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MACHINE GUARDING

THE 7 QUESTIONS
everyone should ask

Our presentation will
begin shortly...

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MACHINE GUARDING

THE 7 QUESTIONS
everyone should ask

ICW Group Risk Management

Your Presenter

Rick Kropp

Sr. Risk Management Consultant

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Cost of Claims…

$60,000,000

Caught and struck by machinery claims cost last 6 years

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Injury Impact…

36%

Impacted productivity

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Days Loss...

38,000

Days, due to
machinery injuries

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OSHA Annual Stats

Amputations, lacerations, crushing injuries, abrasions

18,000

800 Deaths

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Topics

- About Machine “Safeguarding”
- 7 Questions You Should Ask
- Bonus Questions
- After Webinar Resources

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Safeguards prevent:

- Struck by work (kickback, flying chips)
- Struck by machinery (traverse motion)
- Struck due to failure (blade failure)
- Caught between/in (gears, conveyor belts)

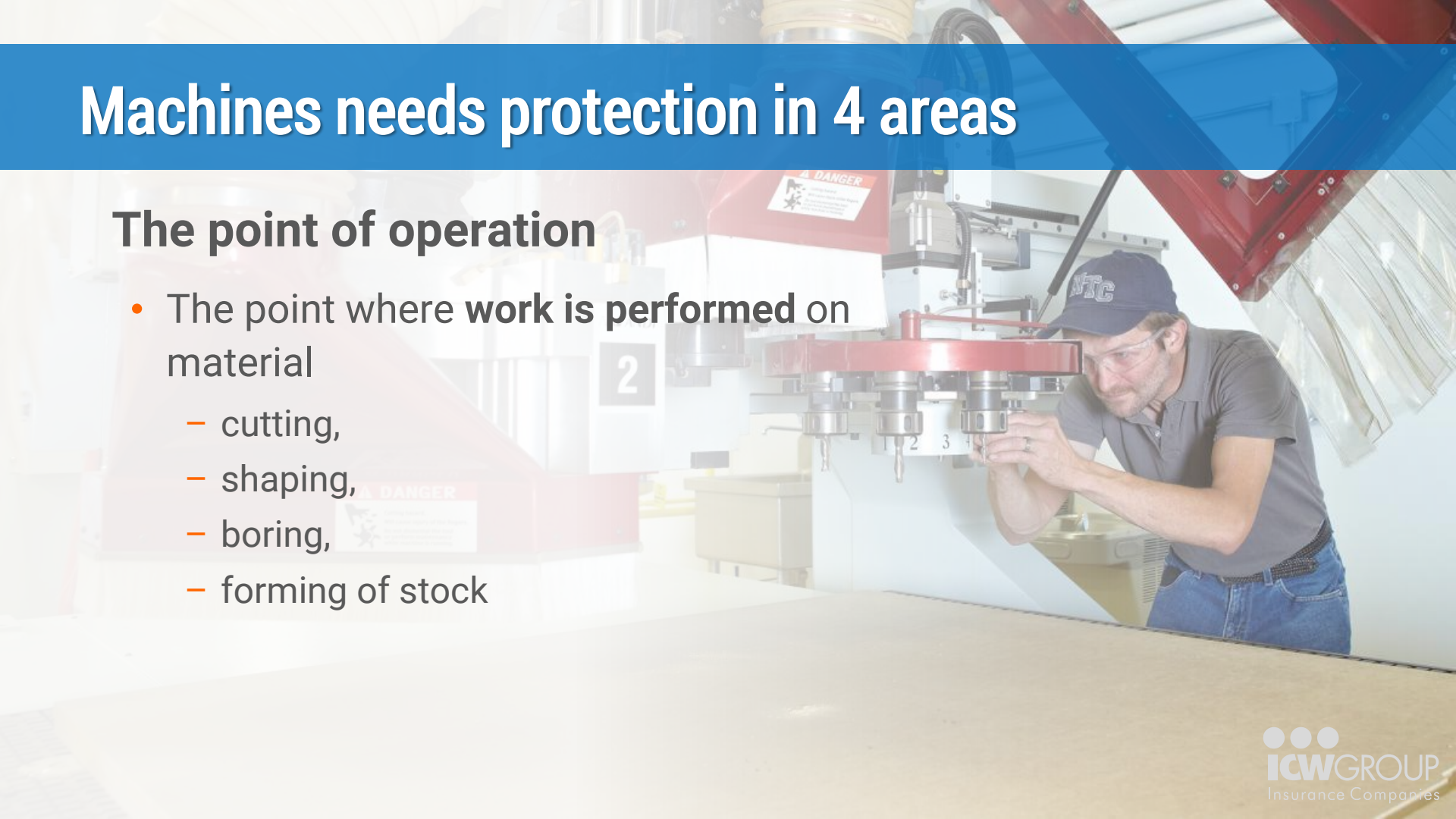
Machines needs protection in 4 areas

1. The point of operation
2. Power transmission apparatus
3. Other moving parts
4. Flying Chips and Sparks

Machines needs protection in 4 areas

The point of operation

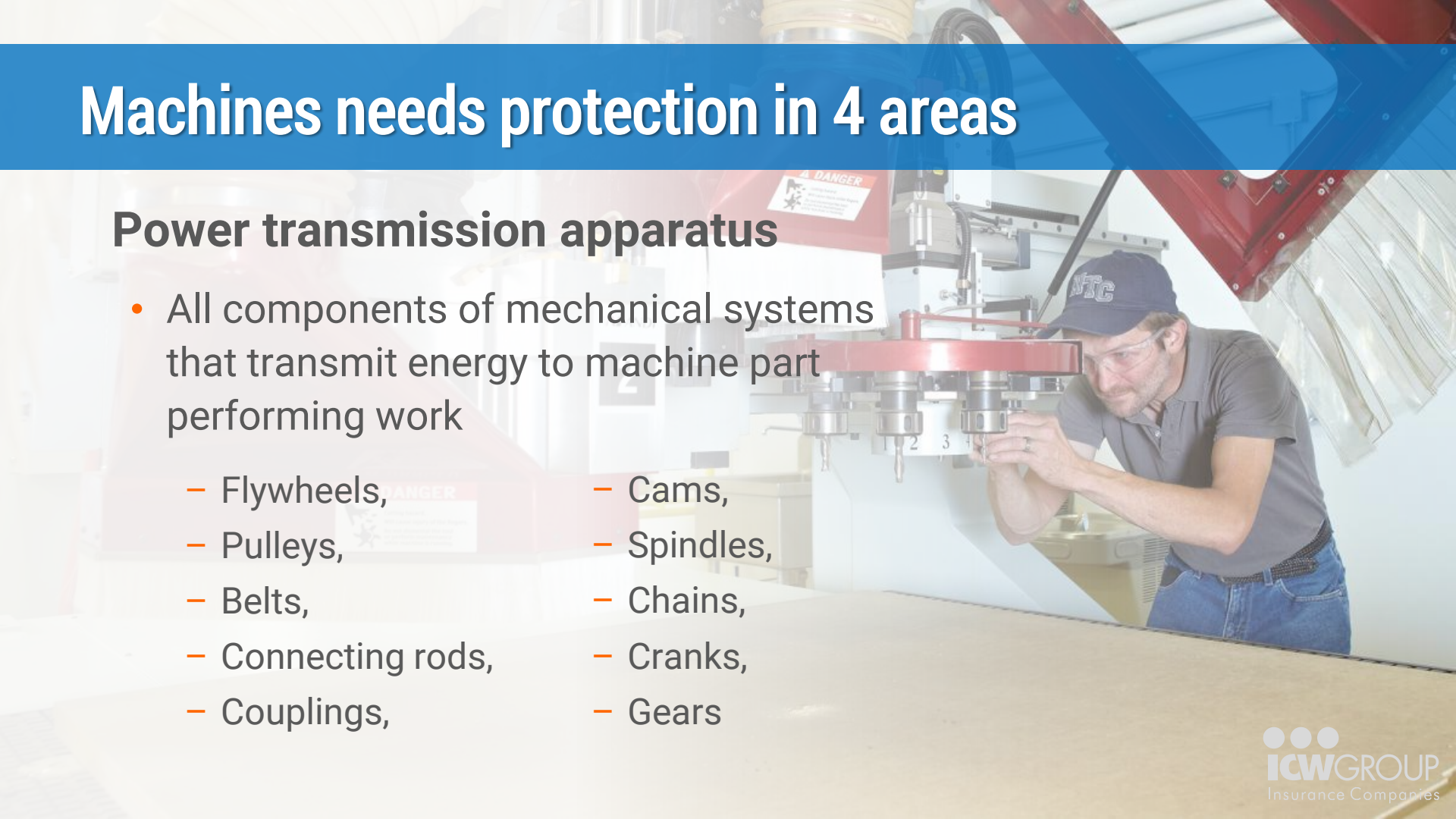
- The point where **work is performed** on material
  - cutting,
  - shaping,
  - boring,
  - forming of stock



Machines needs protection in 4 areas

Power transmission apparatus

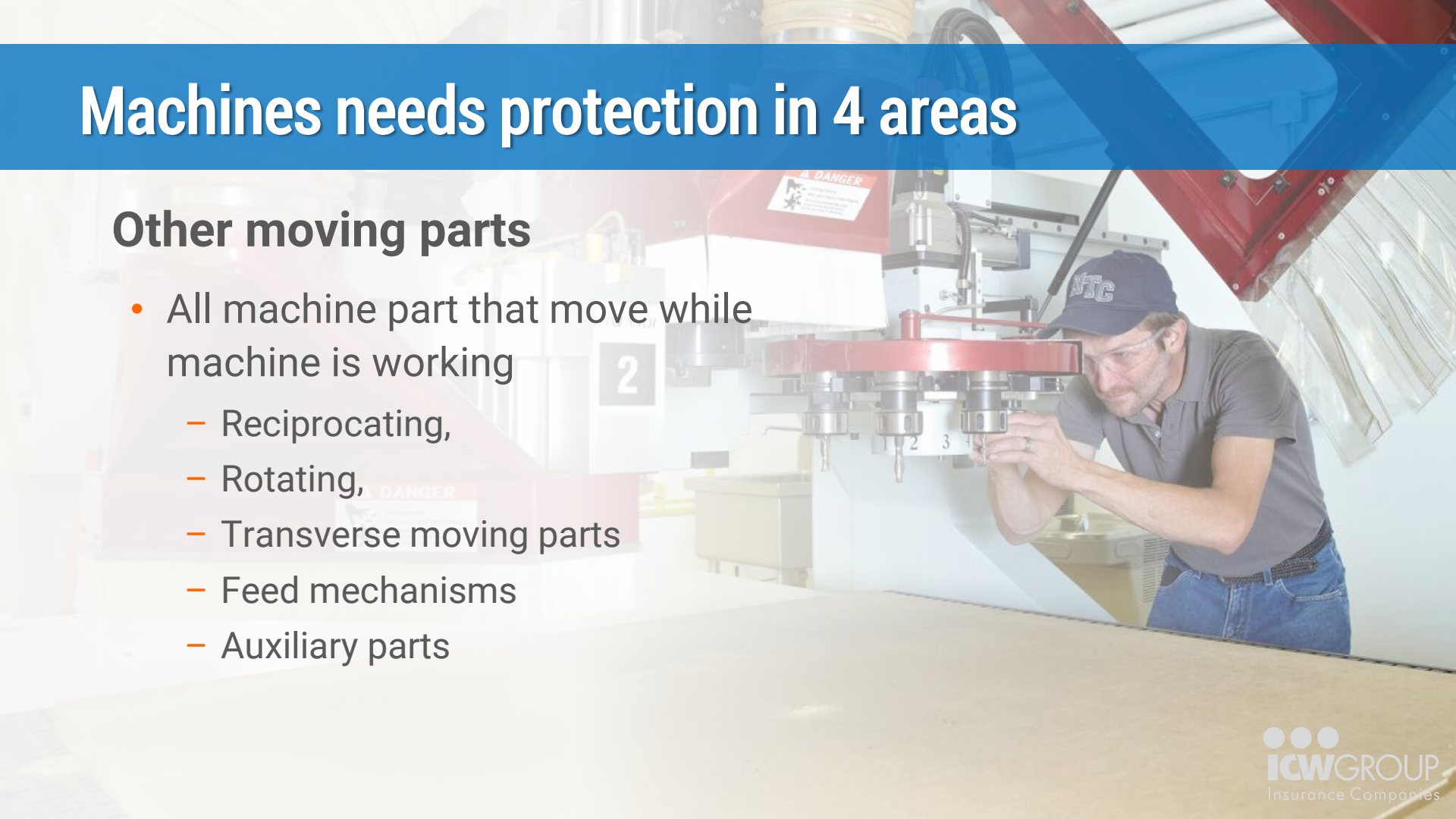
- All components of mechanical systems that transmit energy to machine part performing work
  - Flywheels,
  - Pulleys,
  - Belts,
  - Connecting rods,
  - Couplings,
  - Cams,
  - Spindles,
  - Chains,
  - Cranks,
  - Gears



Machines needs protection in 4 areas

Other moving parts

- All machine part that move while machine is working
  - Reciprocating,
  - Rotating,
  - Transverse moving parts
  - Feed mechanisms
  - Auxiliary parts



Machines needs protection in 4 areas

Flying chips and sparks

- Operators must be protected from being struck by all **product and materials** used in creating product

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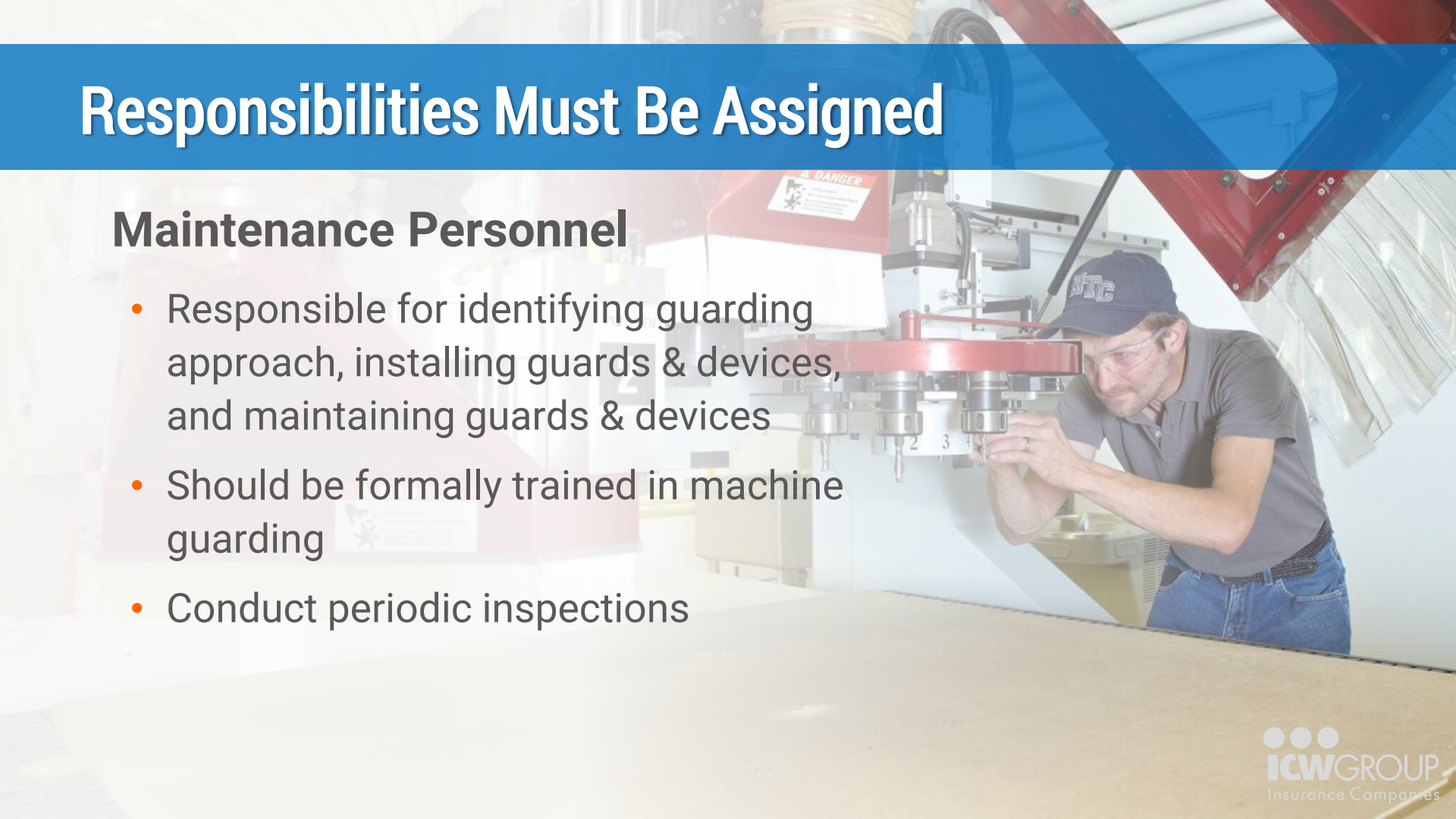
Responsibilities Must Be Assigned

Maintenance Personnel

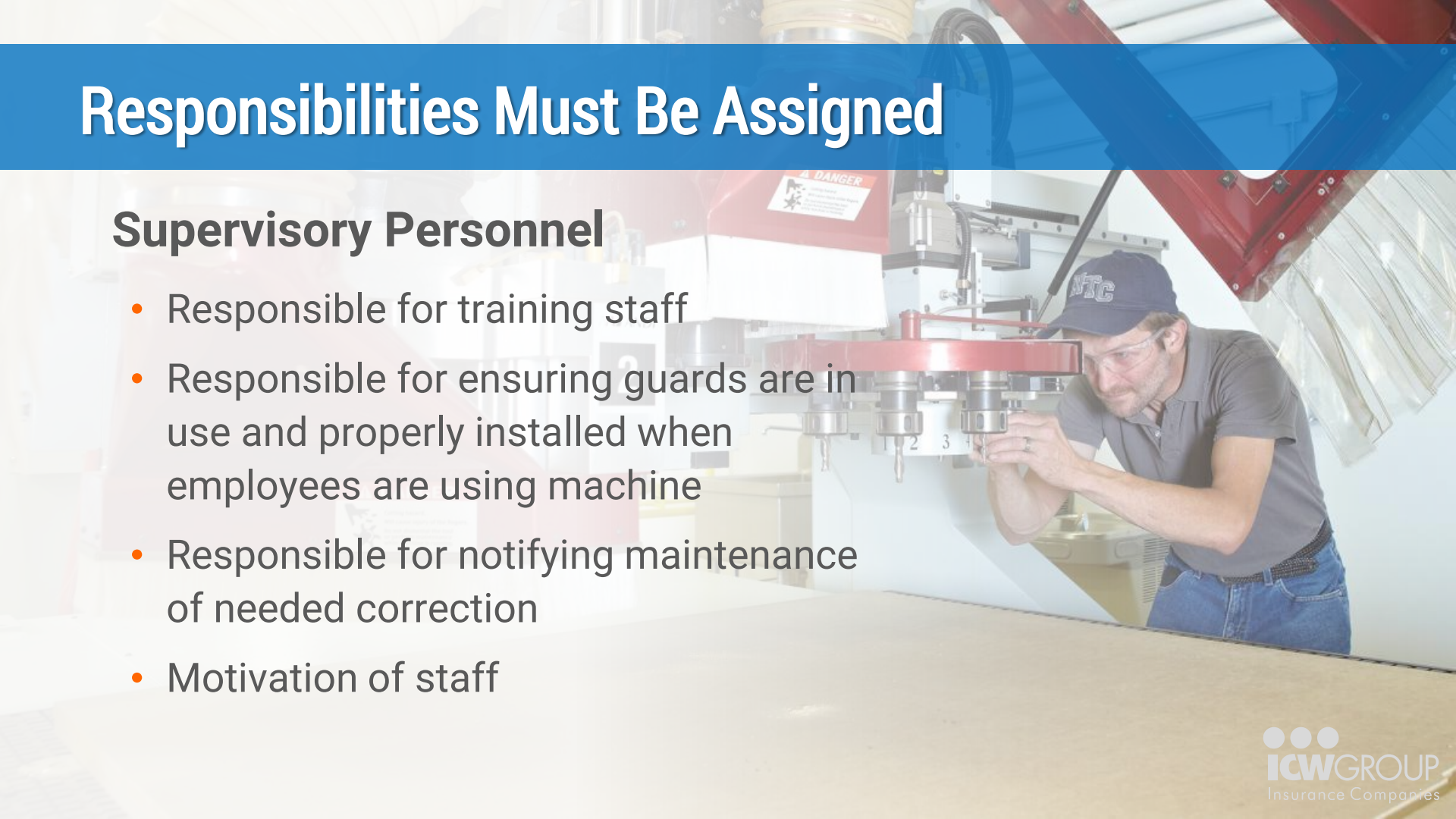
- Responsible for identifying guarding approach, installing guards & devices, and maintaining guards & devices
- Should be formally trained in machine guarding
- Conduct periodic inspections



Responsibilities Must Be Assigned

Supervisory Personnel

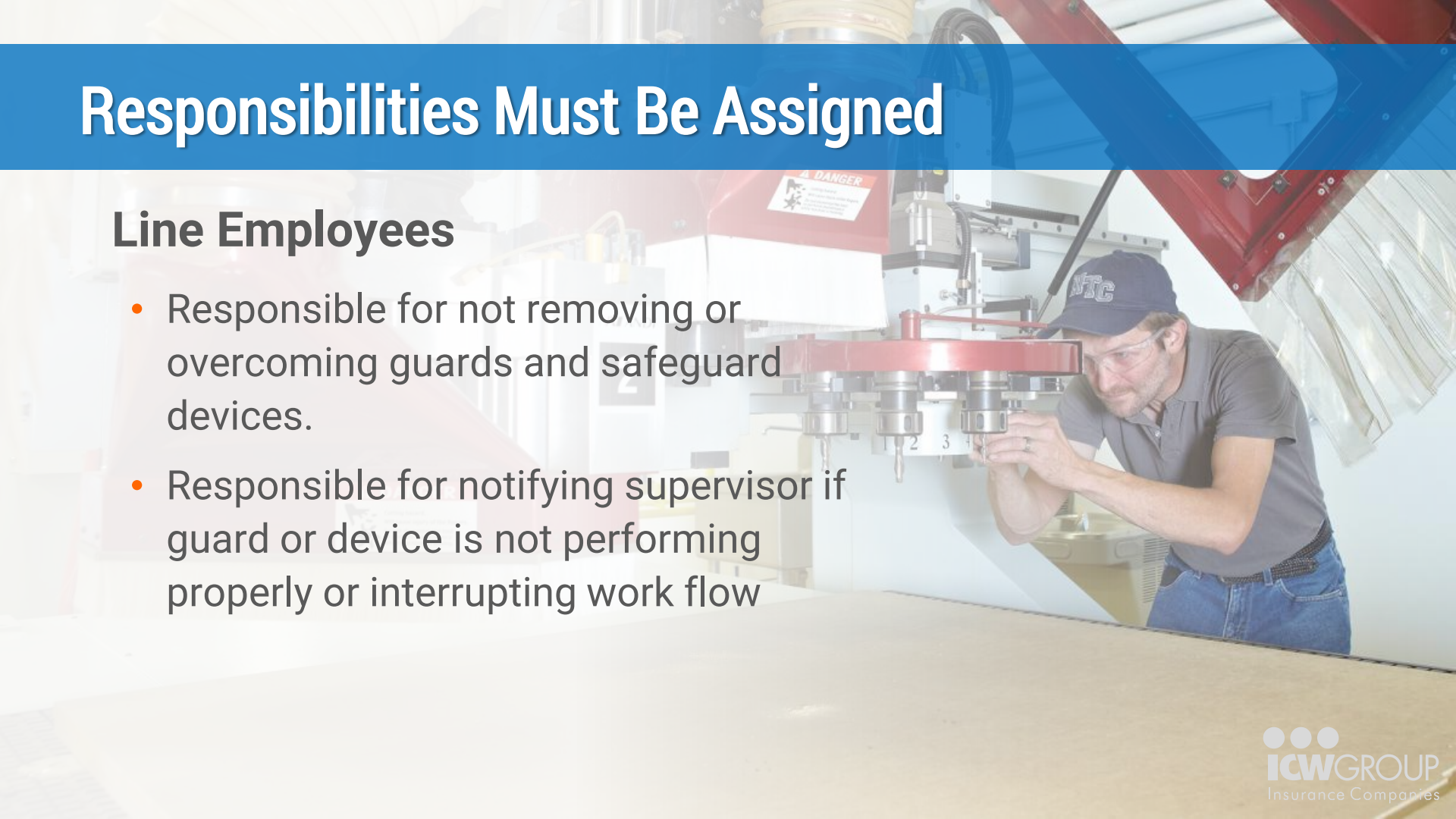
- Responsible for training staff
- Responsible for ensuring guards are in use and properly installed when employees are using machine
- Responsible for notifying maintenance of needed correction
- Motivation of staff



Responsibilities Must Be Assigned

Line Employees

- Responsible for not removing or overcoming guards and safeguard devices.
- Responsible for notifying supervisor if guard or device is not performing properly or interrupting work flow



Topics

- About Machine “Safeguarding”
- 7 Questions You Should Ask
- Bonus Questions
- After Webinar Resources

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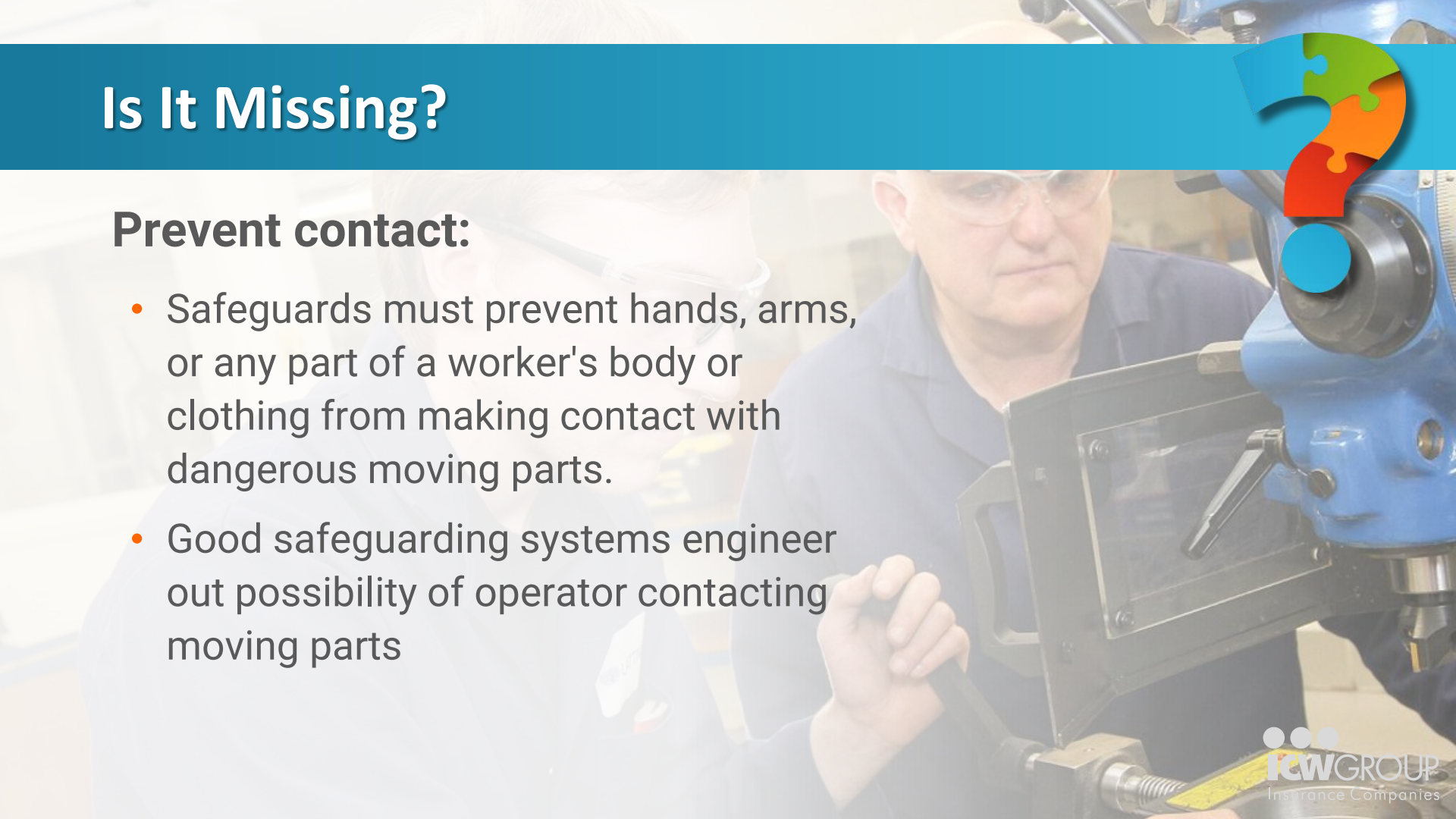
Is It Missing?



Prevent contact:

- Safeguards must prevent hands, arms, or any part of a worker's body or clothing from making contact with dangerous moving parts.
- Good safeguarding systems engineer out possibility of operator contacting moving parts

Is It Missing?

Primary Ways of Safeguarding

- Guards
- Devices
- By Distance/Location
- By Opening Size

Is It Missing?

Guards: Barriers against contact

Is It Missing?

Guards: Barriers against contact

- Fixed
- Adjustable
- Self Adjusting
- Interlocked

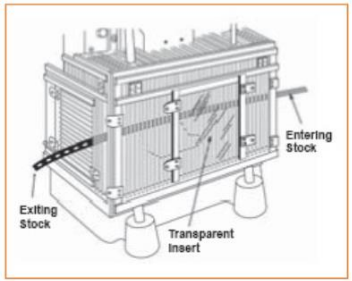


Figure 9. Fixed Guard on a Power Press

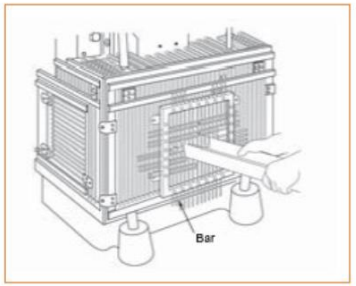


Figure 10. Power Press with Adjustable Barrier Guard

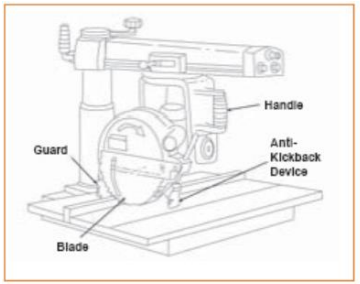
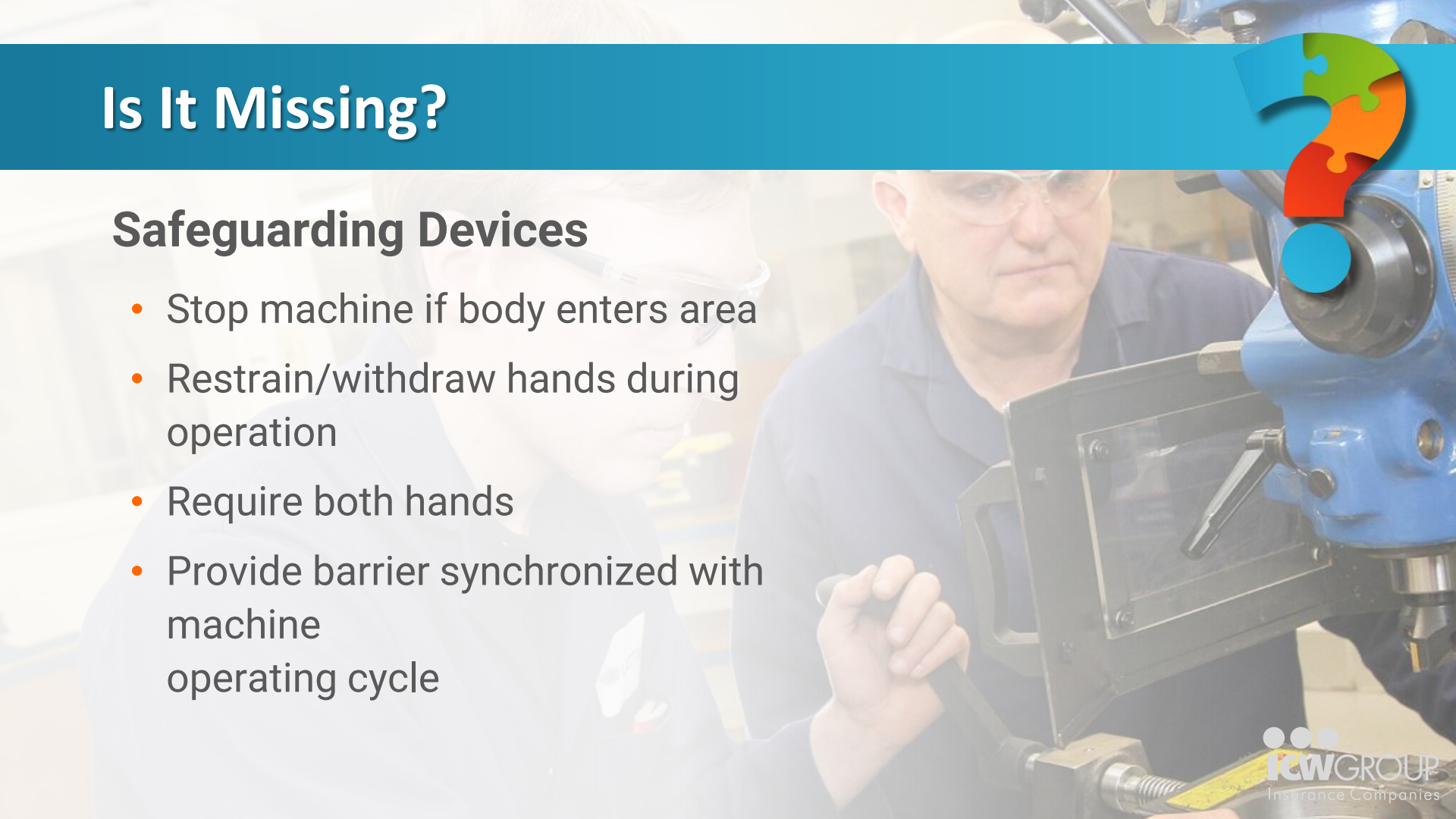


Figure 11. Self-Adjusting Guard on a Radial Saw

Is It Missing?



Safeguarding Devices

- Stop machine if body enters area
- Restrain/withdraw hands during operation
- Require both hands
- Provide barrier synchronized with machine
  operating cycle

Is It Missing?

Safeguarding by Location

Is It Missing?

Safeguarding by Location

- Control Station Distance
  - Operator sufficient distance from moving parts
- Height
  - Part more than 7 feet above floor
  - AND can't be accessed

It doesn't require a guard

Is It Missing?

Safe opening size

Safe?

Is It Missing?

Safe opening size

OSHA table 0-10

- Created in the 1940s
- Based on women's size 6 glove

Table O-10

[In inches]

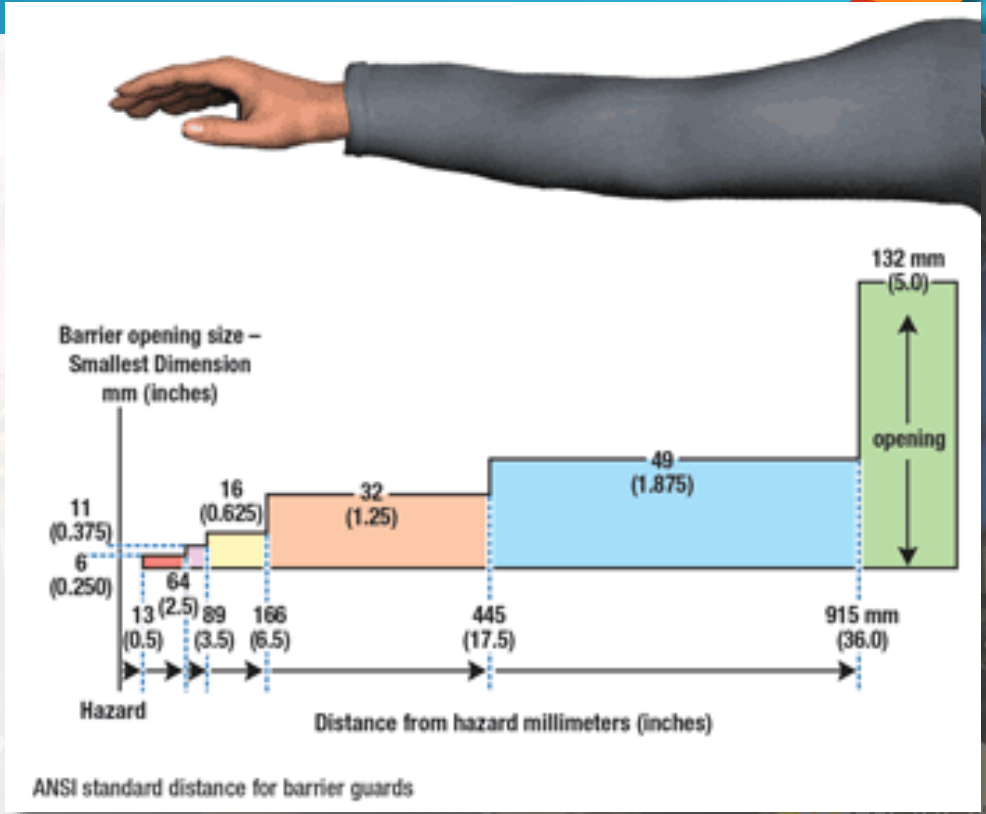
Distance of opening from point of operation hazard	Maximum width of opening
1/2 to 1 1/2	1/4
1 1/2 to 2 1/2	3/8
2 1/2 to 3 1/2	1/2
3 1/2 to 5 1/2	5/8
5 1/2 to 6 1/2	3/4
6 1/2 to 7 1/2	7/8
7 1/2 to 12 1/2	1 1/4
12 1/2 to 15 1/2	1 1/2
15 1/2 to 17 1/2	1 7/8
17 1/2 to 31 1/2	2 1/8

This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings.

Is It Missing?

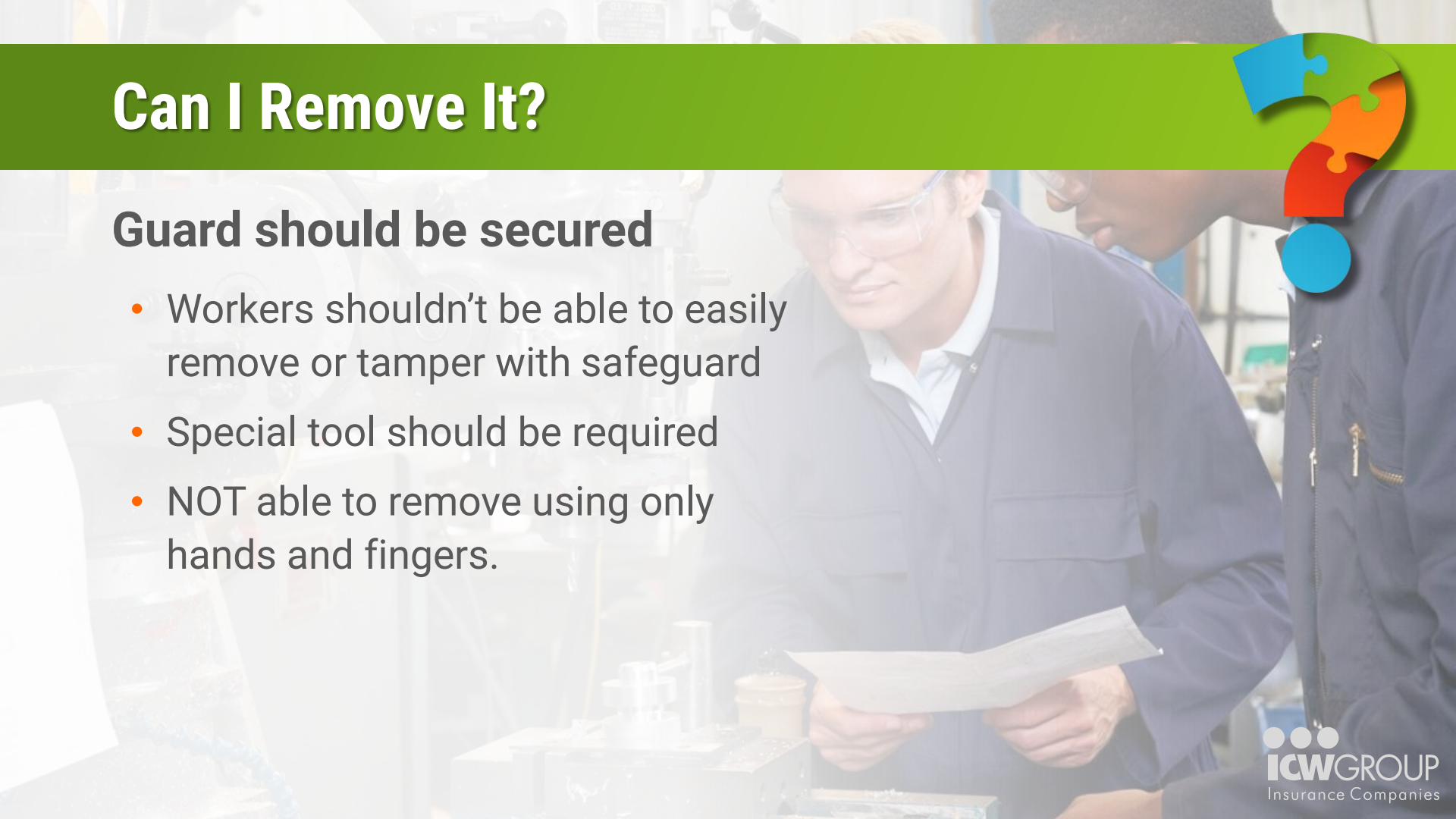
Safe opening size

- 1996 ANSI standard created for smaller hand
- OSHA still uses their distances for citations



ANSI standard distance for barrier guards

Can I Remove It?



Guard should be secured

- Workers shouldn’t be able to easily remove or tamper with safeguard
- Special tool should be required
- NOT able to remove using only hands and fingers.

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Can I Drop Stuff Through It?

Protect from falling objects:

- Ensure nothing falls into moving parts
  - Even a small tool dropped into cycling machine can become deadly projectile!
- Is a work platform above machine?

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Can I Hurt Myself On It?

A safeguard shouldn’t be a hazard!

- Defeats its own purpose if it creates a hazard
  - shear point,
  - jagged edge
  - unfinished surface

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Can I Hurt Myself On It?

A safeguard shouldn't be a hazard!

- Material guard is made of may deteriorate over time.
- If it cracks
  - Could strike workers
  - Allow product to strike workers

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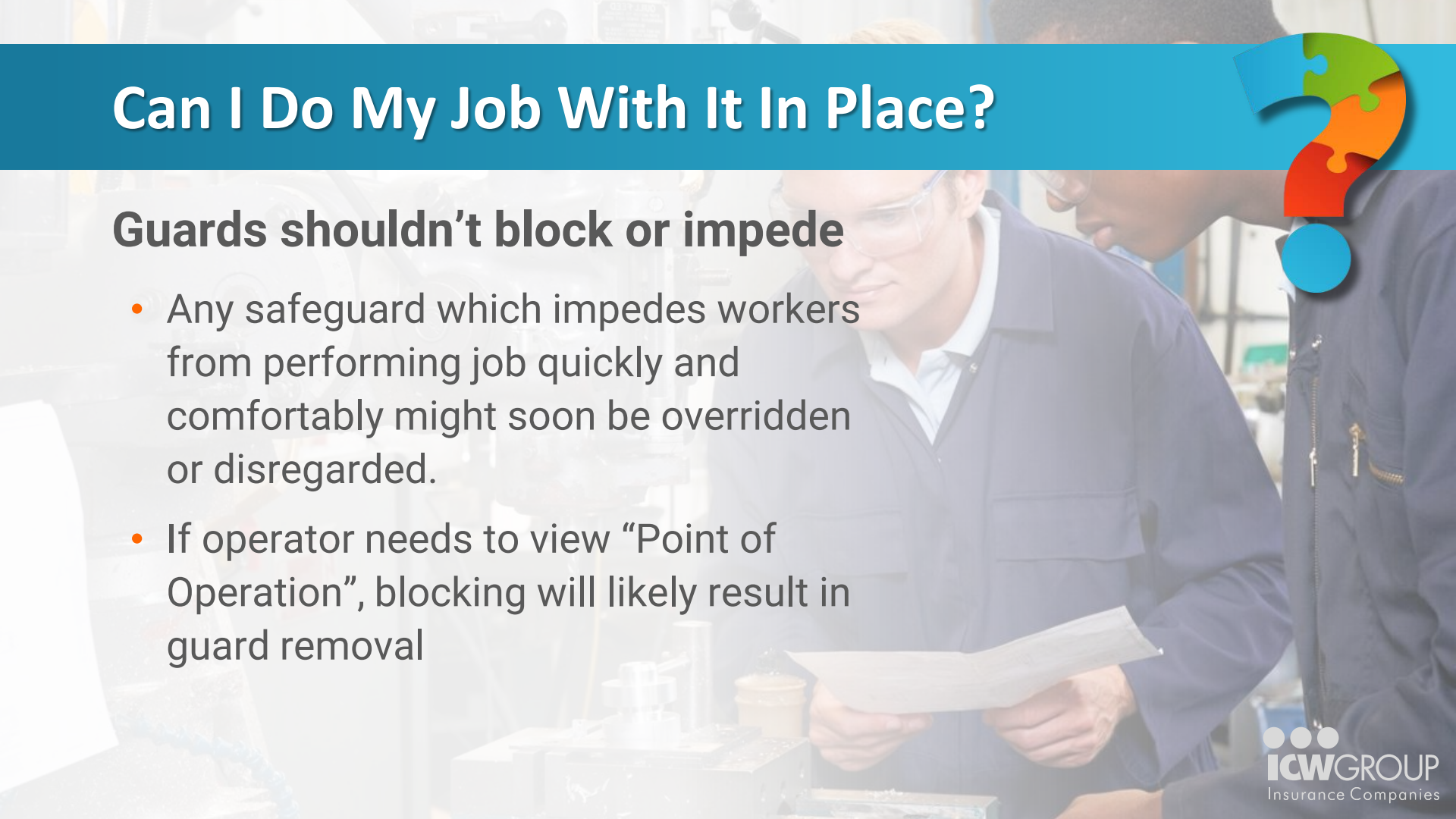
Can I Do My Job With It In Place?



Guards shouldn’t block or impede

- Any safeguard which impedes workers from performing job quickly and comfortably might soon be overridden or disregarded.
- If operator needs to view “Point of Operation”, blocking will likely result in guard removal

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Can I Do My Job With It In Place?

Example

- “Device” controls entry into danger area
- But with new technology, devices like pull backs are often just source of interference

Do I Have To Remove It For Maintenance?

Allow safe daily maintenance and lubrication

- If possible, maintenance should be possible without removing safeguards
- Locating oil reservoirs outside guards, with line leading to lubrication point, reduces need to enter hazard area

Can I Outsmart It?

Not be easily bypassed

- Shouldn't be able to override interlocks

If you can "GRAB" it - STOP!

Get over it

Reach through it

go **A**round or

Below it

Can I Outsmart It?

Interlock Guards

Can I Outsmart It?

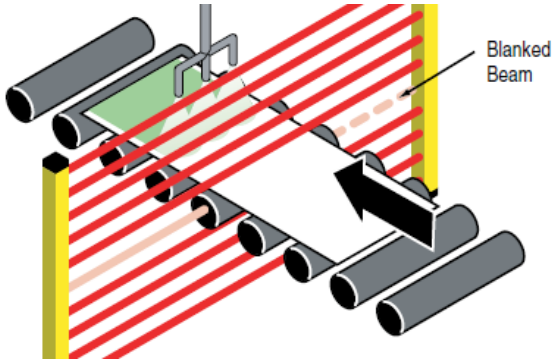
Interlock Guards

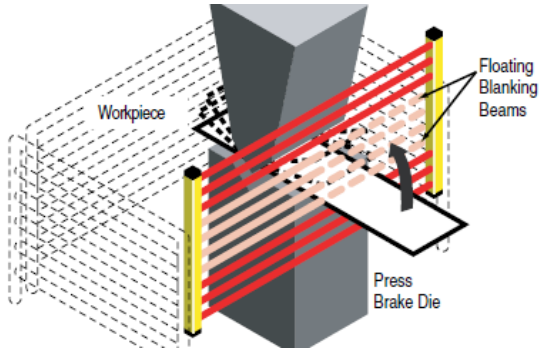
- Drawback of interlocks - they can be defeated
- Are interlocks working as expected?
- Installed by qualified person

Can I Outsmart It?

PSD – Presence Sensing Device

- Light curtains only need to be active during hazardous times
  - Muting = shutting off light curtain during non-hazardous cycle time
  - Blanking = blocking off portion of light curtain so areas don't emit or receive light
  - Must be small enough so hands and arms can't get through





Topics

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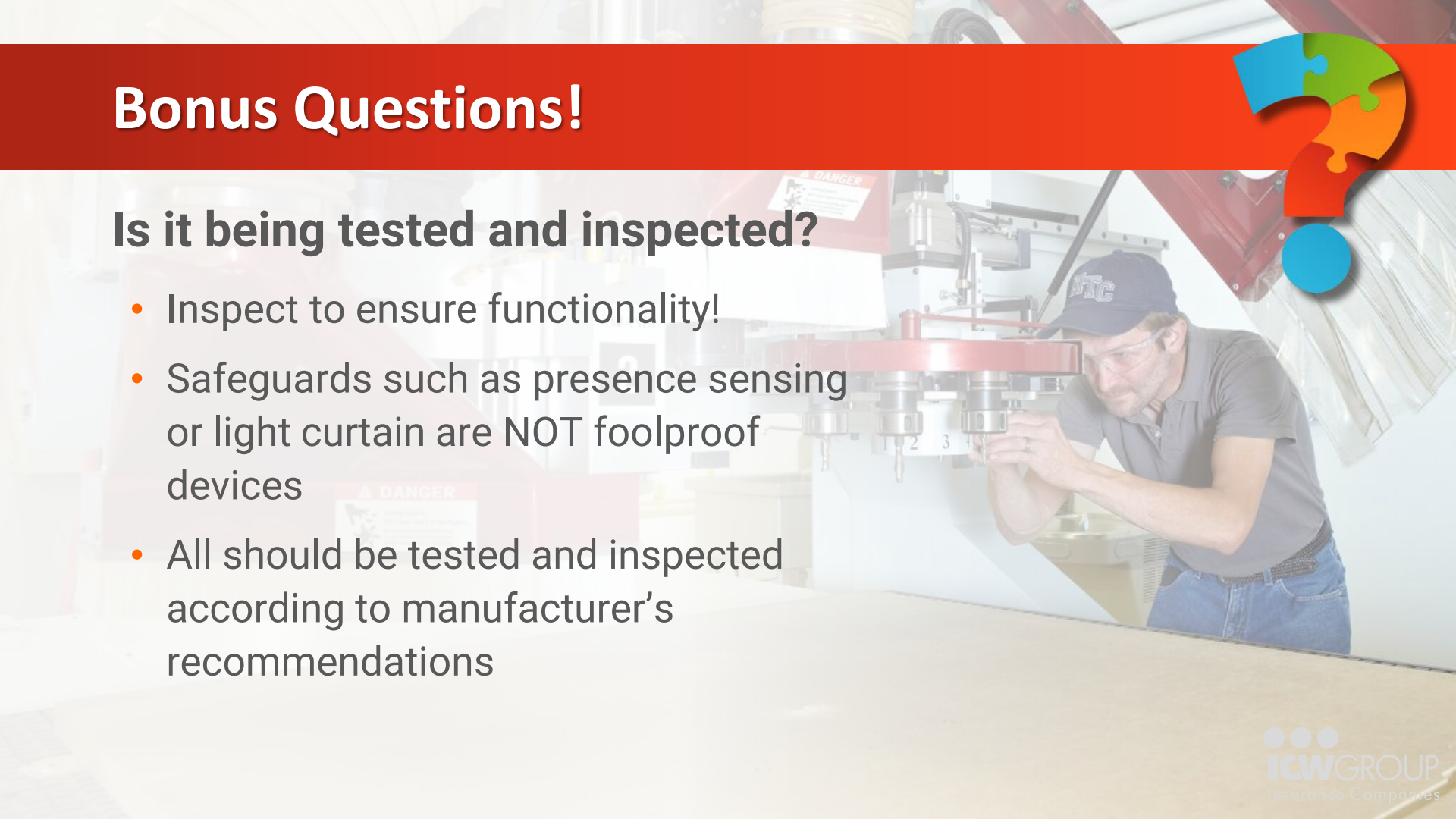
Bonus Questions!

Is it being tested and inspected?

- Inspect to ensure functionality!
- Safeguards such as presence sensing or light curtain are NOT foolproof devices
- All should be tested and inspected according to manufacturer's recommendations



Bonus Questions!

Is it being tested and inspected?

- Light curtains must be mounted and programmed properly!

When was the last time they were tested?
How did you determined where to mount curtain?

Bonus Questions!

Is it being tested and inspected?

- Light curtains must be mounted and programmed properly!

General rule: Safety Light Curtains should never be mounted closer than **6 inches** from point of operation or pinch point hazard.

Bonus Questions!

Is it being tested and inspected?

- Light curtains must be mounted and programmed properly

How will you know if an employees breaks light curtain with their hand, that machine will stop before their hand gets to danger point?

Bonus Questions!

Is it being tested and inspected?

- When determining safety distance, portable or built-in stop-time measuring unit must be used to check machine stopping time (Ts)

Bonus Questions!

Is it being tested and inspected?

- The OSHA “CFR Subpart O 1910.217” safety distance formula:

$$D_s = 63 \times T_s$$

- **63** - OSHA recommended hand speed constant in inches per second
- **T_s** - Total stop time of all devices in safety circuit
  Must include response times of all devices

Bonus Questions!

Is the machine vetted for safety initially?

- Formal review process for new equipment
- Safety should be part of the discussion early on
- The safety committee can provide valuable insight

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Bonus Questions!

Is the machine vetted for safety initially?

grand·fa·ther clause
ˈgran(d)fäTHərˌklôz/
*noun*North American *informal*
1.a clause exempting certain classes of people or things from the requirements of a piece of legislation affecting their previous rights, privileges, or practices.

Conduct a Risk Assessment

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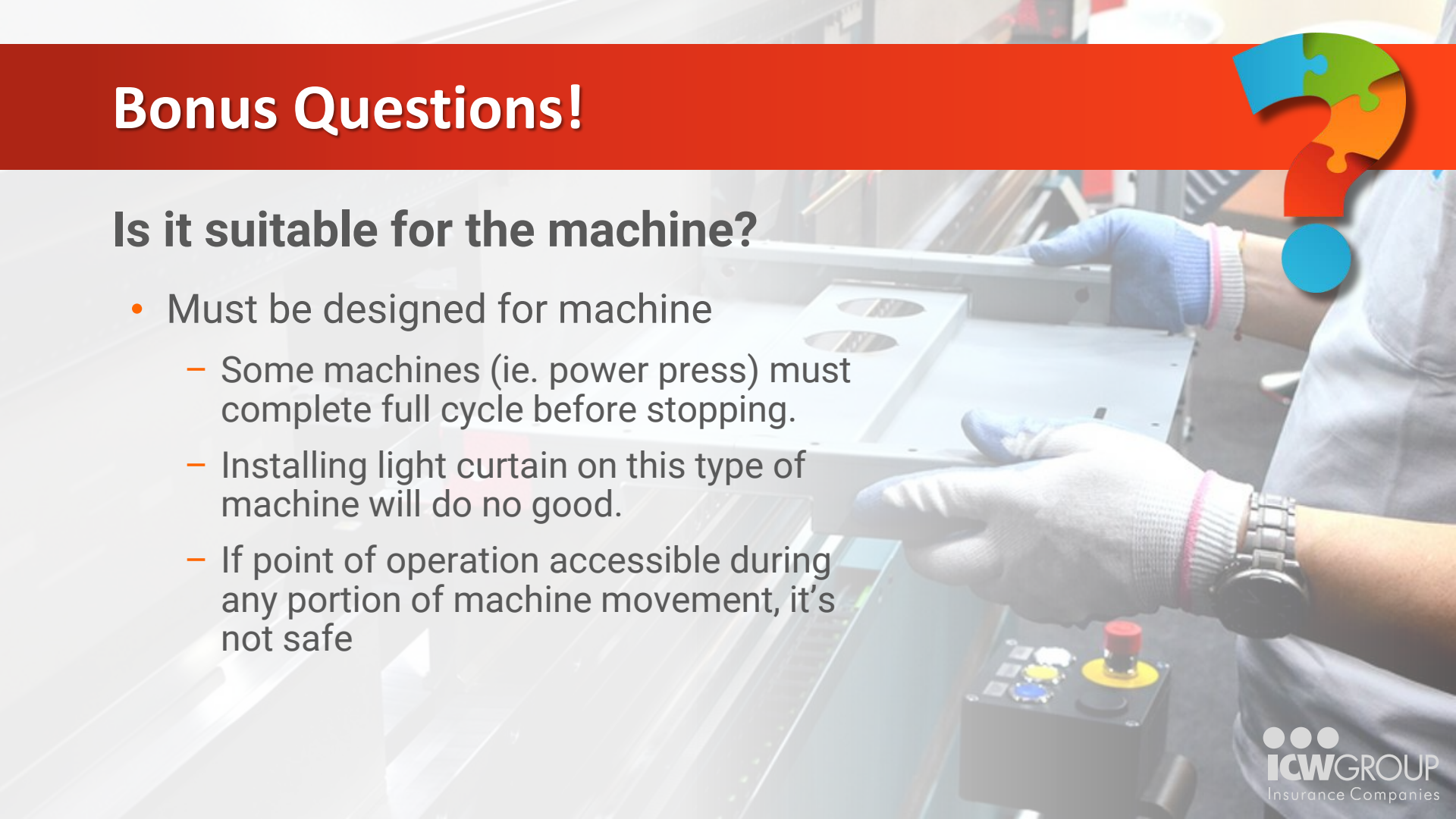
Bonus Questions!

Is it suitable for the machine?

- Must be designed for machine
  - Some machines (ie. power press) must complete full cycle before stopping.
  - Installing light curtain on this type of machine will do no good.
  - If point of operation accessible during any portion of machine movement, it's not safe



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Bonus Questions!

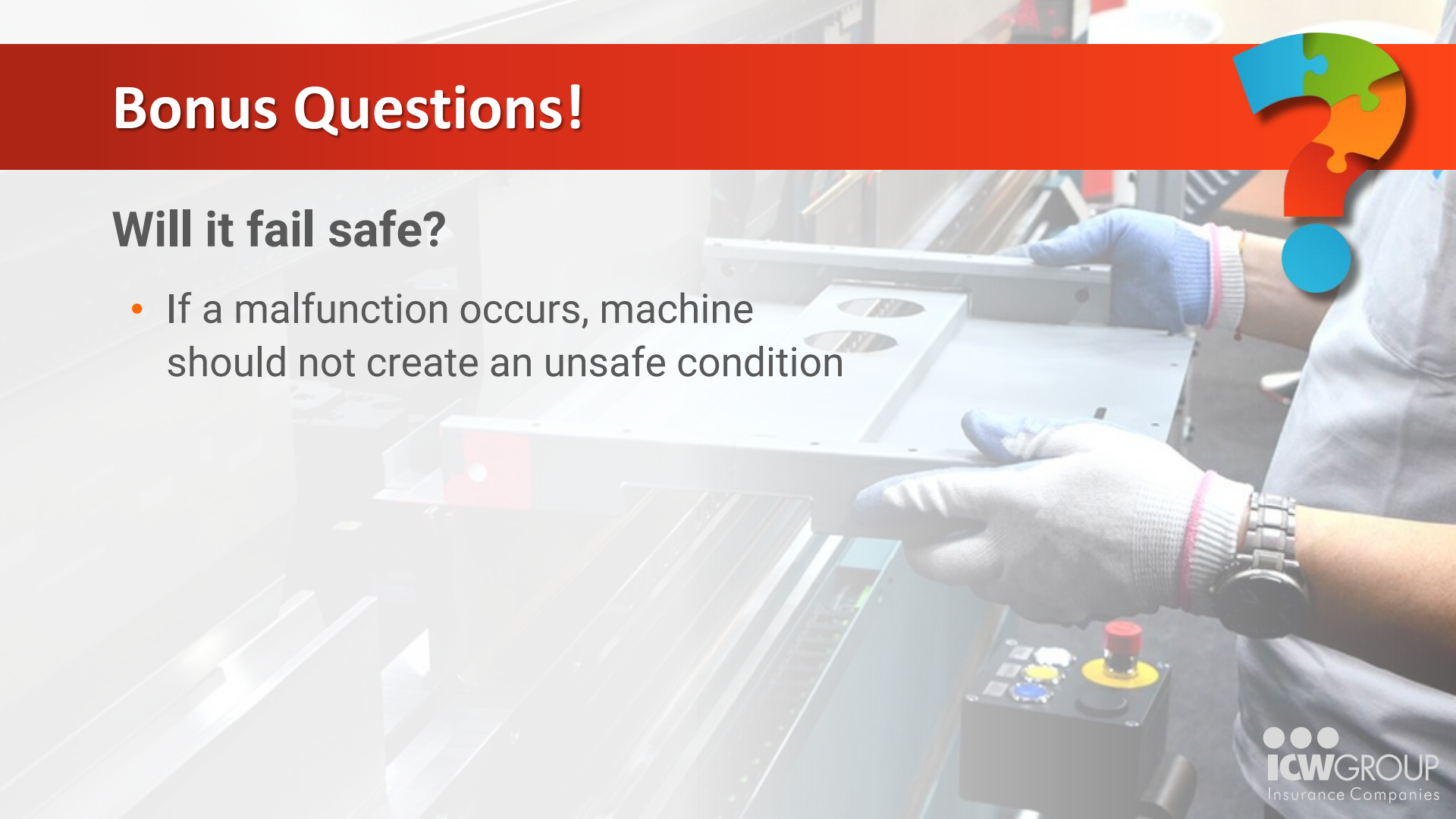
Is it suitable for the machine?

- Two hand controls/trips require
  - Constant, concurrent pressure by the operator to activate the machine
  - Concurrent application of both control buttons to activate machine cycle, after which hands are free

Bonus Questions!

Will it fail safe?

- If a malfunction occurs, machine should not create an unsafe condition



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Bonus Questions!

Will it fail safe?

- Control Reliability - **OSHA 1910.211**
  - Fault occurring inside system doesn't prevent activating normal stop process
  - Another machine cycle can't be executed before fault is removed
  - Fault can be revealed by simple test, or displayed by control system.

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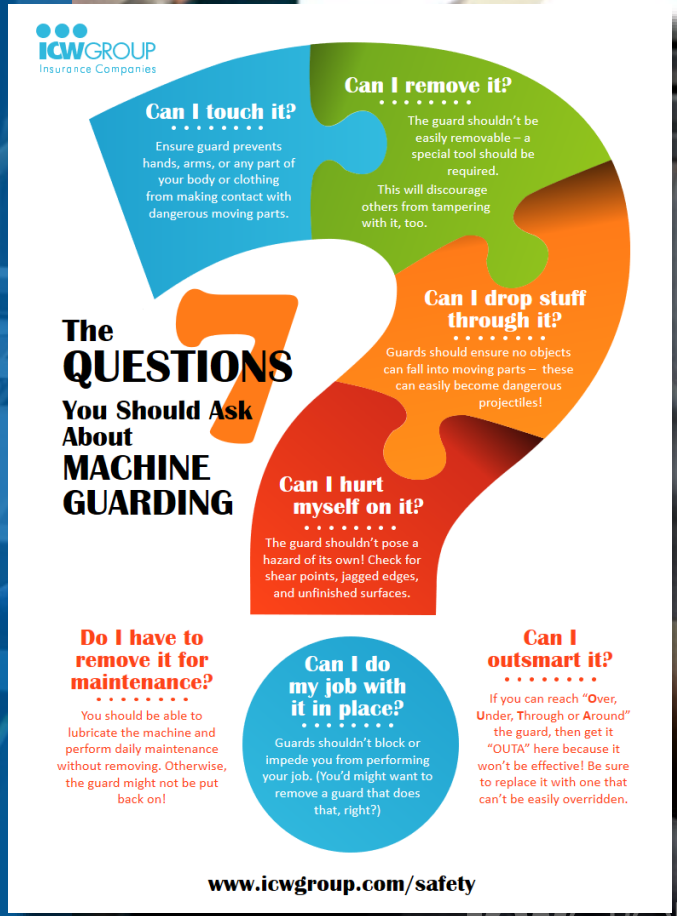

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ICW Group Policyholder Website!

icwgroup.com/safety

- Safety and Risk Management area!

- Safety Webinars
- RTW Materials

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ICW Group Policyholder Website!

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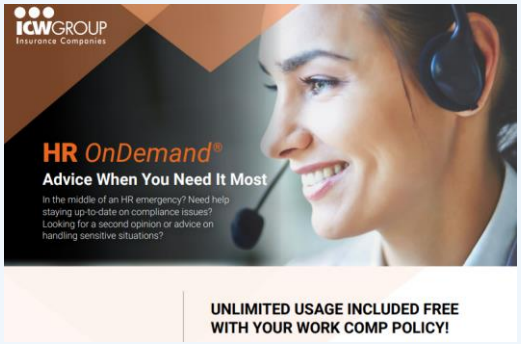
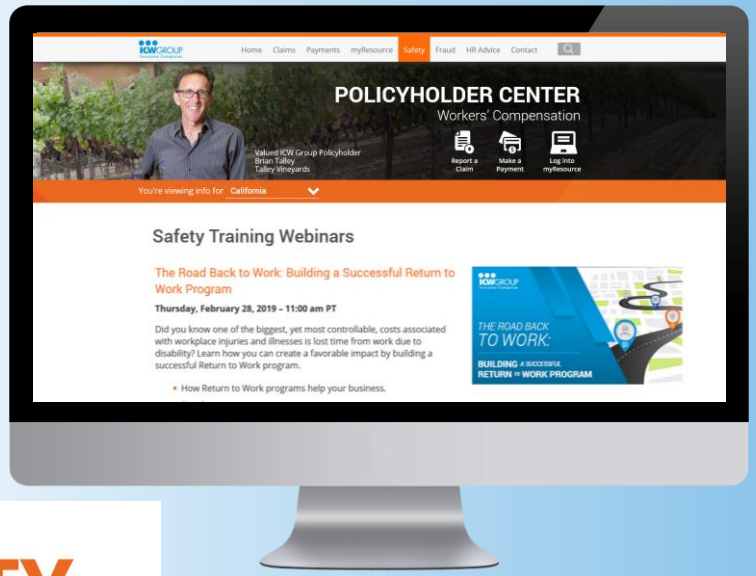
- HR OnDemand
- Safety OnDemand





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QUESTIONS?

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THANK YOU!