

Continuous On-line Concentration and Density Measurement via Microwave Technology

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... before we show the technology:

Some words about pro/M/tec:





pro/M/tec is located in the South-West of Germany, in the Black Forest.



Company was formed in 1996 and introduced the microwave technology to control the sugar crystallisation.

Market activity only for industrial process control:
originally for the SUGAR INDUSTRY.

International business. By 2005 over 1.500 instruments have been placed all over the world.
You find pro/M/tec-installtions in all continents.

Focussing to **microwave** measurement technology for the online determination of density and concentration in liquids:

Inline Concentration Control μ -ICC 2.45

... basic principles of the microwave technology

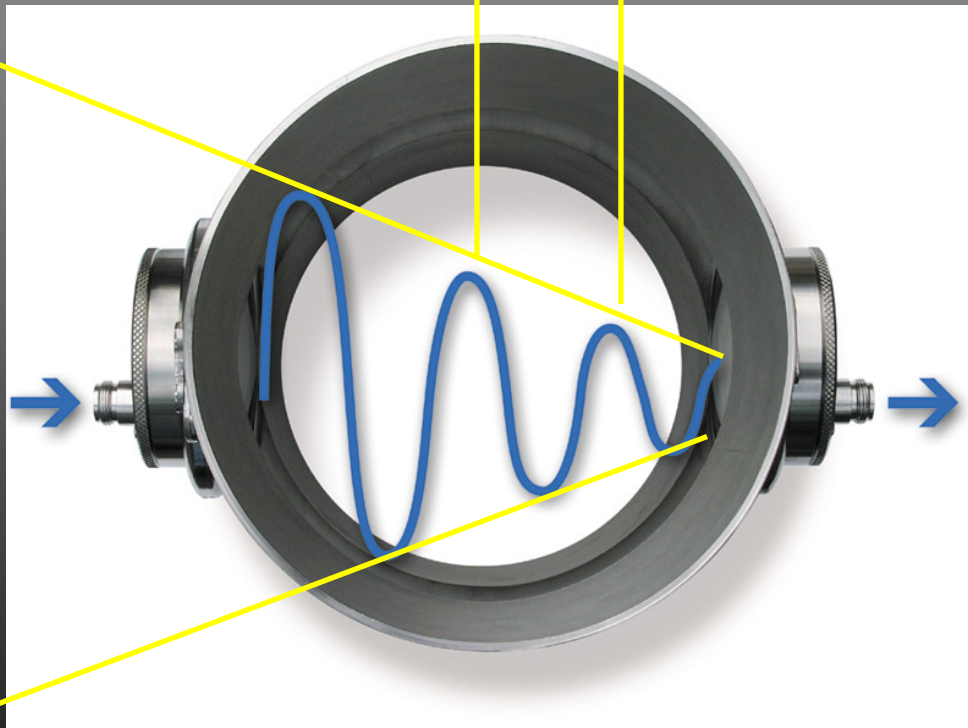


PHASE SHIFT

**Radiated micro-
waves suffer a
phase shift**

**While radiating
through the
medium the
mirowaves
suffer an
attenuation**

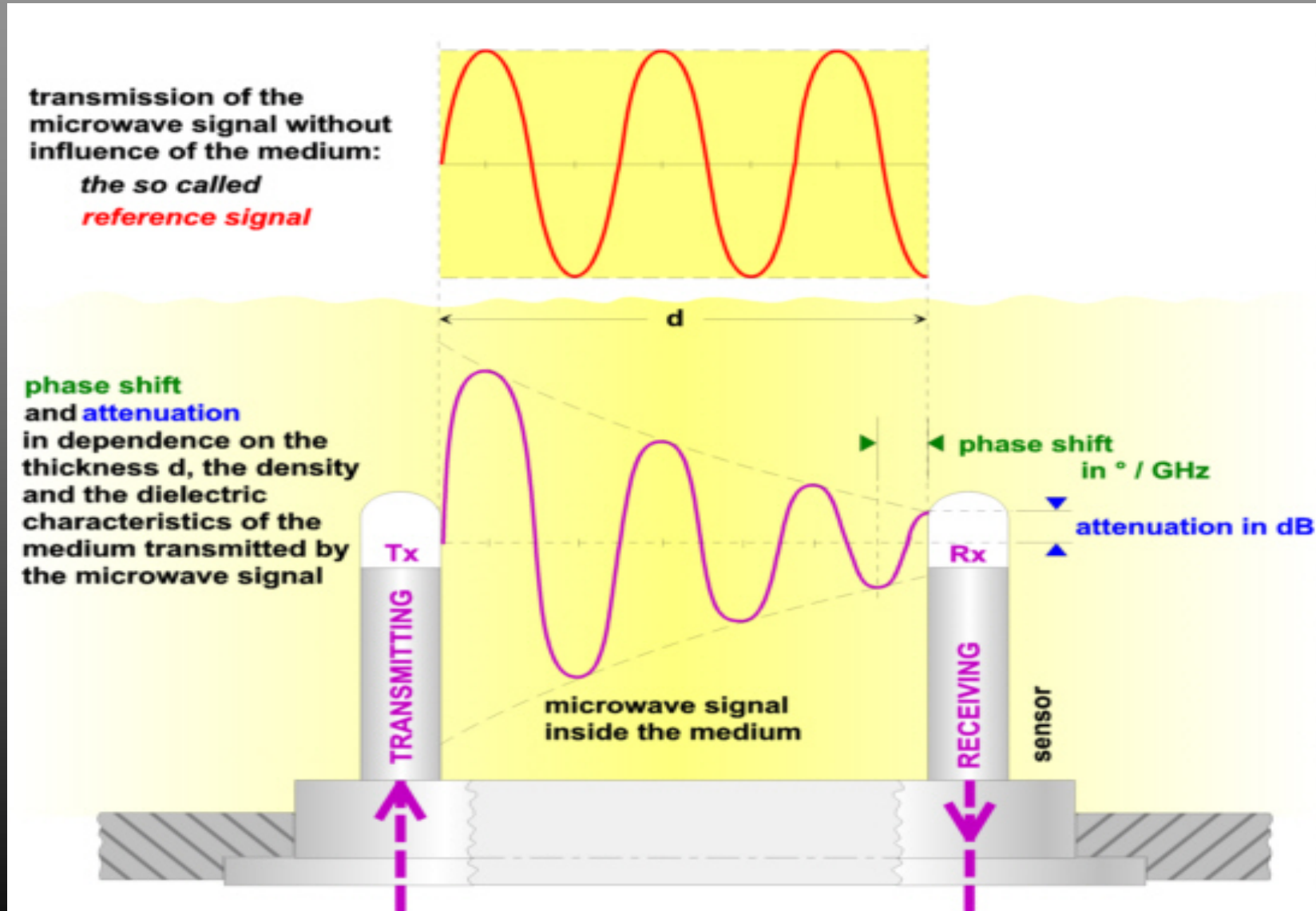
ATTENUATION



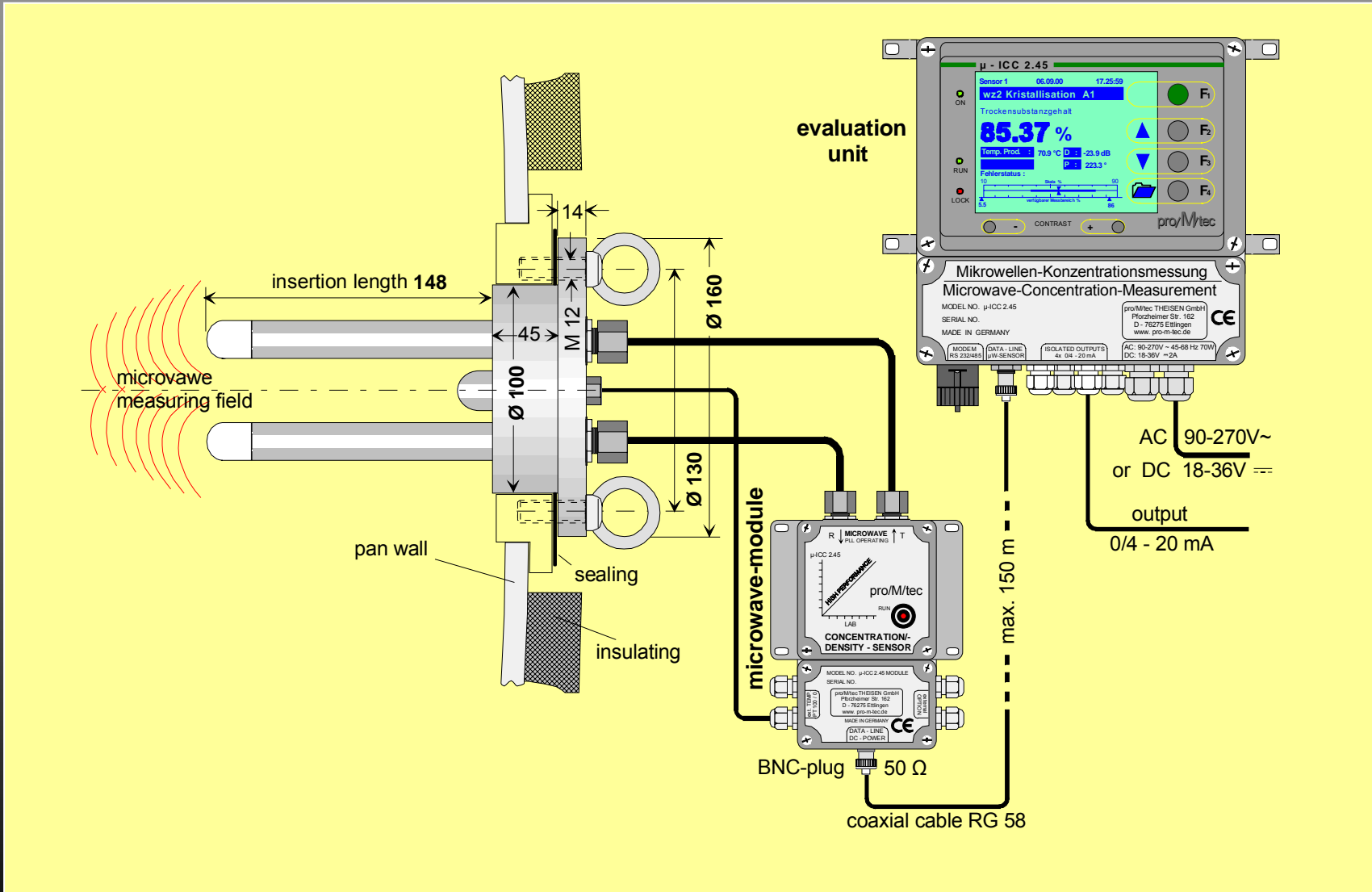
**Microwave signal
before transmission**

**Microwave signal after
radiated through**

... basic principles of the microwave technology



... typical installation for pan application:



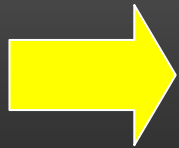
... basic principles of the microwave technology



MICROWAVE PHASE SHIFT AND ATTENUATION
CORRELATES WITH THE WATER CONTENT OF
THE MEDIUM.

WATER CONTENT CORRELATES WITH THE DRY
MATTER CONTENT.

**THE BEST AND SENSITIVE SIGNAL IS THE
PHASE SHIFT.**



**MICROWAVE PHASE SHIFT MEASURES THE
CONCENTRATION, DENSITY, DRY MATTER OR
WATER CONTENT OF THE MEDIUM.**

... typical components that make up a system:



or

1. MICROWAVE SENSOR

2. MICROWAVE MODULE

Max 3 m



Max 150 m



3. EVALUATION UNIT

4. MEMORY CHIP





Microwave evaluation unit μ -ICC 2.45

and the compact microwave module



Microwave evaluation unit μ -ICC 2.45

and the microwave sensor for pans



Mikrowellen-Konzentrationsmessung
Microwave-Concentration-Measurement

MODEL NO. μ -ICC 2.45

SERIAL NO.385

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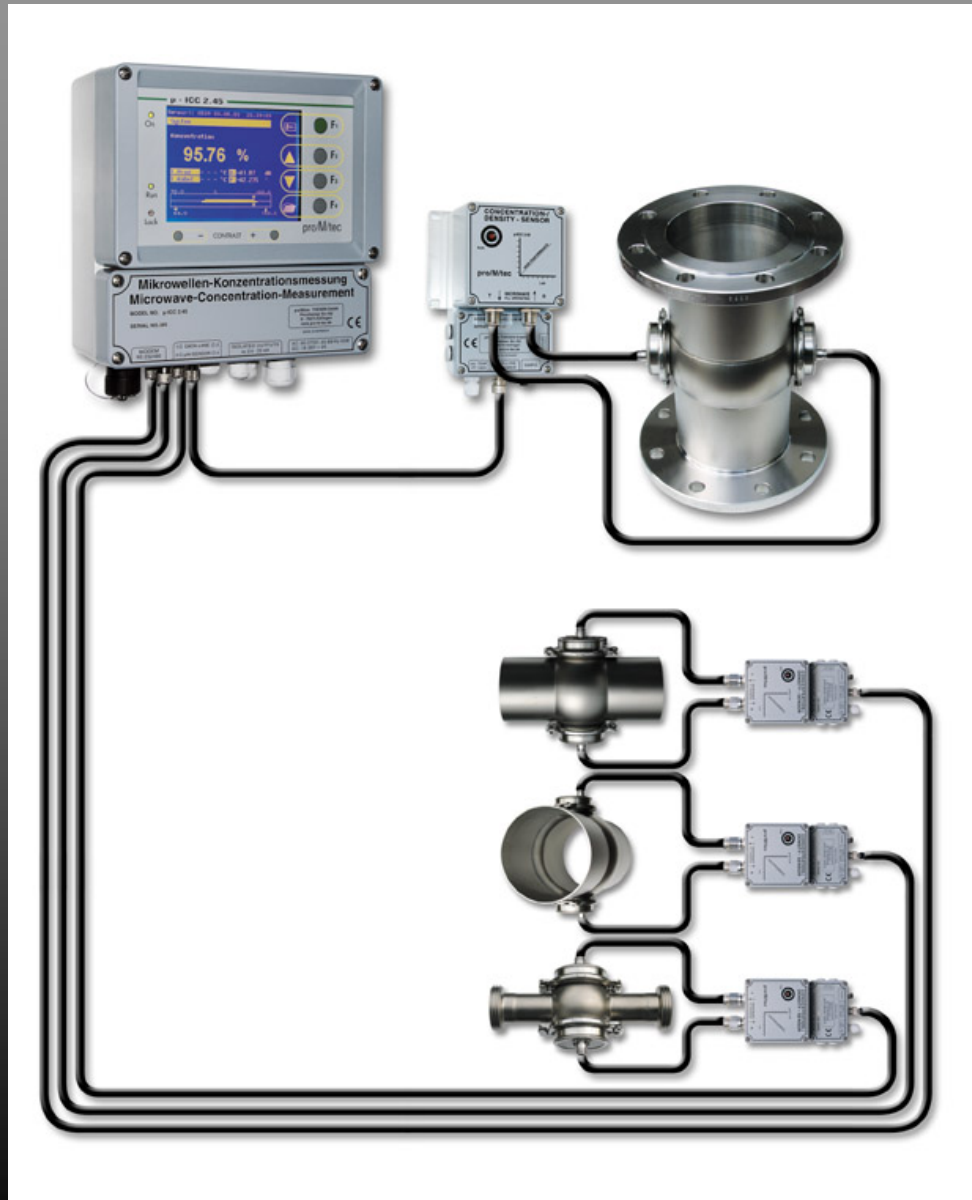
MADE IN GERMANY

MODEM
RS 232/485

1 DATA-LINE \odot 2
3 μ W-SENSOR \odot 4

ISOLATED OUTPUTS
4x 0/4 - 20 mA

AC: 90-270V - 45-60 Hz 45W
DC: 18-36V - 2A



Microwave measurement system μ -ICC 2.45 for pipeline

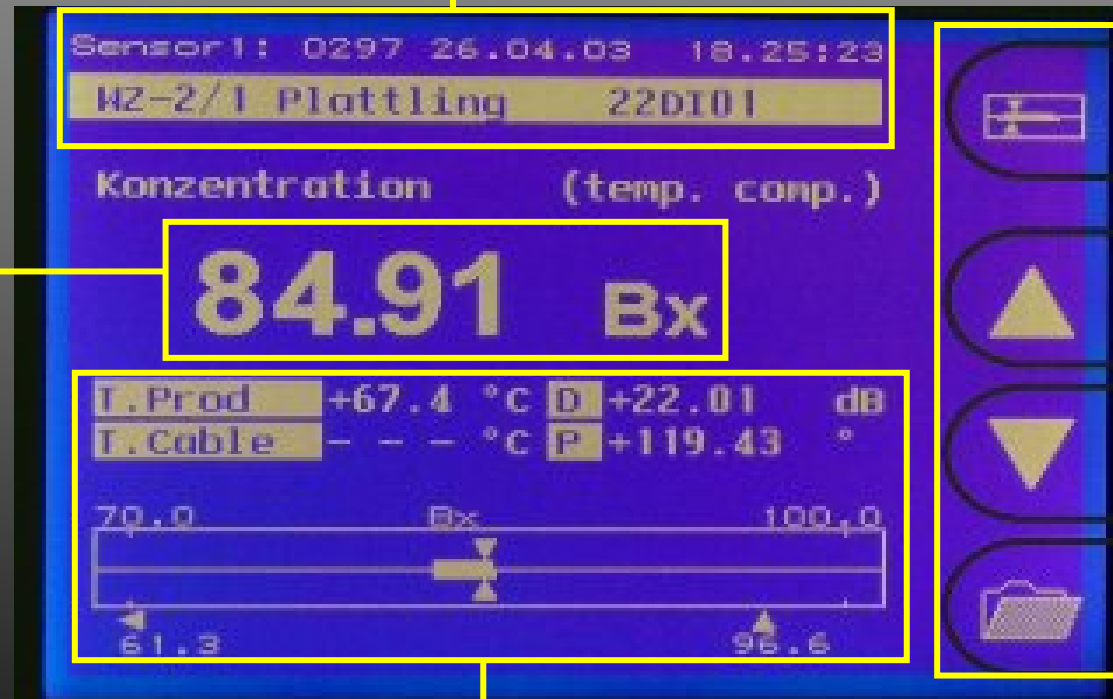
MODULAR EXTENSION
FOR UP TO 4 UNITS ON
ONLY ONE CONTROLLER.

Multiple installation of μ -ICC 2.45 controllers



... all relevant, important measurement information
in the main displaypage

Date, Time, Measurementpoint Description



Process Value

Softkeys

Details des Microwavesignal:
Phase, Attenuation and Producttemperature, and Range

Sensors- typical installation



In-line-Section
DN40-DN150



Rod Sensors
Direct mounting in a boiler

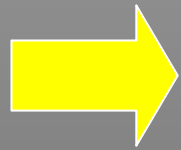


Insertion Sensors
Installation below a pan

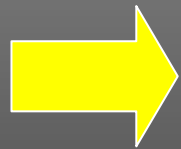


Flat Sensors in a pipe

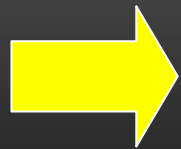
... advantages of the microwave technology:



THE MEASUREMENT IS INSTALLED INLINE TO THE PROCESS. NO BYPASS.



MICROWAVE TRANSMISSION OF REPRESENTATIVE CROSS-SECTION WILL MEASURE THE PRODUCT STREAM CORRECTLY. IT MEASURES WHAT COUNTS.



MICROWAVE MEASUREMENT DOES NOT REQUIRE OPTICAL TRANSPARENCY OF THE PRODUCT. THEREFORE IT IS ALMOST INDEPENDENT OF CONTAMINATION AND DEPOSITS ON THE SENSOR.

Where do we use it in the sugar factory ?



Inline Concentration Control μ -ICC 2.45



Applications in the sugar industry:

- **Crystallization pan control:**
all types of the crystallization process
for product and seed magma pans in
discontinuous (batch) and continuous technology
installed vertical, horizontal or in a cascade.
Also use for cooling crystallization.

Inline Concentration Control μ -ICC 2.45

Applications in the sugar industry:

- Evaporator and concentrator control:**
 thinjuice and thickjuice control to optimize evaporator work in each step.

Thickjuice conditioning to stabilize standard liquor dry substance content.

Thinjuice control to compensate thickjuice irregularities what may cause instabilities in the crystallization.

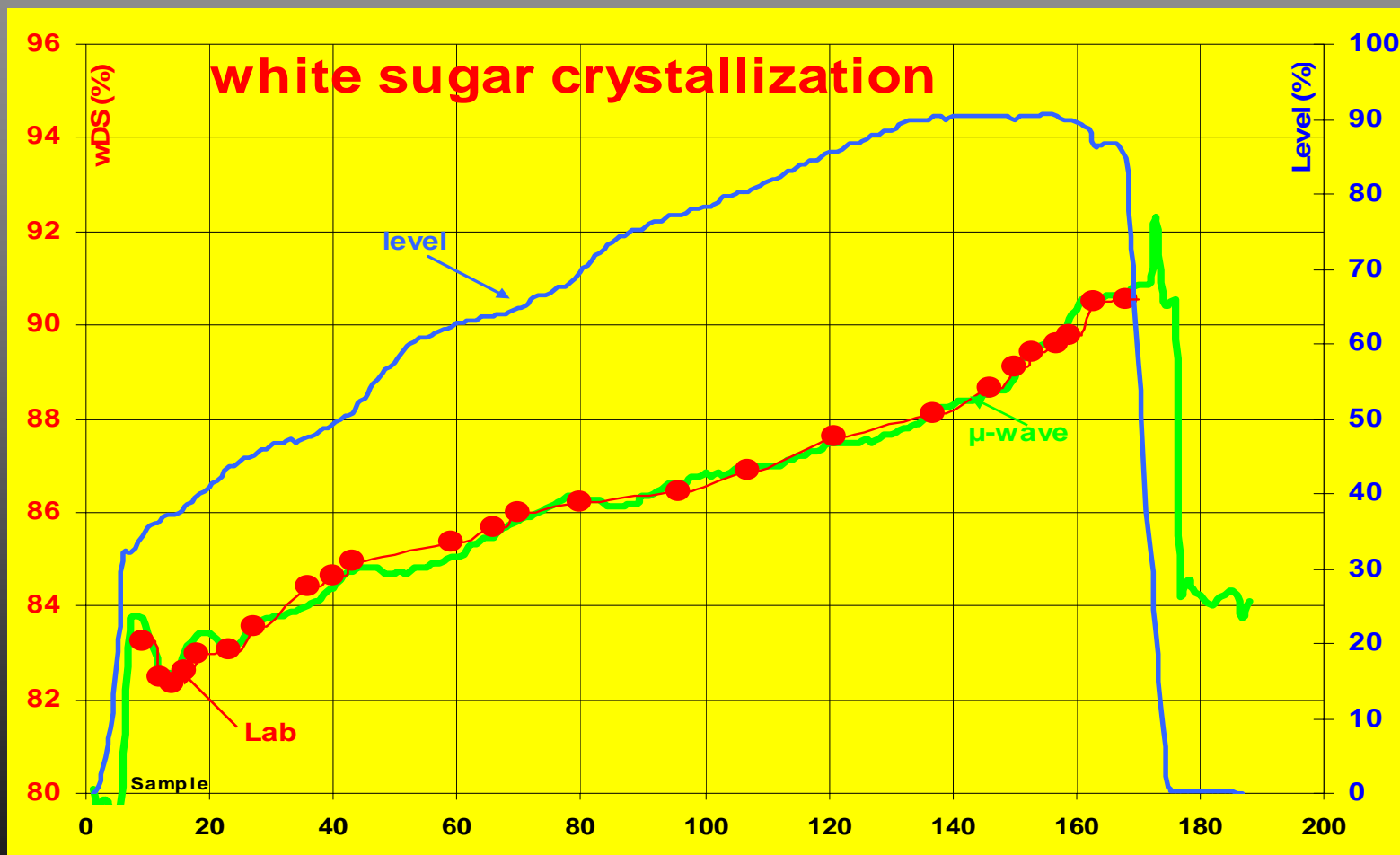
Thickjuice, syrup and feed syrup control to increase dry substance content in order to minimize the amount of water introduced to the sugar house to save energy consumption.

Inline Concentration Control μ -ICC 2.45

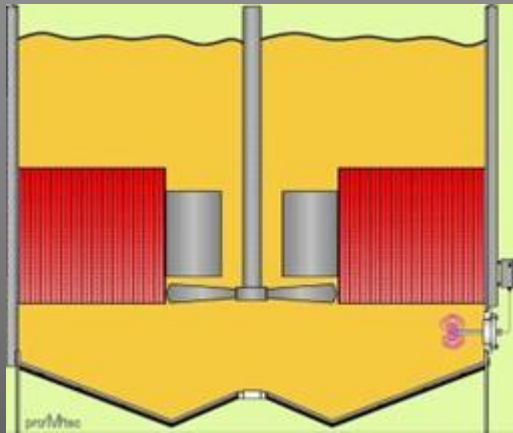
Applications in the sugar industry:

- **Any installation on pans, tanks, vessels, mixers or pipelines** to control any liquid, massecuite, syrup and crystal suspension for the inline process control.

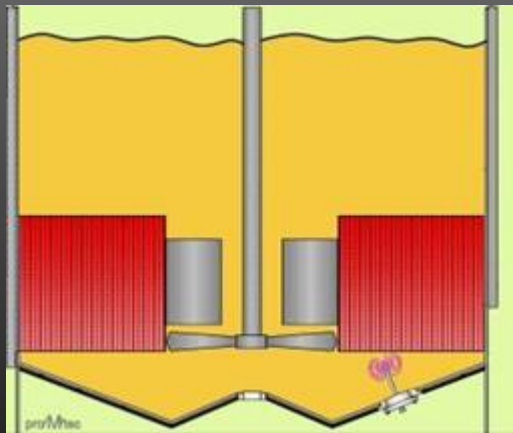
... main application: batch crystallizers



... typical installation in batch pans:



BEST INSTALLATION
POINT IS ALWAYS
BELOW CALANDRIA

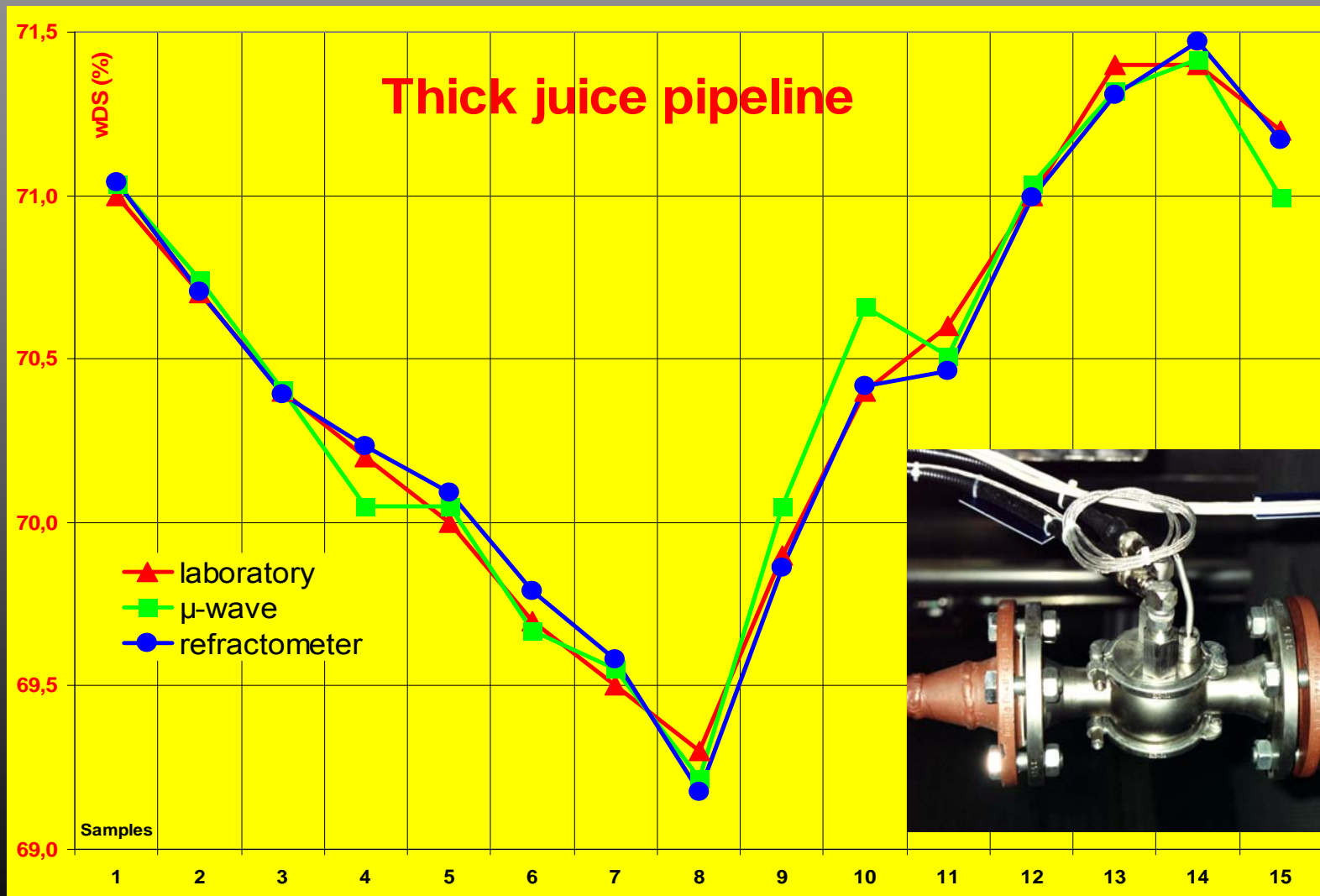


IN CYLINDER PART
OR CONE AREA.

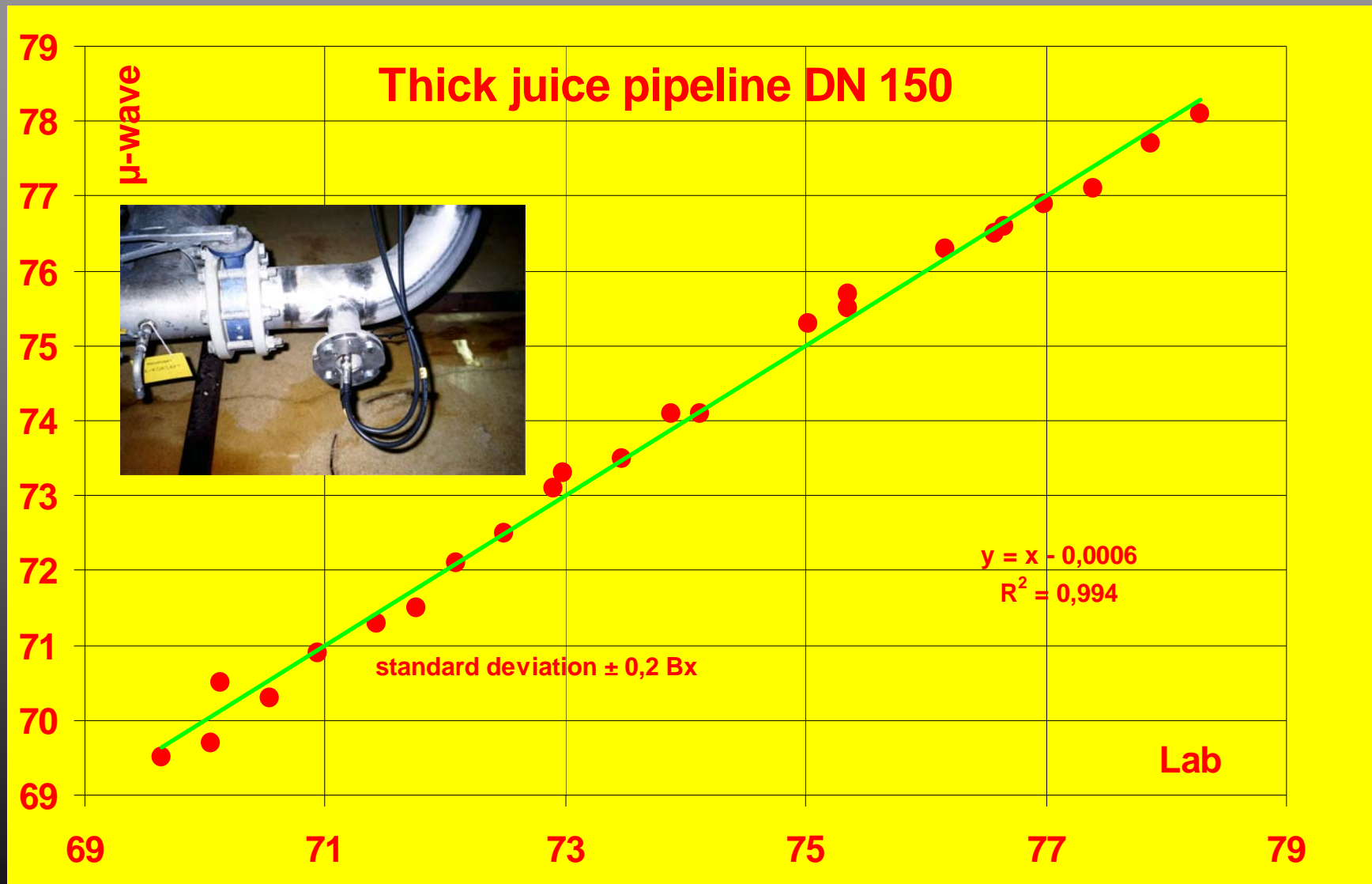


*Best results will be expected
for pans with stirrer.*

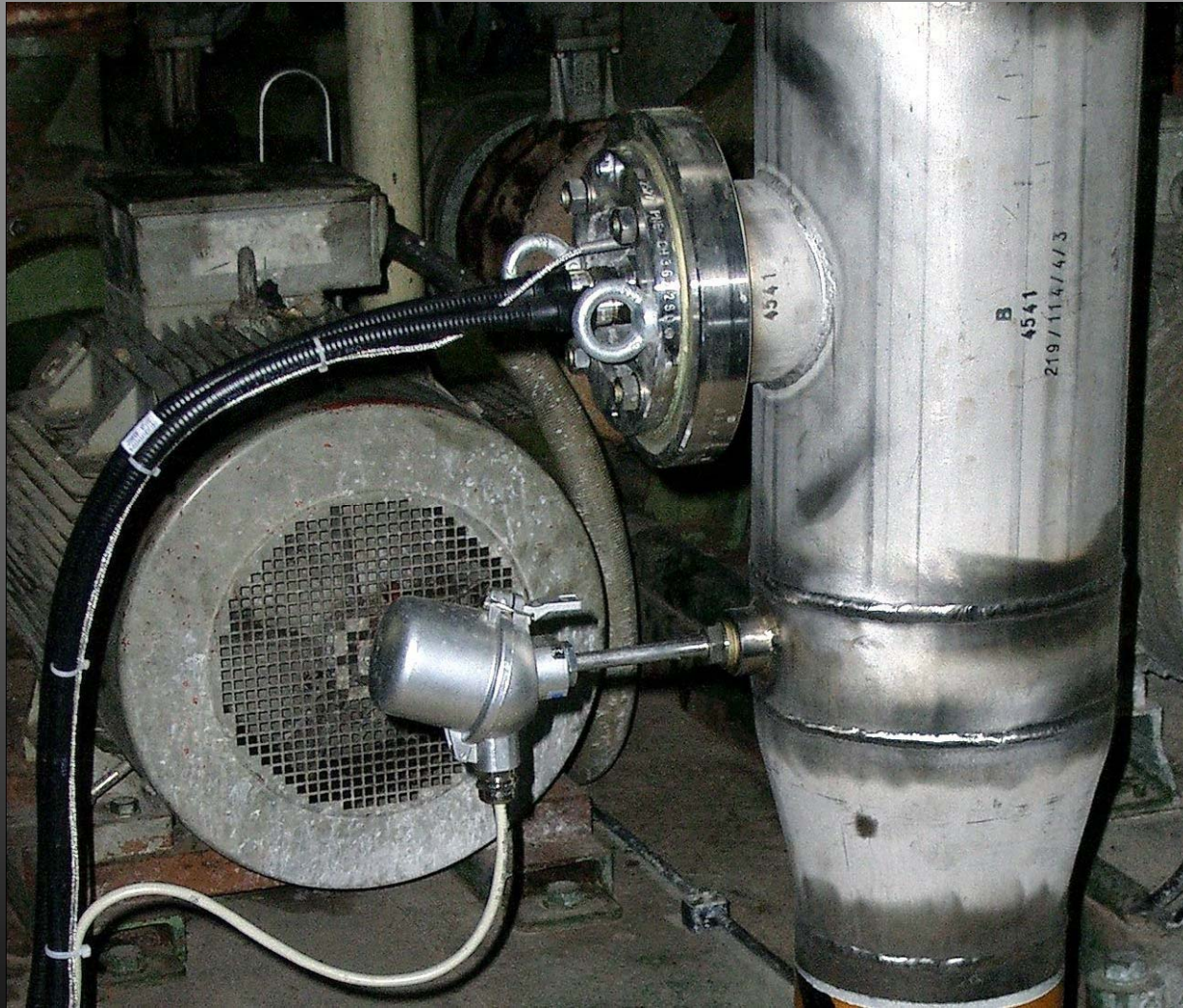
... inline application for thick juice control



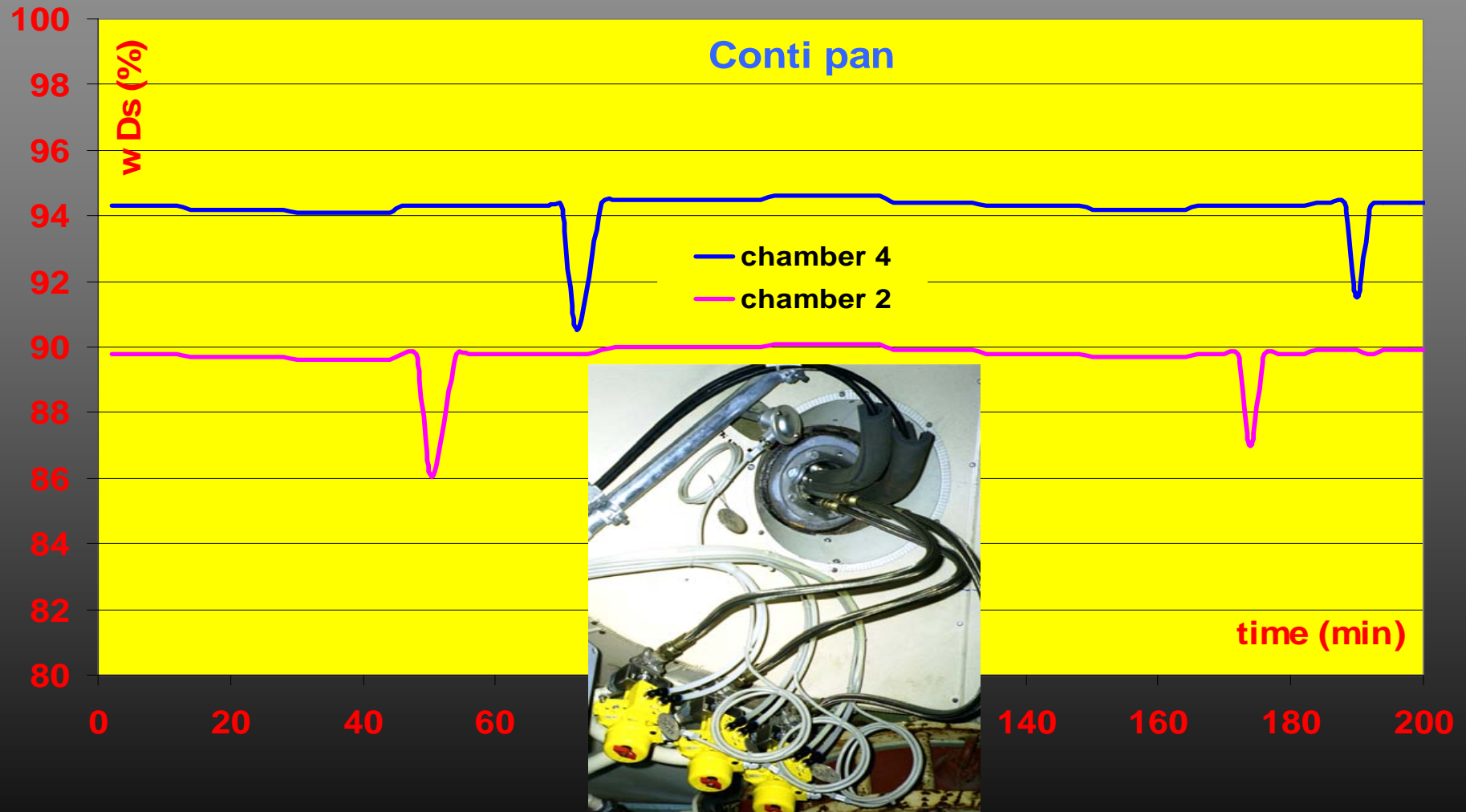
... inline application for thick juice control



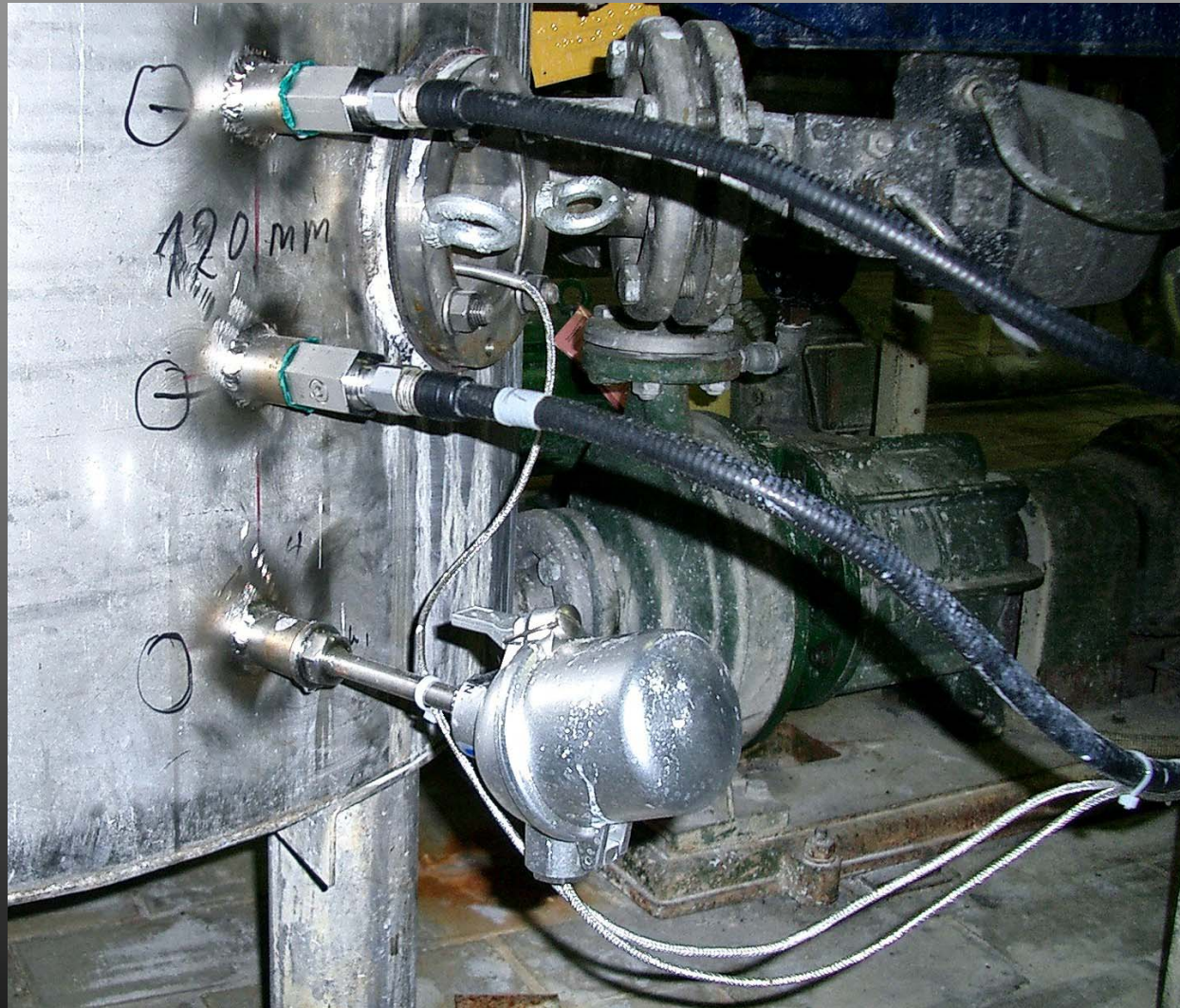
... inline application for thick juice control



... application for continuous pan boiling



... installation directly into mixer wall



Application Span



- Concentration and Density of almost all Mixtures, Suspensions, Solutions, Emulsions, Dispersions, Slurries IN WATER
- Boiling
- Mixing
- Concentrating / Diluting
- Evaporating
- Quality Control

Danke / Thank you !

