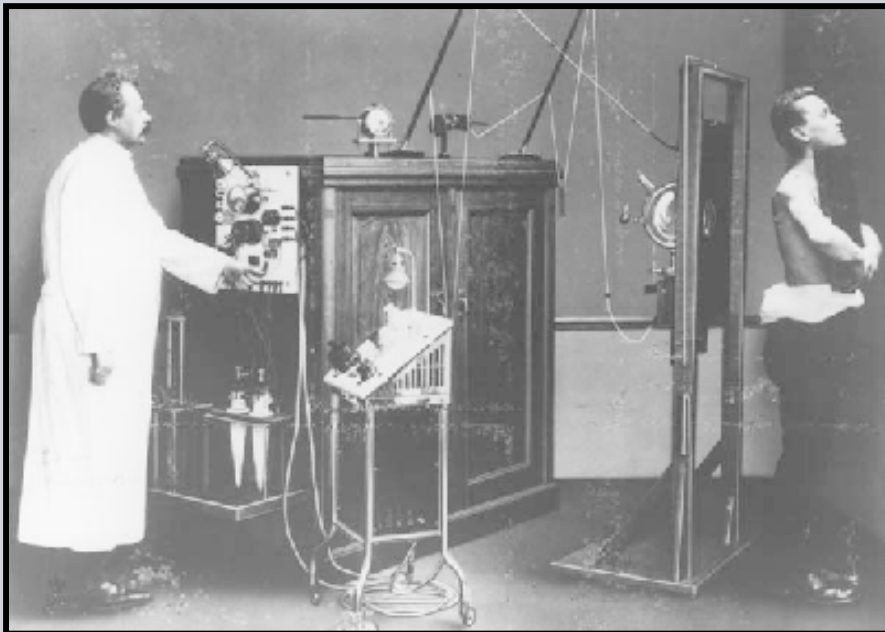


ETRAP 2009

8 - 12 November 2009, Lisbon, Portugal

SIEMENS

SECTOR - SPECIFIC IN - HOUSE EDUCATION AND TRAINING AT SIEMENS



1. Medical X-ray equipment

- about 1906
at an experimental stage

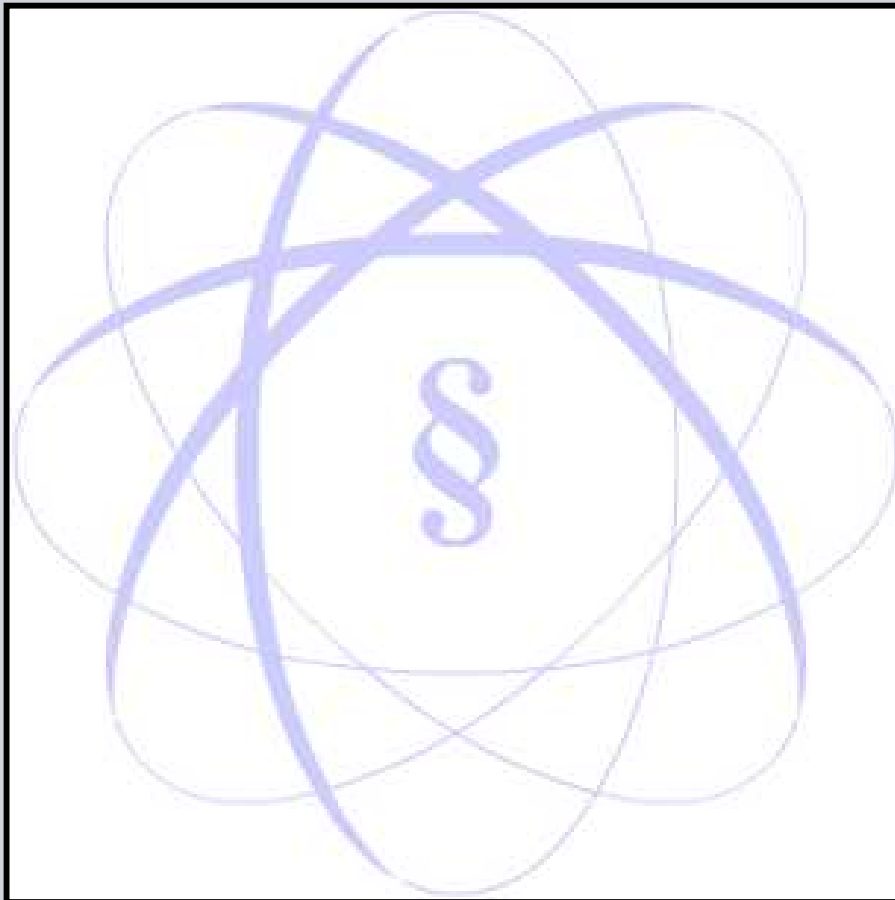
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Sector-specific in-house education and training at SIEMENS



1. Medical X-ray equipment

- about 1906
at an experimental stage
- today



1. Medical X-ray equipment

- about 1906
at an experimental stage
- today
regulations everywhere

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Sector-specific in-house education and training at SIEMENS

1. Medical X-ray equipment

1.1 The X-ray Unit

- Medical Device Directive 93/42/EEC – national legislation
- Classification – potential hazards
- Essential requirements – intended use
- Harmonized standards – IEC 60601-x-x
- Conformity assessment procedure – notified body
- CE-mark

Safe equipment

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Sector-specific in-house education and training at SIEMENS

1. Medical X-ray equipment

1.2 The X-ray department

- Radiation protection areas
- Controlled area $>6\text{mSv/a}$
- Supervised area $>1\text{mSv/a}$
- Public area $<1\text{mSv/a}$

Tested and certified by a government physicist

Safe environment

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1. Medical X-ray equipment**1.3 Operation of X-ray systems**

- Application of radiation to persons
- Responsibility of operation by the member states
- Requirements based on the intended use
 - Corresponding limits of image receiver dose
 - and image quality parameters

The required image quality must be achieved with reasonably low dose

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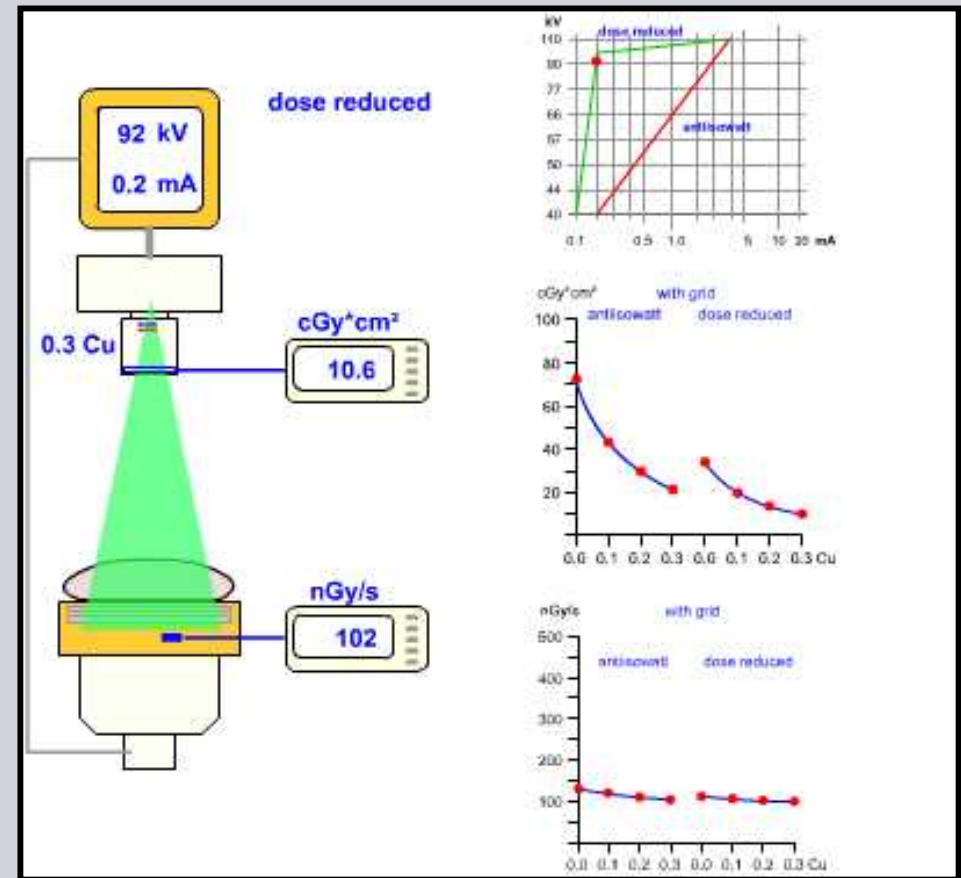
Sector-specific in-house education and training at SIEMENS

1. Medical X-ray equipment

1.3 Operation of X-ray systems

- Monitoring the patient dose
- Dose area product measurement
- Optimizing the radiation quality

EC Reference values



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Sector-specific in-house education and training at SIEMENS

2. Specific radiation protection knowledge

Design

- Medical Device Directive
- Harmonized standards
- Prototype testing
- Conformity assessment
- Notified Body

At this level extensive knowledge of radiation physics and radiation protection is definitely required.

This level of qualification is not provided by our technical training center.

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Sector-specific in-house education and training at SIEMENS

2. Specific radiation protection knowledge**Manufacturing**

- Production
- Assembly
- Testing

Extensive radiation protection knowledge is not required.

The personal are trained and supervised by the radiation protection officer.

2. Specific radiation protection knowledge

Putting into operation

- On site adjustment according to setting instructions
- Testing according to test instructions
- Hand over to government physicist

The unit is operated under the responsibility of the field service engineer.

A minimum knowledge of radiation physics, radiation protection, and biological hazards is required along with operational skills.

This knowledge is trained in our “fundamental X-ray class”.

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2. Specific radiation protection knowledge**Maintenance**

- Image quality tests
- Trouble shooting
- Preventive maintenance

Checking the internal and external radiation protection devices.

These skills are trained in our “regular product training classes”.

2. Specific radiation protection knowledge

Application support

- Automated operation
- Organ programs
 - Radiation quality
 - Image receiver dose
 - Image processing

The application specialist has to understand examination procedures. He has to optimize the organ program parameters, and know their influence on patient dose and image quality.

We offer dedicated education classes enabling the engineers to support the radiologist in optimizing the unit's performance.

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Sector-specific in-house education and training at SIEMENS

3. Sector-specific in-house education and training

3.1 Statistics

- 5300 X-ray engineers worldwide
- 450 regular technical training classes per year on diagnostic X-ray equipment
- 12 fundamental X-ray classes per year

100-150 new field service engineers every year.

Training facilities in:

- Erlangen, Germany
- Cary, USA
- Shanghai, PRC

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Sector-specific in-house education and training at SIEMENS

3. Sector-specific in-house education and training**3.2 Vocational qualification**

- Very good knowledge in electronics and IT
- Good mechanical skills
- Fluent in English language

Since the level of education can be very different between countries, we trainers have to stick to simple English, and simple facts.

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Sector-specific in-house education and training at SIEMENS

3. Sector-specific in-house education and training**3.3 Training on knowledge in radiation protection**

Skills trained in our *fundamental X-ray class*:

- Obvious radiation protection training
 - X-ray physics
 - Biological hazards
 - Radiation protection measures

- Not so obvious radiation protection training
 - Dose adjustment
 - Dose measurement
 - Mechanical adjustment of radiation beam

3. Sector-specific in-house education and training

3.3 Training on knowledge in radiation protection

The radiation protection training in *regular technical training classes* is of the not so obvious kind:

- Image quality tests
- Optimizing organ programs
- Preventive maintenance

In all our training classes we start with a reminder of the basic radiation protection rules.

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Sector-specific in-house education and training at SIEMENS

3. Sector-specific in-house education and training**3.4 Governmental handling in Germany**

- X-ray ordinance
- Requisite Knowledge and Know-How in Radiation Protection
- Acceptance and Constancy Tests

These skills along with our German regulatory environment are trained in special classes, which we conduct on demand.

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Sector-specific in-house education and training at SIEMENS

More than wishful thinking?

It should be possible to establish a **basic level of required knowledge for field service X-ray engineers**, which is agreed upon worldwide.

Then the operation and service of X-ray equipment would become safer, and the local authorities could depend upon a certain safety standard.

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Thank you for your attention!



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