

# DOE LSO Workshop 2011 MIT Cambridge

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## ***Industrial Laser Safety***

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# Overview

- Industrial Laser Safety
  - ◆ Manufacturing industry
- Products
  - ◆ WHO & WHAT
  - ◆ Regulation and Guidance
    - FDA / CDRH- Product
- Users
  - ◆ WHO & WHAT
  - ◆ OSHA
    - ANSI Z 136. ANSI Z 136.9

## *Robots & Lasers*

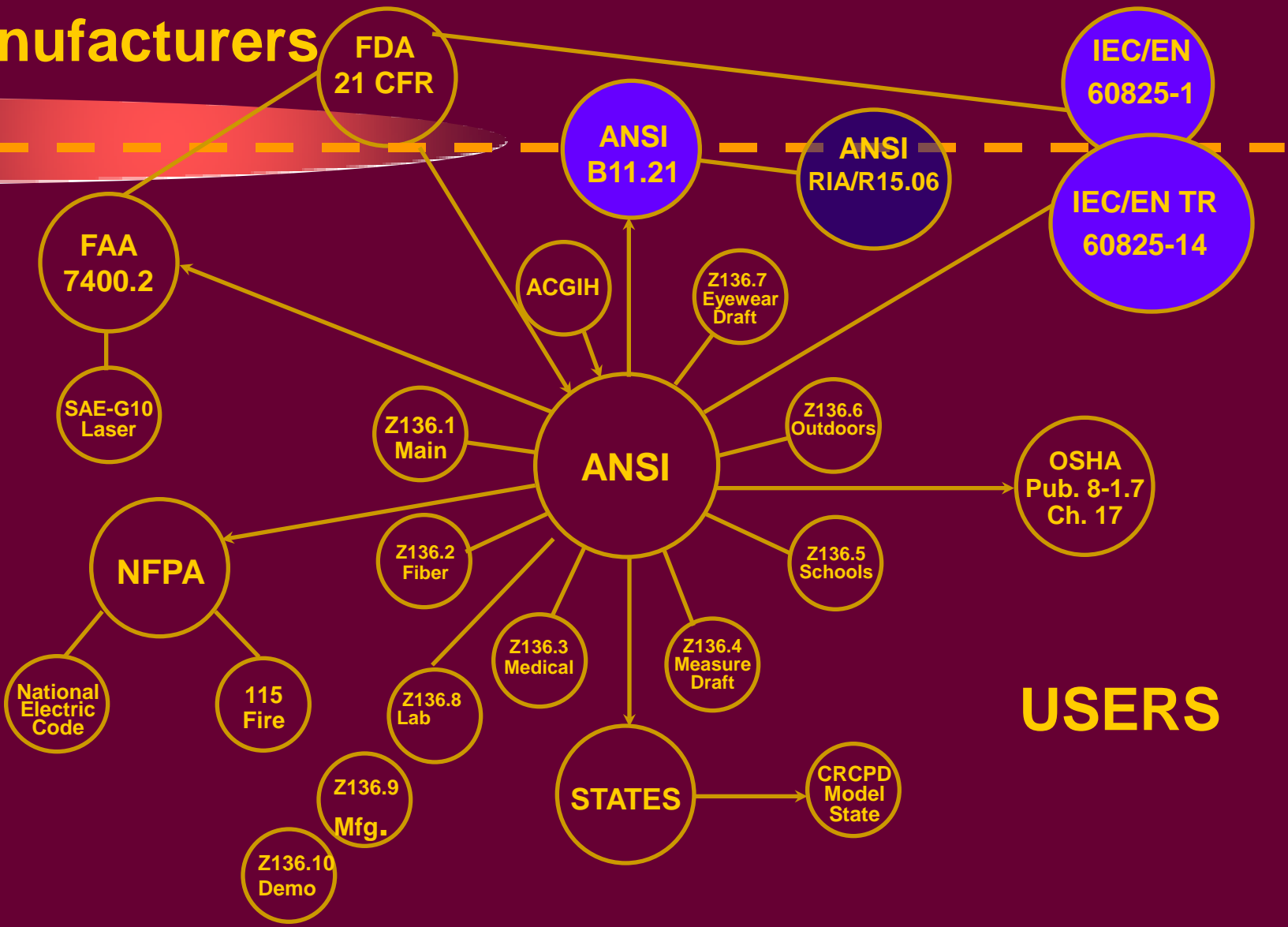
### *Why are we concerned:*

- Multikilowatt laser beams, capable of vaporizing steel in fractions of seconds, produced at retinal hazard wavelengths, with long focal lengths, flung at high acceleration rates, in virtually all directions, under the control of absentee programmers or grad students who already know everything.



# Industrial Laser Safety

## Manufacturers

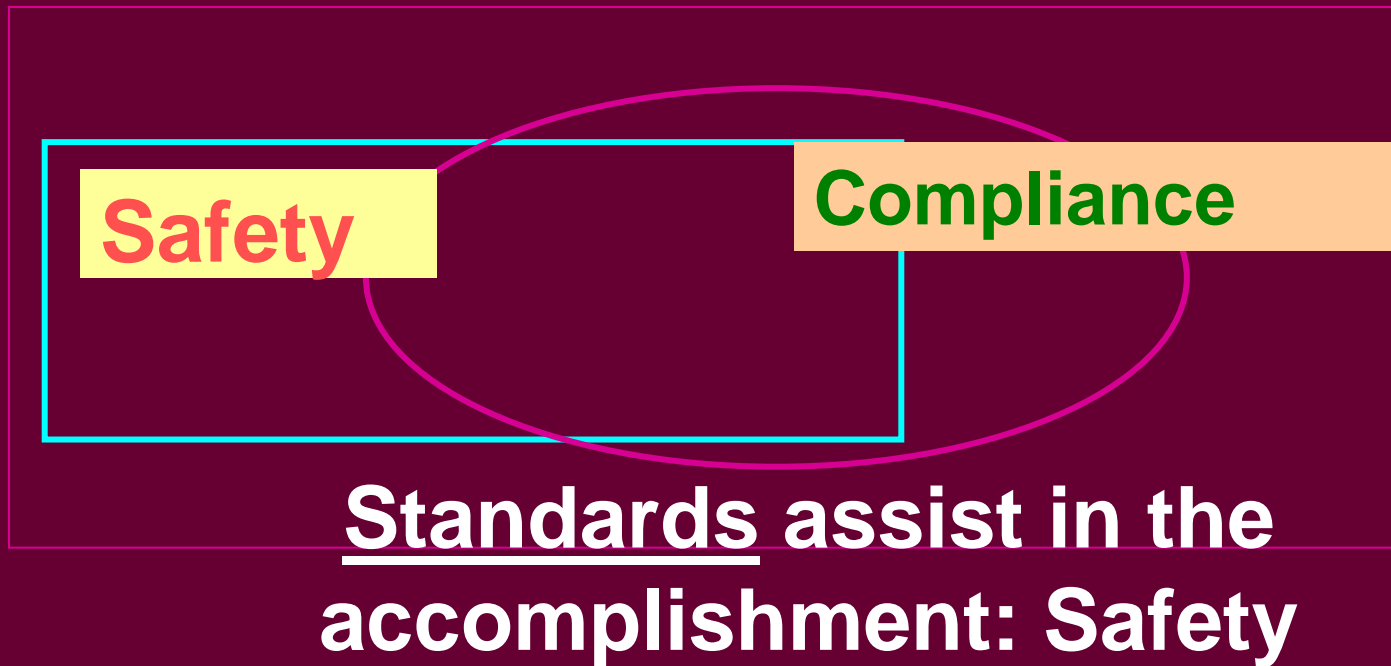


## USERS

# *Industrial Laser Safety*

## *What to Do?:*

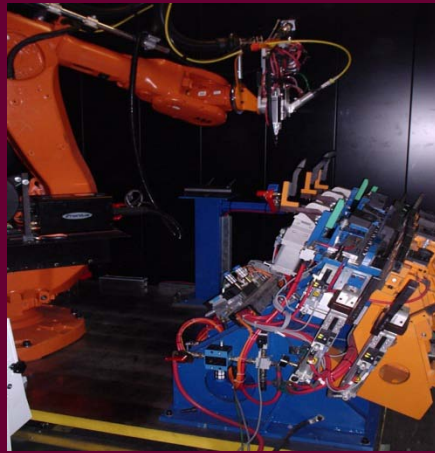
- **Purpose of LASER Standards**



# *Industrial Laser Safety*

## ● WHO

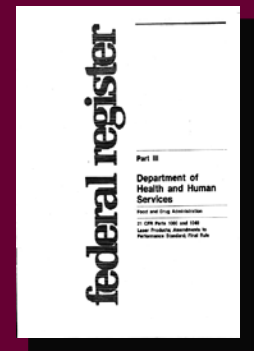
### ◆ Are You a Laser Product Manufacturer?



- Any electronic product that incorporates or is intended to incorporate a laser is a laser product
- Some exemptions can be claimed for truly “own use”

# Center for Devices and Radiological Health (CDRH)

- Agency within Food and Drug Administration (FDA)
- Federal Laser Product Performance Standard (FLPPS)
- Applies to laser product manufacturers and individuals modifying laser products other than the end user.
- Reference: 21 CFR Subchapter J
  - ◆ Parts 1040.10 and 1040.11: specific to lasers
  - ◆ Part 1010: general requirements



# *Industrial Laser Safety*

## *What*

- Product Requirements
  - ◆ 21 CFR -1000-1005, 1010, 1040
    - 21 CFR 1040.10 and .11
  - ◆ ANSI B11.21





# What

- Product Requirements

- ◆ **Laser Notices**

- **Laser Notice 50 (IEC 60825)**
- **Laser Notice 45 (International Labels)**
- **Laser Notice 37 (Walk-in Workstation)**
- **Laser Notice 39 (5-Axis machines)**

- ◆ **ANSI B11.21**

- **Management for all the standards**

# Industrial Laser Safety

## ● Walk-in Workstations.



# *Industrial Laser Safety*

## **21 CFR 1040.10**

### *. . . Certify & Report*

#### *Product meets the FLPPS*

- *Emission Indicator*
- *Key Control*

#### *Classification*

- *Product Labeling*
  - *Warning Logotype; aperture, Cert & ID*

## *Industrial Laser Safety*

### **21 CFR 1040.10**

*...in the protective housing of the product. Class I anywhere and everywhere the radiation is not necessary for the function of the product.*

- *Products made to the lowest class possible or justify the higher class*
- *Interlocked during operation*
- *if reasonable for a person to walk-in*

# *Industrial Laser Safety*

## *OSHA:*

- No Direct text
- Substantial practice in industry
- OSHA *Alliance* program
- Virtual force of law
  - ◆ ANSI Z 136 Series

# *Industrial Laser Safety*

## *OSHA:*

### *General Duty Clause*

- Section 5(a) of the Occupational Safety and Health Act of 1970 (enabling legislation)
- Requires employer to provide employees a place of employment safe from recognized hazards that may cause serious bodily injury or death.

# *Industrial Laser Safety*

## *OSHA:*

### *Essentially*

1. Appoint Laser Safety Officer
2. Establish Laser Classification
3. Evaluate Hazards by Determining
4. Define Control Measures
5. Authorize users
6. Perform period audits

# *Industrial Laser Safety*

## *OSHA: (ANSI)*

### *Essentially*

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# Industrial Laser Safety

## ● Walk-in Workstations.



# ***ANSI Z 136.1 Safe Use of Lasers***

## ***4. Define Control Measures***

### ***4.3.1.2 Walk-in Protective Housing (Embedded Class 3B or Class 4).***

***Class 1 lasers or laser systems which contain embedded Class 3B or Class 4 lasers with protective housings which are of sufficient size to allow personnel within the working space (walk-in protective housings) shall be provided with an area warning system (floor mats, IR sensors, etc.) which is activated upon entry by personnel into the protective housing. The sensors shall be designed to interlock with the laser power supply or laser beam shutter so as to prevent access to laser radiation above the applicable MPE. Only authorized personnel shall be provided means to override the sensors for alignment or testing procedures if beam access is required for beam diagnostic purposes. If overridden, an appropriate warning (light, electronic tone, etc.) shall be activated. All appropriate control measures shall be implemented within the enclosure during such testing periods (see Sections 4.3.1.1, 4.3.12 and 4.6).***

*Note: Engineering controls are preferred over administrative controls.*

# *Industrial Laser Safety*

## *OSHA: LSO*

### *Additionally*

**Provide laser safety consultative services**

**Maintain policies and procedures**

**Has authority to terminate operations if controls are inadequate**

**Maintains records**

**Inspects laser areas and accompanies regulatory inspectors**

**Investigates accidents**

**Approves laser operation**

**Appoints Deputy LSO (optional)**

**Appoints Laser Safety Committee (optional)**

*Industrial Laser Safety*

**ANSI Z 136.9** *Safe Use of Lasers*

*in a Manufacturing Environment*

**Essential elements from ANSI Z 136.1**

**Edited for more direction toward manufacturing concerns**

**(300 pages to 200 +)**

**Can stand alone (for most applications)**

# **21 CFR & ANSI Z 136**

**Different requirements for different responsibilities.**

product = engineering control

**Aim at the same result**

**In Industry, the LSO should be well versed in both**

*Note: Engineering controls are preferred over administrative controls.*