture of large generators and electric motors.

You will find detailed information about the technical options offered by product group if you visit our website [www.smitdraad.nl](http://www.smitdraad.nl).

**More than 100 years experience in winding wire and more than 50 years producer of CTC.**

## Our strategy

Our mission is:

- to be a competent partner for manufacturers of transformers and generators with the development, production and sales of CTC and insulated winding strip;
- to be a growing company with a satisfying profit;
- to be a good employer, aware of our social responsibility.

Our vision is to be the best partner for CTC for the transformer manufacturers in Europe.

**In our mission and vision competence and partnership are key words.**

Furthermore, we invest in the relationship with our employees. Much attention is given to their safety, health and welfare. Our very low staff turnover and low absence through illness are the results of this.

Finally, Smit Draad takes its responsibility for the environment. Our commitments go further than what is required by law.

Within our IRCE Group we are the competence centre for CTC. We support the CTC production and sales on different continents, at this moment in Brazil (Joinville).





# Process

## Routing

The production process follows a logical “U” flow.



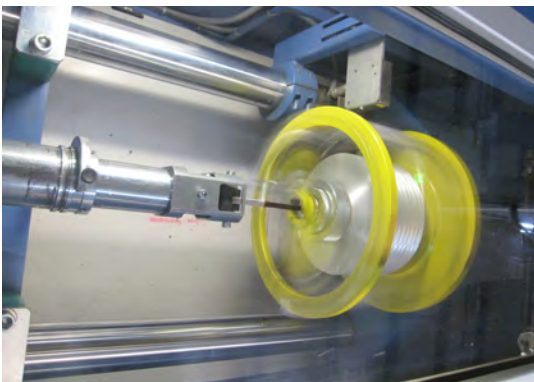
## Bare wire

In the bare wire department the copper, supplied as a round cast wire, is drawn to a wire that has the required diameter. Then one of the two rolling mills rolls the wire accurately to the desired thickness and width.



## Insulation

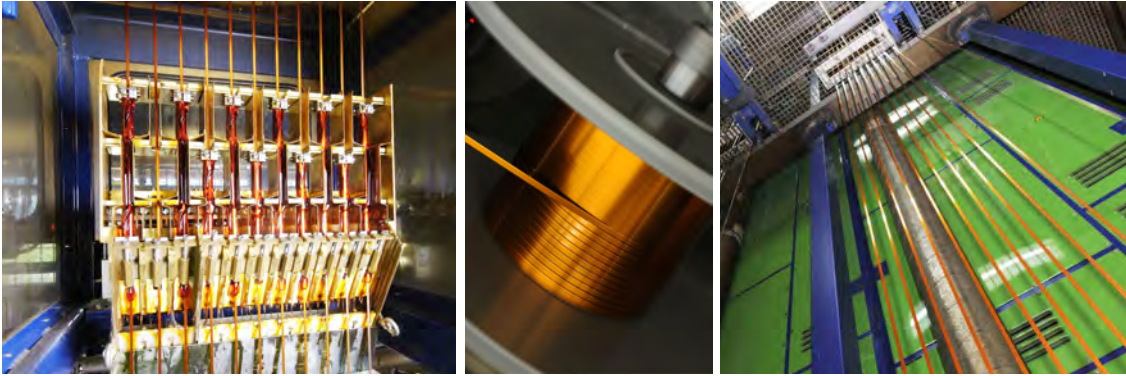
The insulation department produces single or multi paper covered wire and glass-fibre wound wire.





## Enamelling

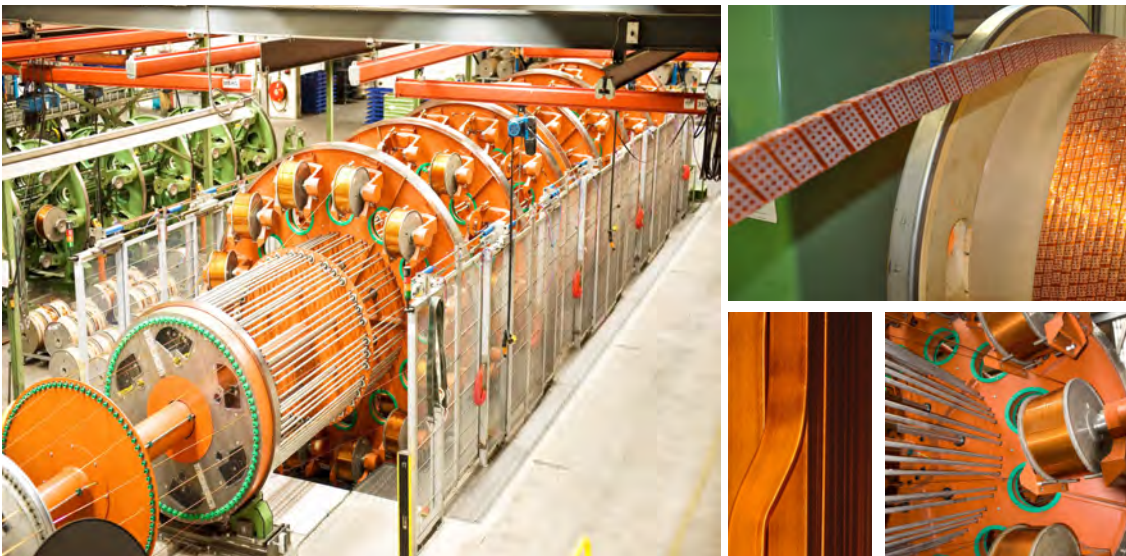
In the enamelling department the rectangular wire is, after being annealed and cleaned, coated with enamel on one of the enamelling lines.



This is done in a number of passes where, firstly, the correct amount of enamel is applied with flexible dies, secondly, the solvent in the enamel is evaporated and finally the enamel is cured. PEI/PAI enamel, called 'SLT', is applied for higher temperature resistant enamelled wire (temperature class 200). PVA enamel, called 'SLN', with the option of an epoxy layer as a bond coat, is used for oil resistant enamelled wire for CTC (temperature class E).

## CTC Production

The CTC department currently has four transposing lines. The enamelled wires are placed in cradles and guided to the transposing head. After transposition, the CTC is wrapped with insulation paper and the product is wound on a reel.



## Shipping

Here the final product is weighed, packed and shipped.





## Lean Manufacturing



*View on CTC department*

In order to maintain our competitive price level, continuous productivity improvement is an important objective. Smit Draad therefore employs various Lean Manufacturing concepts. We do not accept waste. We make waste visible and implement improvements.

For instance at the CTC machines we continually measure effectiveness ('OEE'), per shift and per week. Rapid changeover times of the machines have an important influence on effectiveness. That's why we pay much attention to a smarter machine changeover time by technical and, above all, organisational measures ('SMED').

Each employee has a mission to do things the first-time-right, to avoid repairs and material losses. We monitor our scores on all critical parameters, improving our level following the 6 sigma method.

At Smit Draad we apply the '5 S' method to maintain a neat and tidy work environment. The motto is: "There's a place for everything and everything in its place."



**"We do not accept waste !"**



## Innovation

The objective of Smit Draad is not simply to deliver products, but rather to deliver solutions.

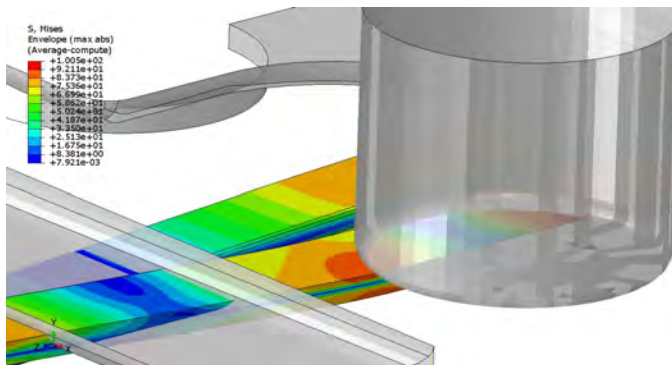
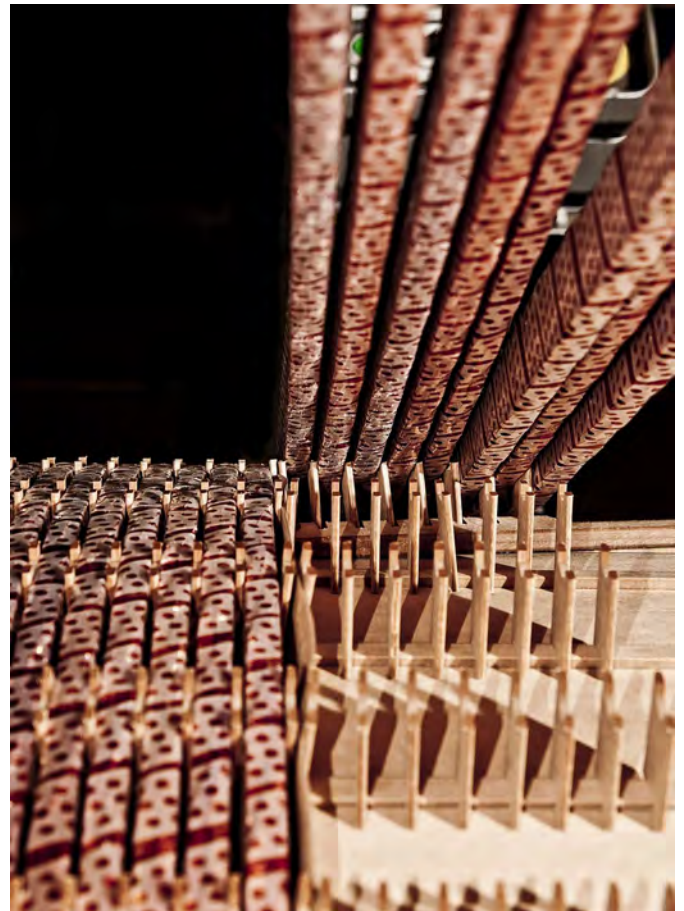
Together with you we will develop concepts that reduce electrical losses and limit the labour costs related to your winding process.

Characteristic of this approach is the development of a transposing head to realise shorter CTC pitch lengths. Such a CTC is more flexible, allowing for smaller core dimensions resulting in cost savings.

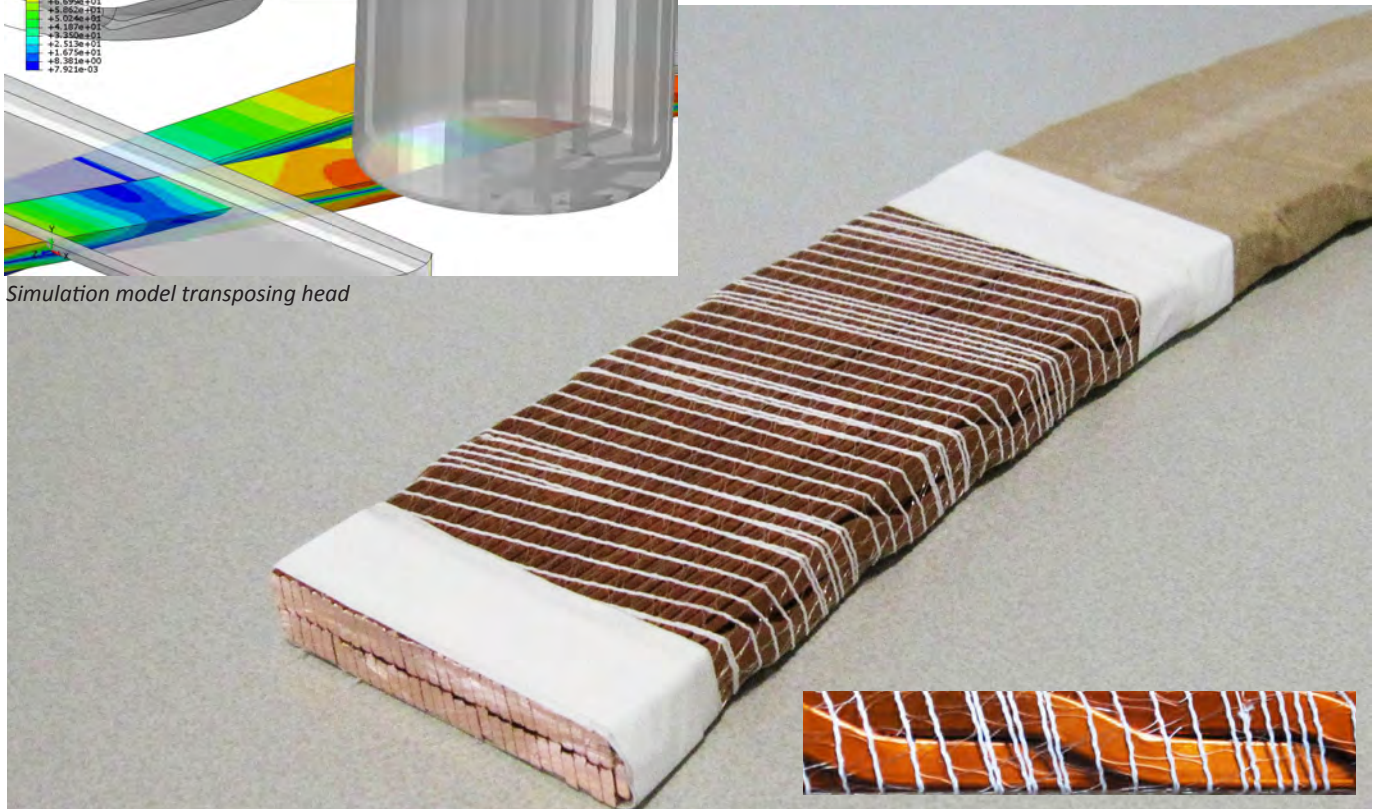
We developed a simulation model to come to the ideal transposing process. Based on this model a transposing head K was developed, which ensures the shortest pitch length within the limitations of copper.

Another example is the use of 'bond coat lite'. Applying the epoxy varnish mainly to one side of the wire, we reduce the thickness of the epoxy layer.

Finally we would like to mention Improved Cooling CTC. Smit Draad developed various alternatives for the use of paper as the insulation material for CTC to improve the cooling of the windings. For further information please contact us at Smit Draad.



Simulation model transposing head



**The objective of Smit Draad is not simply to deliver products, but rather to deliver solutions.**

## Quality

Smit Draad bases its quality policy on five cornerstones:



### Customer orientation

Customers mean everything to us so we deliver solutions that meet your requirements.

This starts with making agreements based on your needs and ends with fulfilling them to your satisfaction.

### Process control

Our process control ensures that we can execute an order first-time-right. This is achieved, not by inspection after the event, but by real time quality control of all steps in the production processes.

An example of this is the Lear concept, where the surface condition of the enamelled wire is continuously checked. Another example is the automatic 3-D camera system, immediately after the transposing head in the CTC machine, monitoring the transpositions in the CTC. To improve our processes, we apply the 6 sigma method in several black belt and green belt projects.

### Training and education

Our training and education program for the operators has two elements. Firstly the apprenticeship system, where a new employee is linked to a master craftsman, to develop a defined set of skills. Secondly the training by experienced engineers based on elaborate manuals. Each training module ends with a theoretical and practical exam and a certificate, if the results are acceptable.

### Employee involvement

The management stimulates a culture of open and two-way communication through management style and regular meetings. The management is focused on results, while maintaining a climate of respect and stimulating work pleasure.

### Quality assurance

Quality assurance guarantees that successful solutions are standardized, as the foundation for further improvement. Our quality management system is certified in accordance with ISO 9001 since 1988. The implementation of this system is audited regularly by our QA department, Lloyd's Register and our customers.



ISO 9001 approval since 1988



The Lear concept, where the surface condition of the enamelled wire is continuously checked



The automatic camera system monitoring the transpositions in the CTC

**Customers mean everything to us so we deliver products to you that meet your requirements.**



## Logistics

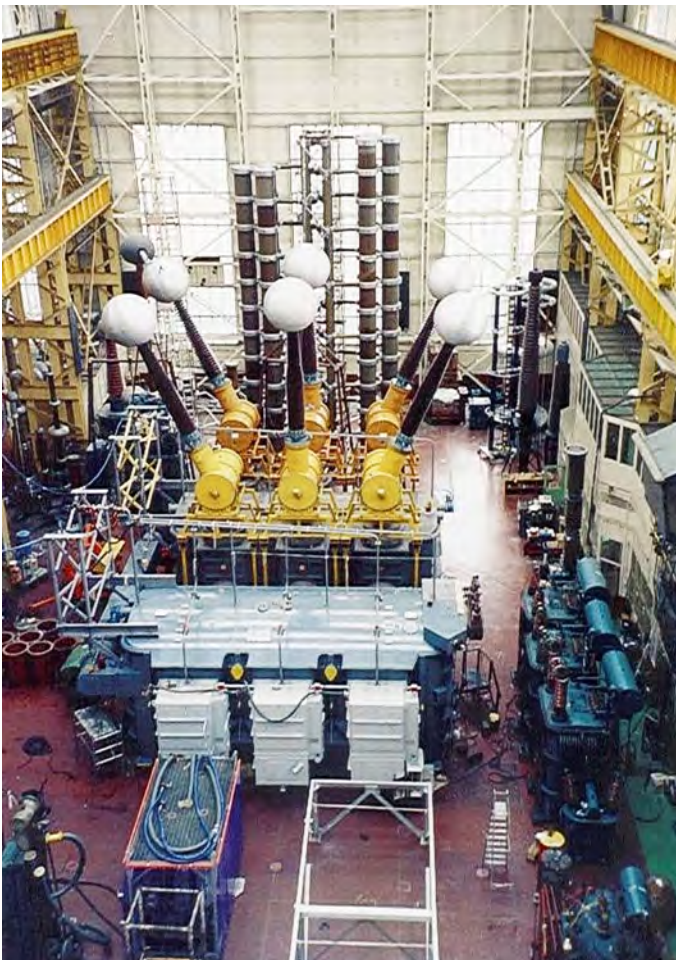
The Smit Draad logistical process is entirely order based. Our product configurator software details every order for further processing in the ERP system. Planning is based on a “pull system”, keeping the lead times in every department as short as possible in order to reduce work in progress.

By means of an automated registration system based on barcodes the production progress is visible at all times. Smit Draad fully appreciates the importance of short and reliable delivery times and monitors the delivery reliability.

Nijmegen is favourably situated, with excellent road connections and the adjacent port of Rotterdam.



*Nijmegen is the oldest city of the Netherlands, founded more than 2000 years ago by the Romans as 'Noviomagus'*



*Our CTC in a quad booster transformer 2,750 MVA (courtesy Alstom Stafford)*



*Our CTC in a Smit transformer (courtesy Smit Transformers)*



*Our CTC in a Siemens transformer (courtesy Siemens AG)*



## History

The history of Smit Draad dates back to 1913. In that year the well-known industrialist Willem Benjamin Smit (1860 – 1950) built a transformer factory in Nijmegen, Netherlands. In order to guarantee the supply of winding wire for his transformers, the company started the production of copper wire in 1915.

### More than 100 years experience in winding wire



*Smit Draad factory (1916)*

The production of enamelled wire started in 1950 and nine years later the first CTC line was installed.

Then part of the Holec Group, in the mid-seventies, the Smit organization was split into four operating companies: Smit Transformers, Smit Weld, Smit Ovens and Smit Draad. Draad is the Dutch word for wire.

Smit Draad became an independent company in 1984, with shares held by an employee foundation. Once established in its own right, Smit Draad successfully built a reputation as a major supplier of winding wire. Smit Draad was awarded ISO 9001 certification in 1988. Three years later the production was relocated to a new purpose-made factory in Westkanaaldijk, Nijmegen.

In 1998 Smit Draad became part of the Italian IRCE Group. IRCE specializes in round wire and cable insulated with rubber and PVC.

The group has its head office in Imola. For more information, please visit

[www.irce.it](http://www.irce.it)



In 2009 Smit Draad installed its fourth CTC line, capable of producing so called "big CTC" with up to 85 strands. Exactly 50 years after Smit Draad started production of CTC, this line was opened by the mayor of Nijmegen, Mr. Thom de Graaf.

In 2014 Smit Draad installed its new transposing head K for this CTC line, especially for very short transposing pitches.



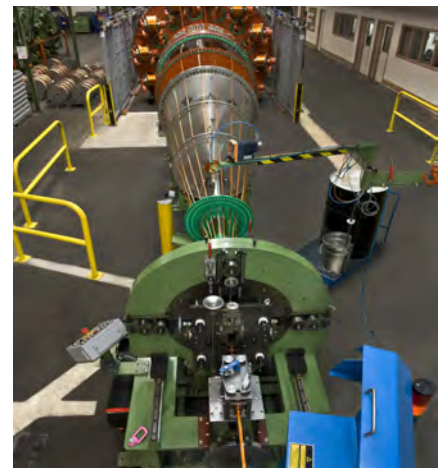
*Willem Benjamin Smit (1860-1950)*



*Smit Draad bare drawing machine (1920)*

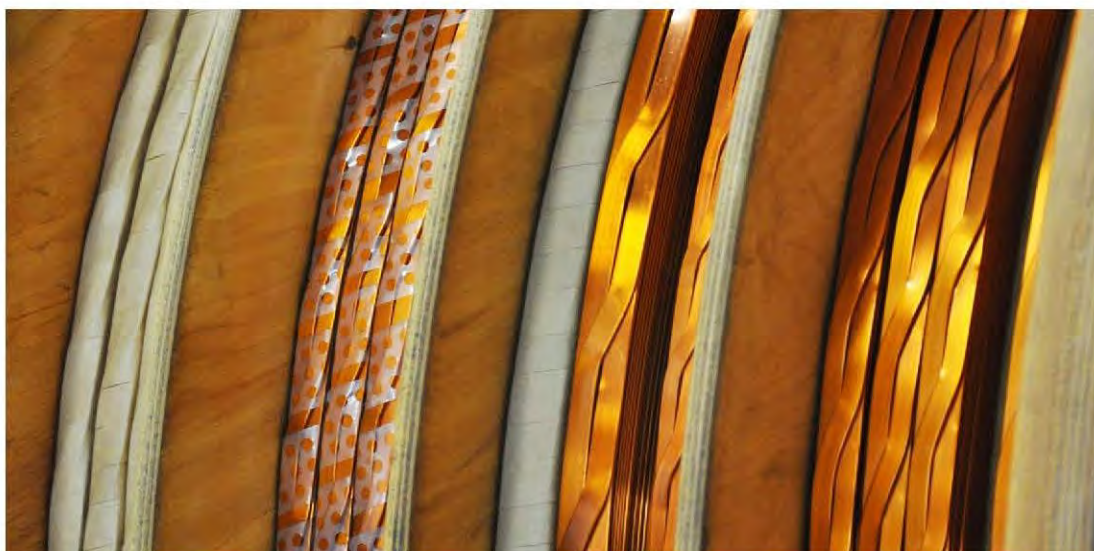


*Smit Draad enamelled wire factory (1960)*



*CTC line up to 85 strands (2009)*





# SMIT DRAAD

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