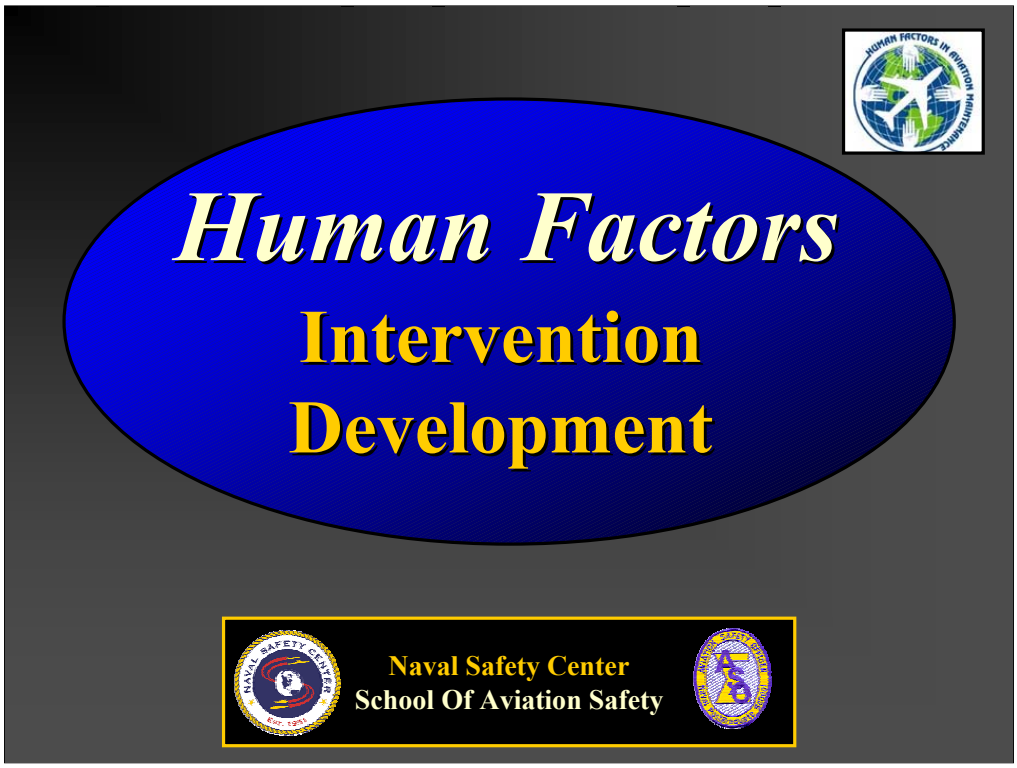
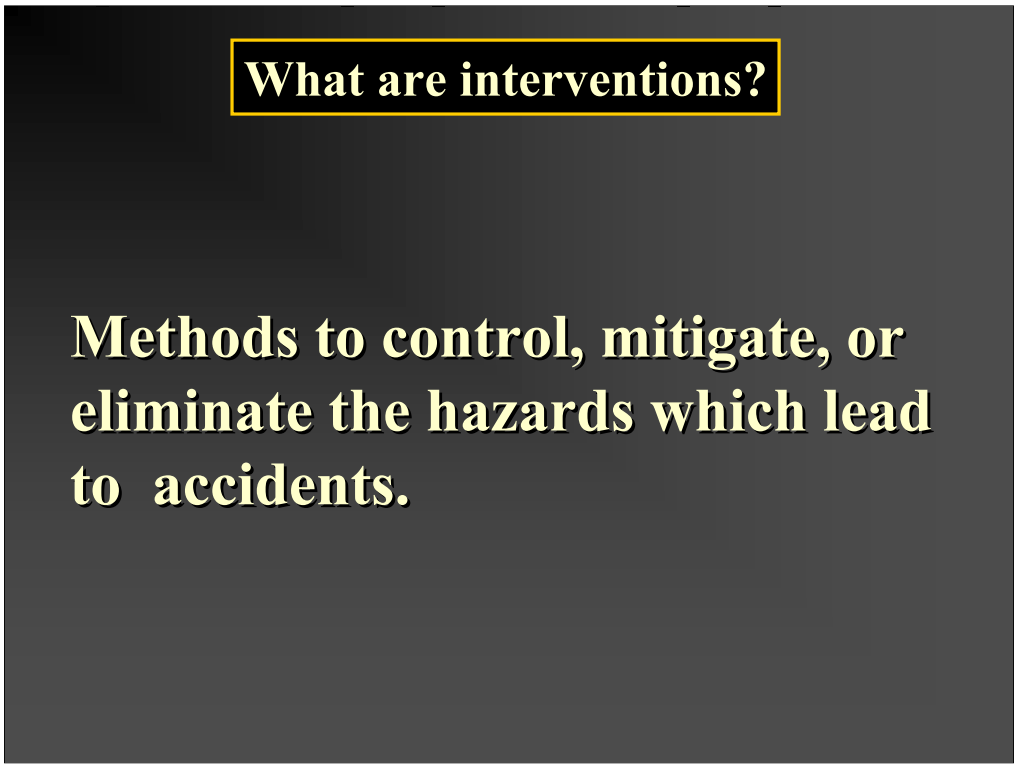


Presentation Time: Approximately 0.5 hr.

Welcome to this presentation on Aviation Maintenance Human Factors Intervention Development. The purpose of this training is to provide managers, investigators, and other safety personnel with preferred methods to formulate effective organizational strategies based upon Error Prevention and Performance Enhancement.



What are interventions?

Methods to control, mitigate, or eliminate the hazards which lead to accidents.

Intervention Strategies

Error Prevention

Reduce, and hopefully eliminate, the possibility of a human error from occurring

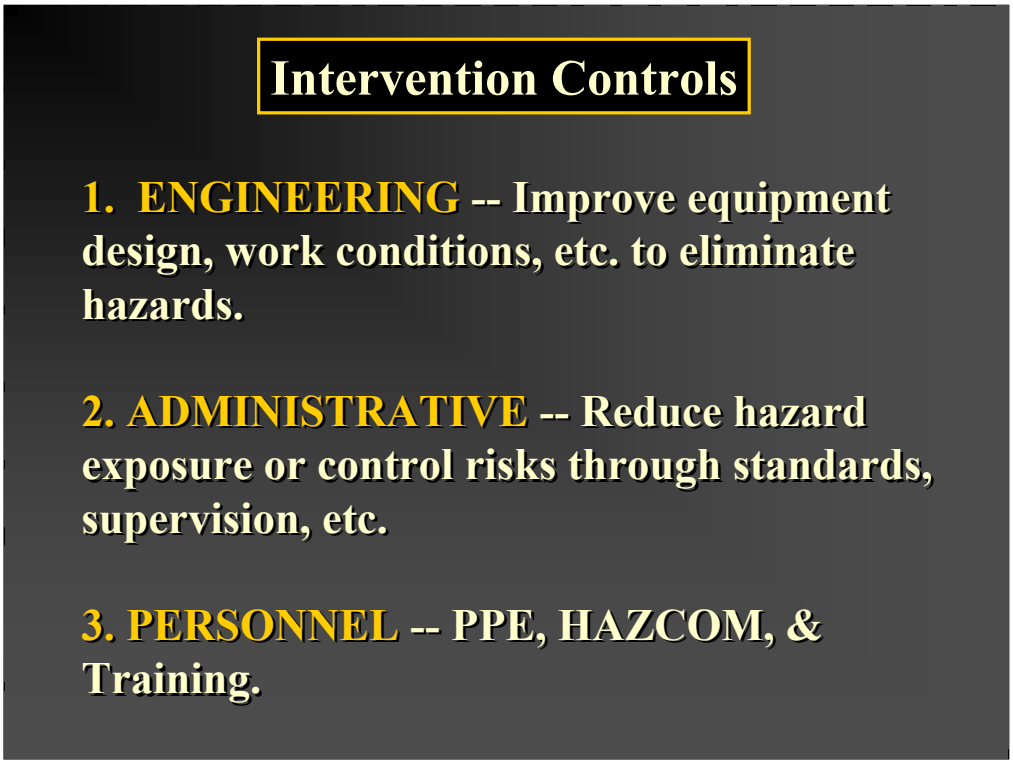
Performance Enhancement

Increase an individual's capacity to perform a given task or operation

There are two main types of intervention strategies:

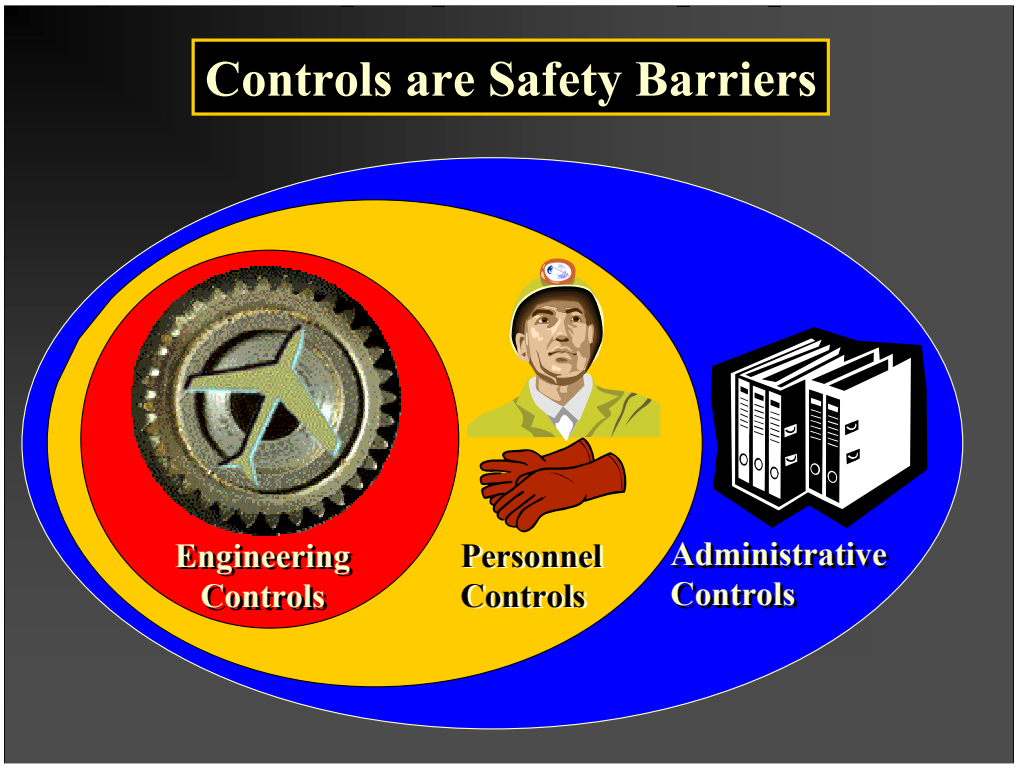
Error prevention: where the objective is to reduce and hopefully eliminate the possibility of a human error from occurring (i.e., safety interlocks, tagging parts).

Performance enhancement: where the goal is to increase an individual's capacity to perform the mission at hand (i.e., pneumatic tools, computer analysis, high-tech measuring equipment).



To Prevent Errors and Improve Performance, we can choose from three major types of Intervention Controls:

1. **Engineering** - Improve equipment design, work conditions, etc. to eliminate hazards.
2. **Administrative** - Reduce hazard exposure or control risks through standards, supervision, etc.
3. **Personnel** - PPE, HAZCOM, & Training.



These Intervention Controls are essentially three levels of barriers:

Engineering - failsafe systems, design for maintainability, "one way" installation components, etc.

Administrative - policy, procedures

Personnel (was Personal) - was initially set up for PPE (personal protective equip)…now includes handling human error (controls/skills).

Despite our best efforts:

It is impossible to engineer every hazard out (though designs are consistently improved).

Examples: Recalls, New and Improved Models, Hazard Bulletins

Policies are also imperfect.

Examples: Manual updates, Changing Organizational Structure and Policies, Equipment Modifications

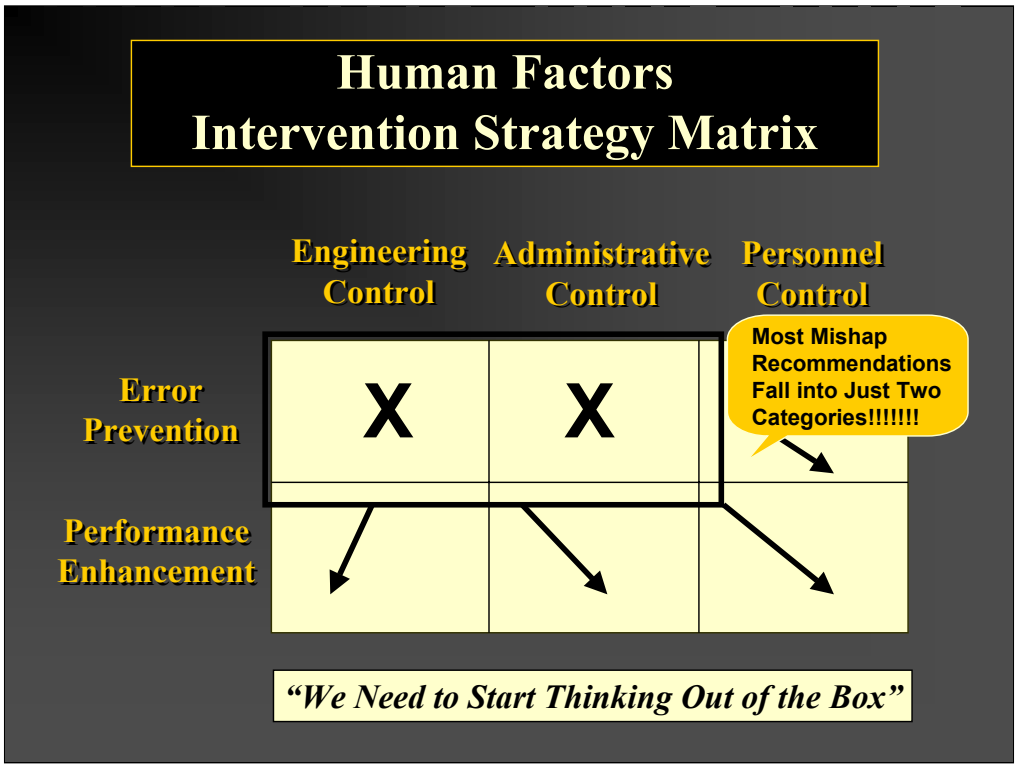
Program or individual shortfalls in training, nutrition, health, professional development.

Examples: Failure to adhere to training --I can train you in GCT (an Administrative Control), but YOU must be assertive, etc. (Personnel Control)

(go to next slide)

Interventions and Controls may fail, because they are not appropriate, not supported, not feasible, or eventually ignored.

- Control is inappropriate
- It is misunderstood
- Operators may dislike it
- Supervisors may dislike it
- It turns out to be too costly
- Overcome by other priorities
- Not monitored for effectiveness



The Human Factors Intervention Strategy Matrix encourages improvements in our choices of corrective interventions.

Let us take a moment to review the Matrix categories.

It incorporates the two main types of intervention strategies :

- **Error Prevention** where the objective is to reduce and hopefully eliminate the possibility of a human error from occurring (i.e., safety interlocks).
- **Performance Enhancement** where the goal is to increase an individual's capacity to perform the mission at hand (i.e., pneumatic tools, computer analysis).

As well as, the three types of Controls:

- **Engineering Controls** a "hardware solution is developed to prevent error (i.e., one use tools, safety interlocks) and/or enhance performance (i.e., ramp use radios, mobile analysis equipment, modular components).
- **Administrative Controls** policies & programs in which an administrative process is instituted to prevent error (i.e., minimal training/qualifications) and/or enhance performance (i.e., workday/shift restrictions).
- **Personnel Controls** an individual action is taken to prevent error (i.e., reviewing maintenance reports) and/or enhance performance (i.e., extra training).

In the past, most recommendations have focused on only two of the categories! It is time to start thinking outside of the box!!

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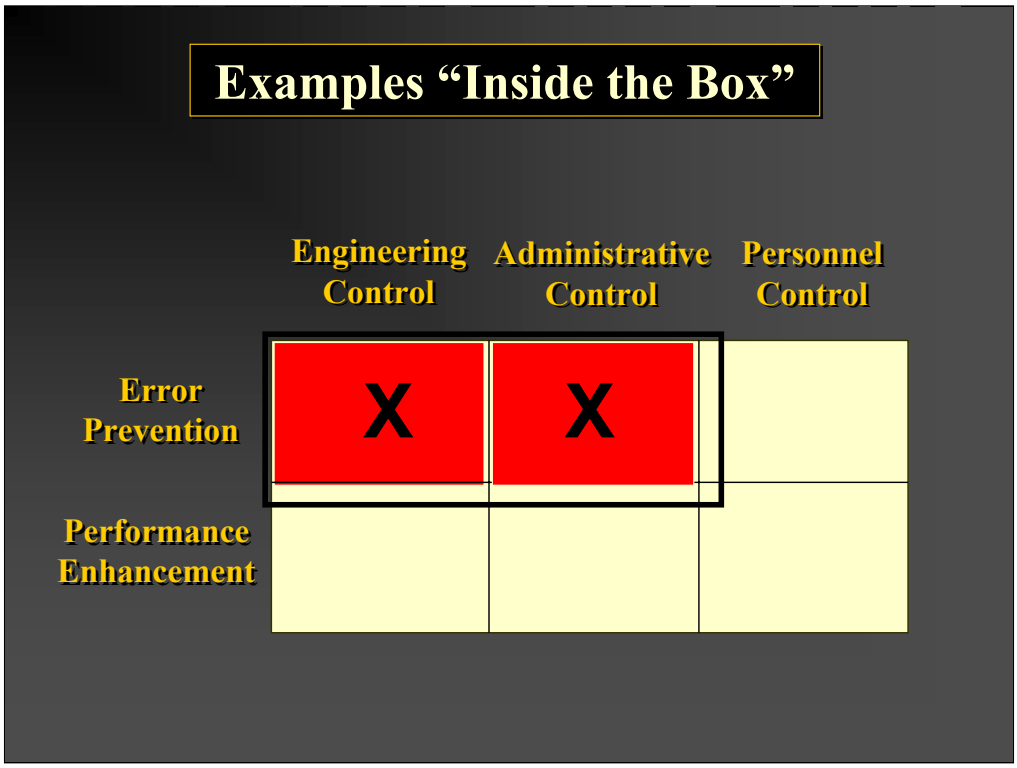


Some examples from "INSIDE the Box" ….

Safety recommendations tend to center on making the equipment safer to use, to the point of being "fail-safe", so that it protects itself (and personnel) in cases of inexperienced use or blatant abuse.

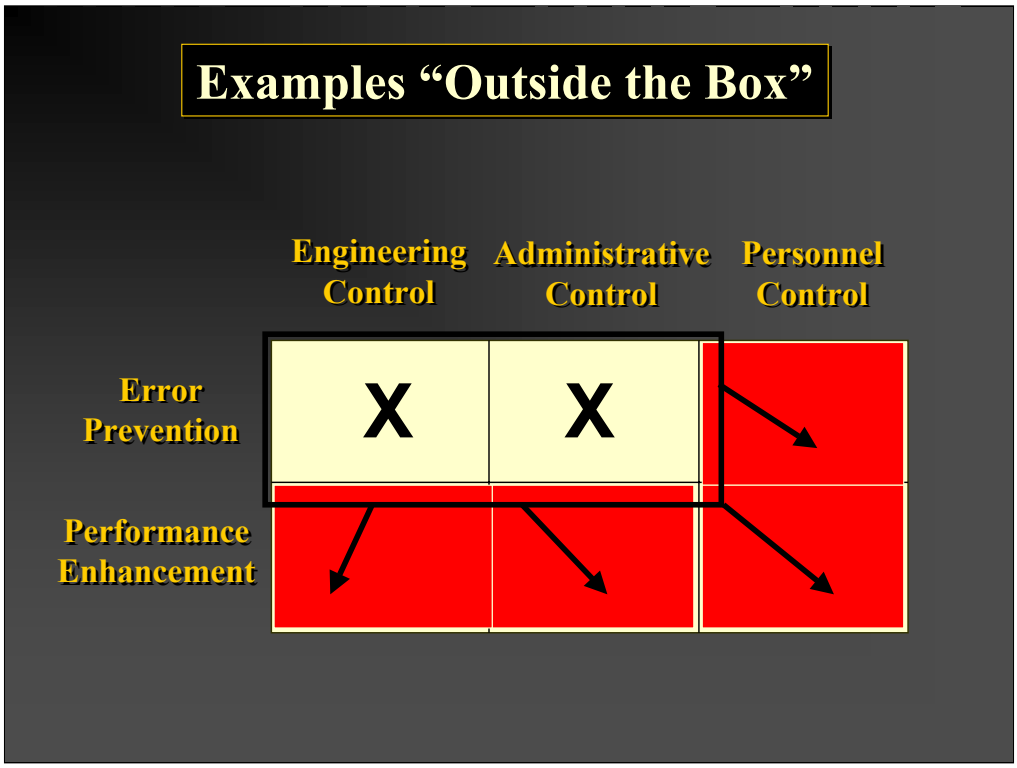
Examples of Error Prevention-Engineering Controls:

Airbags; Seat belts; Anti-skid Brakes; Protective Shields/Covers; Limit Switches; Pressure Switches; Placement of Controls from Hazardous Parts of Machinery; Software; Improved Operator Visibility; Ergonomics; Engine Governors; Exhaust Systems; Warning Systems; Automatic Shutoffs; Single Use Tools and/or Part Orientation; etc.

The other controls (still INSIDE the Box) that receive the most accident safety recommendations are the …

Error Prevention-Administrative Controls:

Indoctrination training; fork truck "licensing"; Personnel Qualification Standards; Safety Training; Crew Coordination Training; Safety Inspections; Quality Assurance; Safety Equipment requirements, Crew Rest, etc.



Now let us examine some examples from "OUTSIDE the Box"…

Error Prevention – Personnel Control:

Individual actions, beyond minimum requirements, to reduce accidents; safety empowerment (e.g. anyone can stop a hazardous evolution); self-imposed restrictions based upon one's own ability; protecting one's own eyesight or hearing; refraining from "risk" taking behavior; ensuring passdowns are not only given (Admin. Control) but our understood.

Performance Enhancement – Engineering Control:

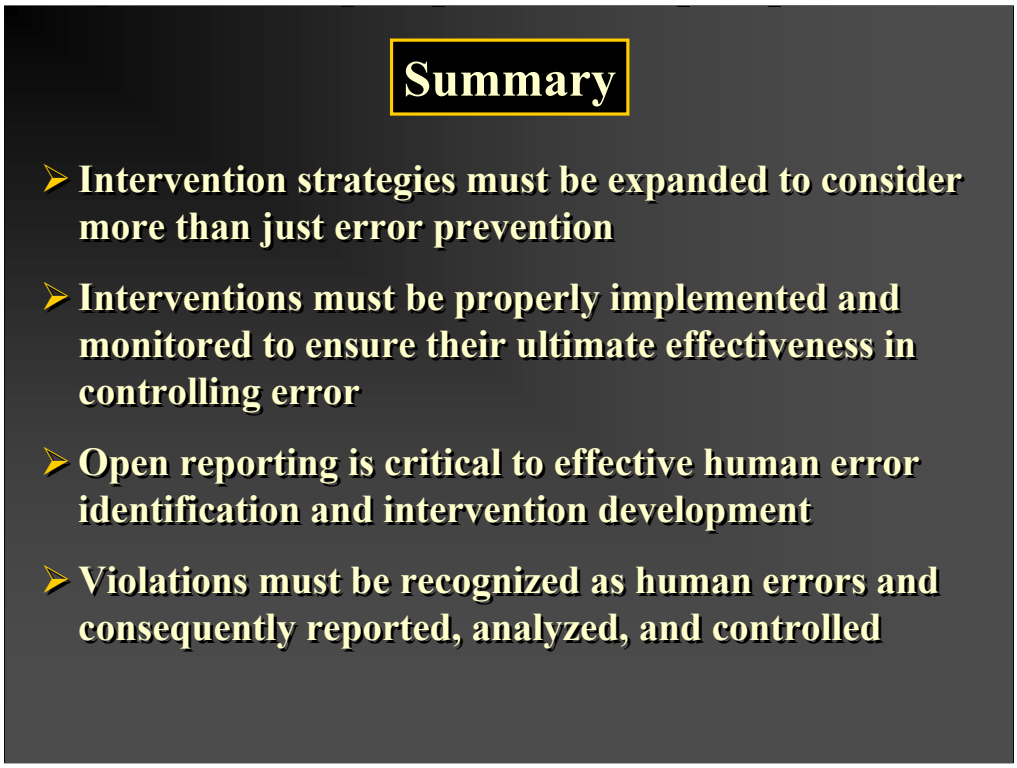
Communication Equipment; "linked" design-manufacturing equipment (CAD/CAM); computer augmentation; modular components/other designs to improve maintenance; precision measuring equipment (lasers); torque/power amplification (pneumatics, hydraulics); "assembly line" processes, etc.

Performance Enhancement – Administrative Control:

Workday/overtime restrictions; physiological considerations (meals, breaks); use of foul weather clothing; tool/lighting requirements; procedural improvements, advanced training on techniques, etc.

Performance Enhancement – Personnel Control:

Individual improvements in time management; stress reduction (training, counseling); personal workspace housekeeping; use of glasses, magnifying glasses, flashlights, appropriate tools; effective communication of tasks; teamwork routinely used, not just trained (Admin. Control), etc.



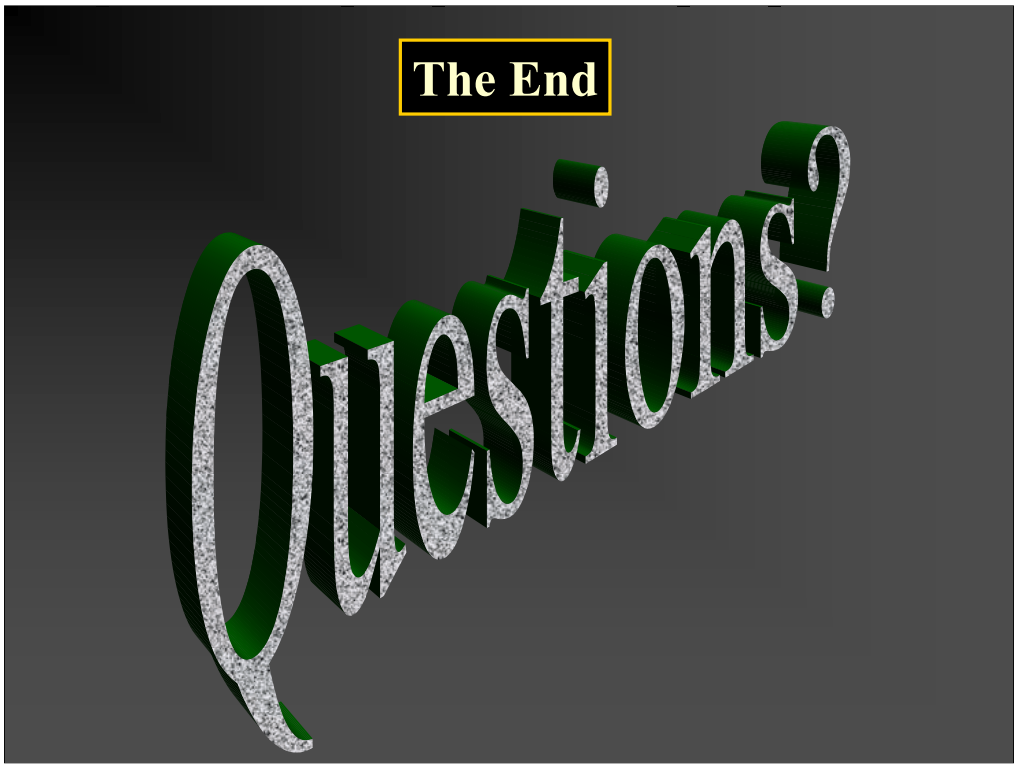
Summary

- Intervention strategies must be expanded to consider more than just error prevention…they should also include performance enhancement

- Interventions must be properly implemented and monitored to ensure their ultimate effectiveness in controlling error

- Open reporting is critical to effective human error identification and intervention development

- Violations must be recognized as human errors and consequently reported, analyzed, and controlled



Questions?