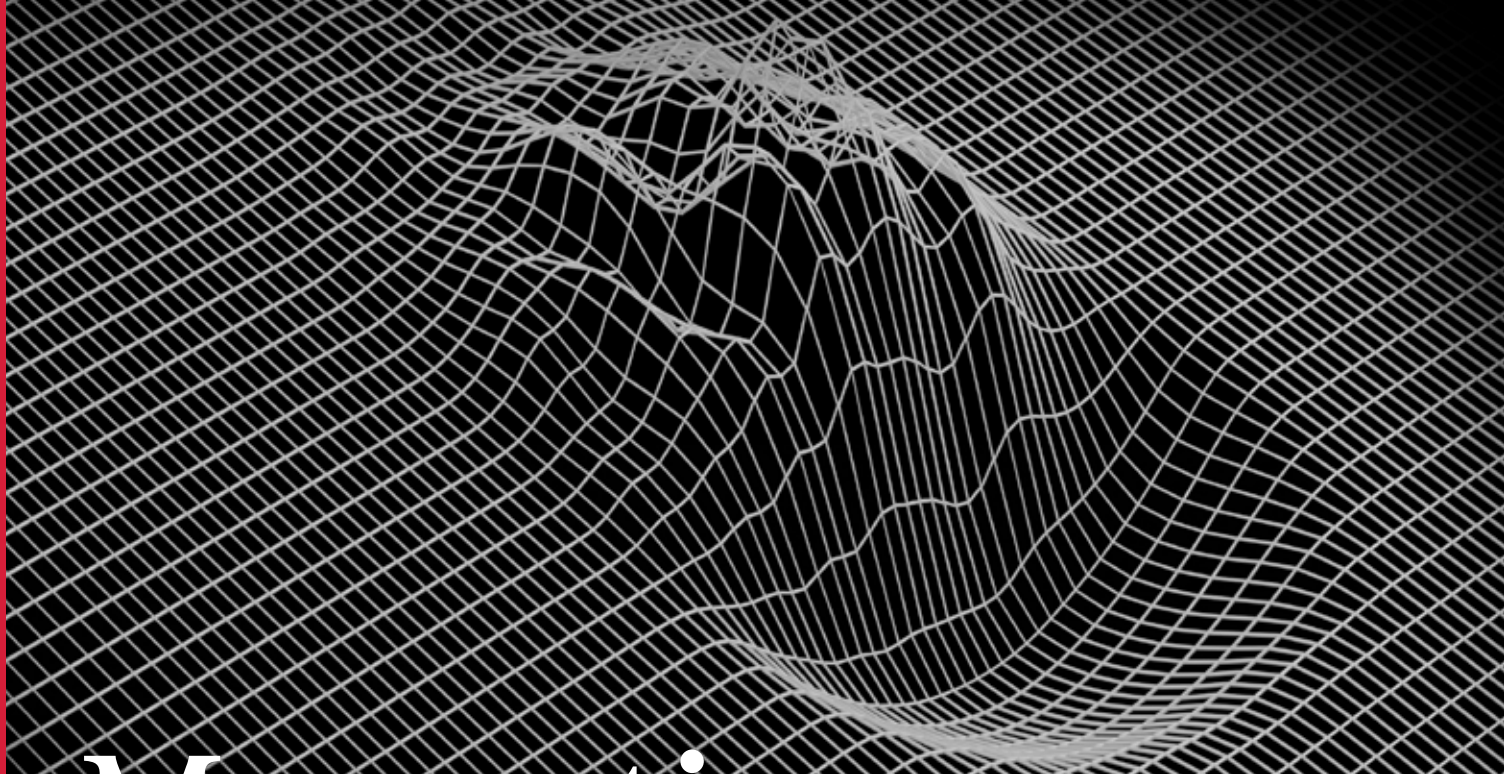
TRAINING

Fleming

ONLINE VIDEO RECORDING



Magnetic Flux Leakage Inspection

"In-depth understanding of the MFL technology to properly engineer the equipment and independently analyze the data"

www.fleming.events

Fully online
no need to travel, just sit back, relax and enjoy the learning experience

On any device
you can log in via mobile, tablet or laptop

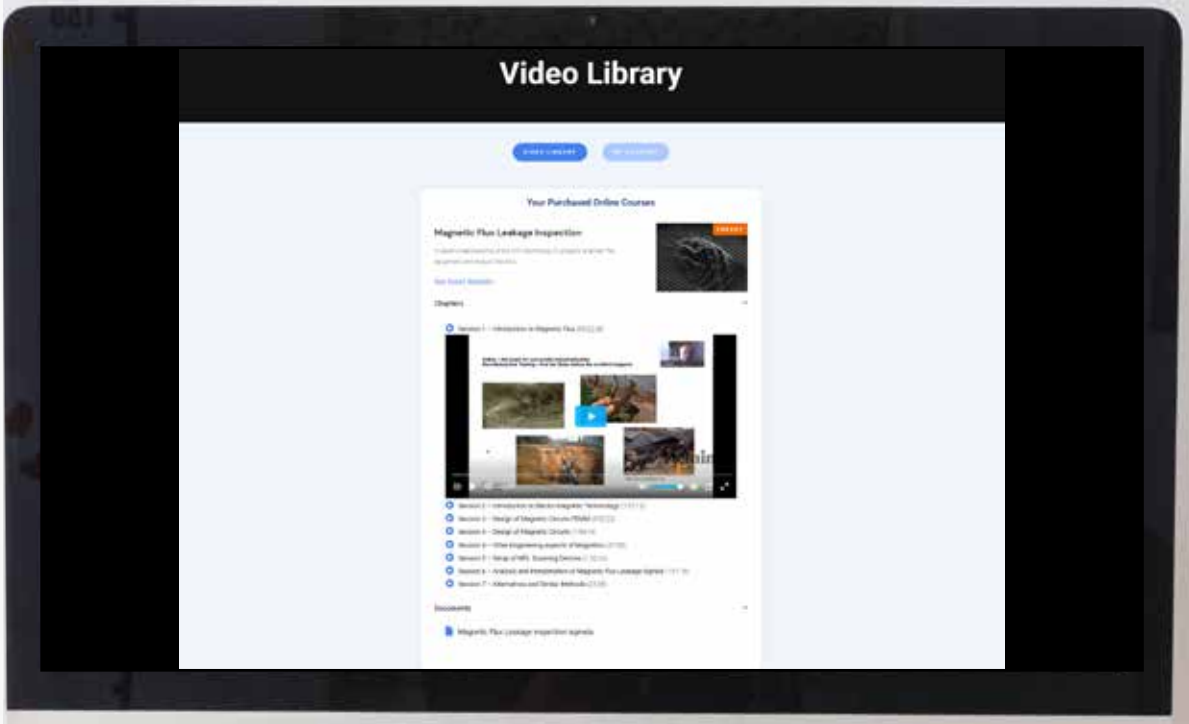
Flexible Schedule
start when you want and follow the course at your own pace

Continuous access
you will continue to have access to the course for 3 months after completing your registration

Conveniently designed video content
the course content is divided into shorter video lectures that will allow you to increase the attention span and improve the learning experience

Certificate of completion
upon the completion of the course you will receive the certificate of completion signed by the course leader

Full slide deck
you will be able to download the full slide deck to support your learning

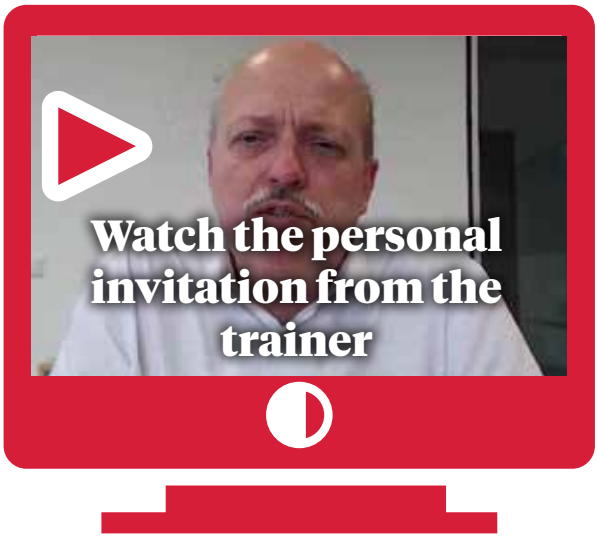


Why Online Video Recording?

We all know that unpleasant feeling of conflicting schedules. You find an interesting training course that you really want to attend to help you gain new knowledge and improve your professional skills. However, when looking at a date you realize you already have another appointment scheduled exactly at the same time - and you will have to miss out on the opportunity. Well, now, you don't have to anymore! Fleming brings you the opportunity to follow a training course of your choice via the pre-recorded video lectures that are conveniently designed as individual sessions of the approximate duration of 60-90 minutes to help you boost the attention span. You can follow the training at your own pace, from the convenience of your home or office via any device - computer, laptop or mobile. You will also receive the full course slide deck to support your learning and upon completing the course you will receive the certificate of completion signed by the course leader. And the best thing of all? You will have access to this content for 3 full months after completing your registration. You won't have to rush and will be able to listen repeatedly to any of the lectures because we know that newly gained knowledge can be overwhelming and fade over short time unless the learned material is revisited. Take control of your learning now and sign up for one of our video recordings.

About your expert trainer:

Dr.-Ing. Konrad Reber
Director Research and Development
Innetiqs GmbH, Germany



Konrad Reber studied physics at the University of Mainz with a focus on Solid State Physics. In a Ph.D. thesis at the material science department of the University of Erlangen, he worked in the field of magnetic materials, in particular the measurement of material parameters using magnetic stray flux methods. At Pipetronix he was responsible for the development of data analysis algorithms for the application to MFL-pipeline inspections. Later he also became responsible for the magnetic design of MFL-inspection pigs. After changing to NDT Systems & Services he continued to work in the field of in-line inspection and broadened his focus to include topics of defect assessment and general comparison methods of different inspection tools. Between 2006 and 2008 he was with TUVRheinland as an expert within the Pipeline Technology Group. He was responsible for international projects on pipeline integrity and pipeline certification. Since 2008 he was head of research and development for the Innospection Group. The department was responsible for designing new inspection equipment for the Oil and Gas industry. His focus was on the development and refinement of testing technologies with applications for underwater or otherwise difficult to inspect structures. As of 2022, Konrad became the Director of Research & Development at Innetiqs GmbH. He is busy in delivering speeches on conferences and is a trainer in various courses on pipeline inspection.

Key Topics:

- MFL Inspection
- Electromagnetic terminology, magnetic properties & material selection
- Design of magnetic circuits
- Engineering aspects in magnetic
- Setup of MFL scanning devices
- Analysis and interpretation of MFL signals
- Alternatives and similar methods – MPI, SLOFEC, MEC, PEC, MMM

Special Feature: 2 Practical Exercises

- Modeling of MFL signals – FEMM software simulation
- Analysis of MFL signals

Testimonials from courses led by Konrad Reber:

"Excellent overview on the ILI industry."
Arnaud Lemaire, Pipeline Engineer, Trapil, France

"Thanks again, I thoroughly enjoyed the course. My favourite aspect was the time taken to go everything in detail on the slides (e.g. talk through all the schematics and tables in details). This made the material easy to follow at a good pace."
Bruce Strachan, Process Engineer, Total Exploration & Production, UK

"Highly participatory and inclusive course! I have gained a lot of knowledge, excellent trainers, nice and inspiring group."
Kostas Golfinopoulos, CEO, Atom Group, Greece

"It was a complete course in which I completed my knowledge related to ILI Inspection and inspection of challenging pipelines. Thank you to the trainers!"
Paul Oancea, Director Regional Operations Center, Transgaz, Romania

"Fleming provide excellent training courses delivered by experts in respective fields - well done!"
James Dwan, Principal Consultant and Director, Dwan Forensic Engineering, Ireland

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The course objective:

In many fields of non-destructive testing **Magnetic Flux Leakage Inspection (MFL) is the standard NDT technique**. This is the case for **internal pipeline inspection, tank floor inspection and also wire rope inspection.**

For many people in the industry it is **important to have a full and in-depth understanding of the technology.** This is the case **for those that will make use of the inspection results**. Often it is not sufficient to base important integrity decisions on unsubstantiated, hand-waving arguments. A sound comprehension and the ability to also consider the technical context of such inspections will lead to a more independent and robust selection of services and usage of the results. It will allow for a better technical communication of service providers to procurement managers.

At the same time **a full understanding is also important for those who generate the results in the first place**. It is a quick and at the same time profound introduction to all people that approach the topic from an engineering point of view. The design of inspection instruments is too bespoke to teach this topic in university classes. Nevertheless, design engineers require a theoretical background in order to design in a purposeful manner.

Finally the course provides **valuable background information for inspection technicians and data analysts that carry out the inspection and analyse the data.** They need to understand the possibilities and limitations of the technology. The course would ideally fit in as a primer prior to in-house training that will familiarise the attendees with the topic before the detailed training on company-specific software and tools is done. Moreover, it can be a supplement to the certified courses for PCN, EN ISO 9712 or ASNT, as these courses are usually broader.

Who should attend?

- ✓ Pipeline Engineers
- ✓ NDT, Inspection, Maintenance, Pipeline Integrity technicians and personnel from pipeline operators, transmission and distribution companies
- ✓ Engineering Consultants active in the field of pipeline inspection, pigging, integrity assessment, NDT
- ✓ Engineering Consultants active in the field of tank floor inspection, steel pipe production, steel rope testing
- ✓ Personnel from Regulators or Certifiers involved with pipeline inspection & assessment

All you need is or with and *It`s easy as that!*

Recommended ***Required***

Create your own In-House Training

Are you looking for something more specific? Create your own In-House Training customized to the specific issues your company and your employees need to understand and resolve. Save time and cost while increasing implementation with an In-House Training held in the privacy of your company.

Read more about In-House Training opportunities

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Course Program:

SESSION 1: Introduction to Magnetic Flux Leakage Inspection

- Scope of the inspection: What MFL can do
- Typical applications – Pipeline inspection, tank floor, wire ropes
- Historical development

SESSION 2: Introduction to Electro-magnetic Terminology

- Basics of electrodynamics
- Description of magnetic properties of matter
- Hard and soft magnetic materials
- Material selection

SESSION 3: Design of Magnetic Circuits

- Ohm's law in Magnetostatics: How to produce the magnetic flux
- Analytic methods of flux level calculation
- Electromagnets vs. permanent magnets: Selection guide
- Finite Element calculation of magnetic circuits – Introduction to electrodynamic FEM
- Speed effects: What changes when the scanner moves?

SESSION 4: Other Engineering Aspects in Magnetics

- Attractive forces – important aspects for design engineers
- Shielding of magnetic fields
- Proximity sensing for MFL

SESSION 5: Setup of MFL Scanning Devices

- Typical design solutions: What do scanner and intelligent pigs look like and why
- Magnetization processes: What happens during the inspection?
- MFL Sensors, variety and selection guide

SESSION 6: Analysis and Interpretation of Magnetic Flux Leakage Signals

- Representation of MFL signals, signal processing, meaning of field components
- Interpretation of the signals, data analysis
- The inverse problem in non-destructive testing
- Defect reconstruction methods, using math to solve the inverse problem
- Comparison of different MFL signals: sample signals
- Machine learning for data interpretation: How to automate the data analysis
- Norms and qualifications for data analysts

SESSION 7: Alternatives and Similar Methods

- Magnetic particle inspection (MPI)
- Magnetic Eddy Current Inspection (SLOFEC / MEC)
- Metal Magnetic Memory effect (MMM), Magnetoelastics: How does it work and what methods are there?
- Pulsed Eddy Current Inspection (PEC)

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In-House Training

- Specific industries face specific problems. They require niche information and solutions. **In-House Training** is precisely tailor-made to your needs.
- We find a trainer, draft topics, and then find the premises and dates which match your needs.
- Taking place in the privacy of your company, including real-life case studies and best practices, the course is led by an independent industry expert.
- Provide your employees a unique learning experience without having to leave the office.

"Knowledge is important, but implementation is crucial."

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GET MORE INFORMATION

The team behind:

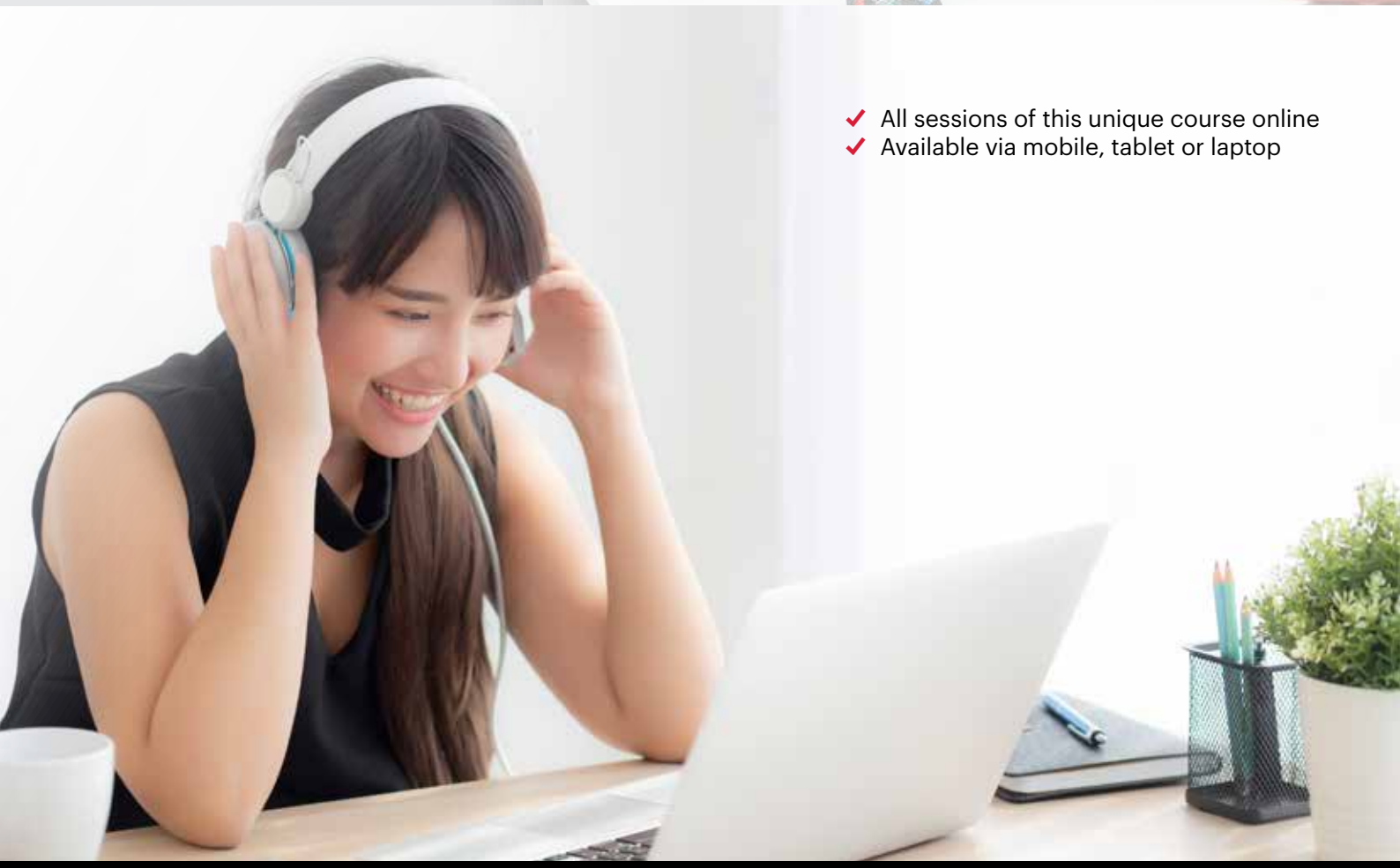
We are delighted to bring you the

Magnetic Flux Leakage Inspection

Click on the ticket below to sign up
Or write to
event.inquiries@fleming.events
to get in touch with a member of our team

Darius Slavik
Production Director

Monica Jones
Marketing manager



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