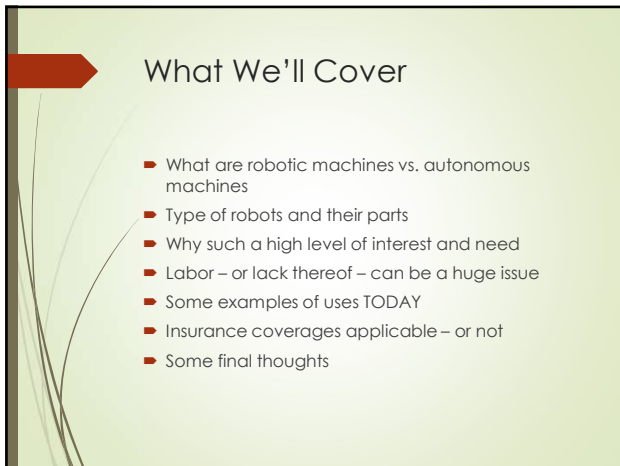
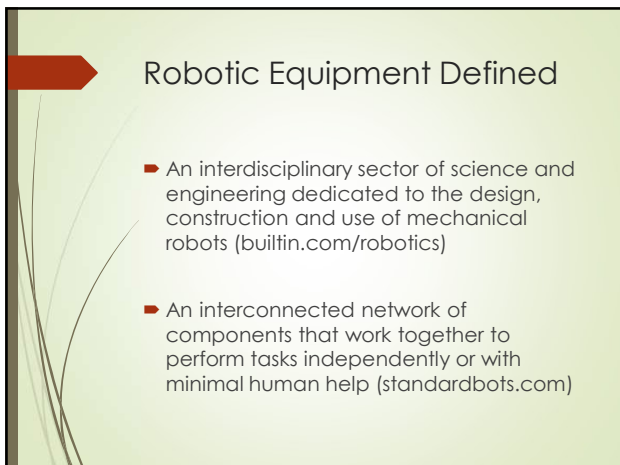



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Autonomous Equipment Defined


- A machine that operates on its own and is not tethered to a control system either wired or wireless (pcmag.com)
- Autonomous systems, a cornerstone of artificial intelligence, are systems capable of performing tasks with minimal human intervention (vationventures.com)

4



System Types

5



Types of Systems

- Augmenting robots
- Teleoperated robots
- Autonomous robots


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Augmenting Robots

- These work alongside humans
- Adding to human capabilities rather than replacing humans
- Used to make tasks more efficient or easier
- Exoskeletons to help factory workers lift large and/or heavy objects or a robotic arm to assist in procedures or processes

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Example



A person wearing a white exoskeleton is walking on a treadmill in a clinical or laboratory setting. The person is holding onto a metal railing for support. In the background, there is a computer monitor displaying a graph and a wheelchair.

8


Example



A person wearing a white exoskeleton is carrying a large cardboard box outdoors. The person is wearing a blue cap and a red and black plaid shirt. The background shows a residential street with a house, trees, and a car.

9

Example




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Teleoperated Robots

- Controlled from a distance by humans
- Normally in real time
- Used for exploring dangerous environments to performing delicate surgeries

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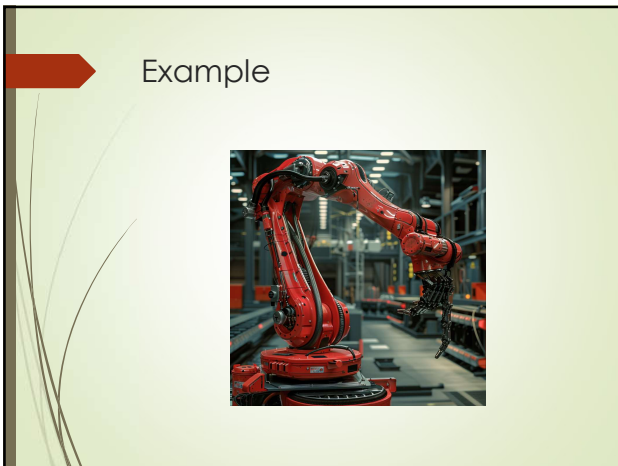
Example



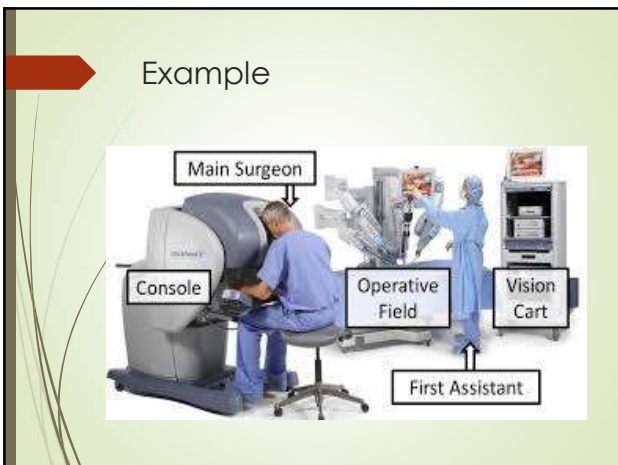
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Autonomous Robots

- Operate without human intervention
- Use of Sensors – artificial intelligence – pre-programmed instructions
- Think self-driving cars, Roombas and the like

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Example




17

Example



18

Example



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How They Work

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Three Primary Requirements

- The CPU
- Sensors
- Actuators

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CPU

- Central processing Unit
- The "brains" of the machine
- Processes sensor information, the execution of its programmed instructions
- Coordinates the robot's actions

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Sensors

- So to speak...the "Sensing" organs
- These act as the sensory organs of the machines to gather data about their environment
- Simple touch sensors – advanced vision systems
- Allow the machine to understand its surroundings and to react accordingly

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Actuators

- Actuators work by converting the energy of the machine into action or physical movement
- Electric motors – spinning wheels – hydraulic pistons – tiny servos
- All of these act to move the machine properly and efficiently

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Main Challenges To Their Use and Adoption


- Human acceptance
- Capital Investments
- Will they play nice with others

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Why The Significant Interest

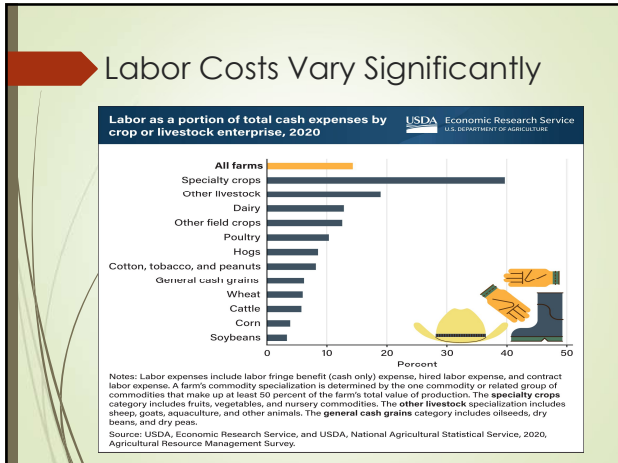
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Some Considerations

- USDA – for every \$100.00 spent on food production costs. At least \$10.00 goes to labor
- 2023 costs rose 1.8% over 2022 costs
- Total cash labor expenses for the U.S. agriculture sector are forecast to be \$43.35 billion for 2023
- 2022 total cash costs were \$42.57bil

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- ### H2A Challenges
- 48,000 positions in fiscal 2005 - 371,000 in fiscal 2022
 - Average duration of stay in fiscal 2022 5.65 months
 - That works out to about 175,000 full year equivalents
 - Worker's average wage rate to increase in 2025 to \$18.12 nationally
 - Increase to \$19.21 (up 4.9%) in Northern Plains states

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- ### More Thoughts
- Ag employment has increased from 1.1 mil in 2012 to 1.18mil in 2022
 - Safety is always a concern
 - Workers' Compensation is another input in a number of states
 - Agricultural labor is not an attractive employment option for many

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Competition for Labor

- Competitive labor pools is another challenge
- Work at a packing plant or in the field
- Work in construction or on the ranch
- Family members often do not return to the family farm once they leave

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Robots or People ?
Robots Preferred !


<ul style="list-style-type: none">Can work in any weatherDo not get boredDon't take breaksDon't demand higher labor paymentsNot subject to workers' comp	<ul style="list-style-type: none">Can work 24/7 as neededRecruiting costs are nonexistentAnswers the labor pool competition dilemmaAging farmers in the U.S.
--	---

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Growth Numbers

- 2024 market estimated at \$4.4 billion
- 2030 market projected to be \$9.77 billion
- Much of the discussion centers on not just replacing human labor, but this:
 - Enhanced efficiency
 - Sustainability
 - Productivity

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Precision Ag Is The Cornerstone of This Growth


- Accurate application of inputs – reduces use to specific applications
- Optimizing irrigation based on real time soil moisture levels
- Precise planting, spraying and harvesting
- Year to year collection and analyzation of data for better opportunities year after year

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Examples In Use Today

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Case IH Baler Automation

- Uses laser pulses to measure the position and size of the windrows
- Adjusts speed and steering of tractor to maximize throughput without overloading the baler
- Provides for increased runtime
- Automatic adjustments make for hands free baling
- Allows lesser experience operators to perform these tasks

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Hagie Sprayer w/John Deere See & Spray Technology

- Can use up to a 120 foot boom and applies weed control ONLY to where it is needed
- Over 2100 square feet can be scanned per second & in optimal conditions can run at 15 mph
- Cameras keep boom level to the ground
- Data collected in real-time and stored for future use as to spray patterns and weed layer maps

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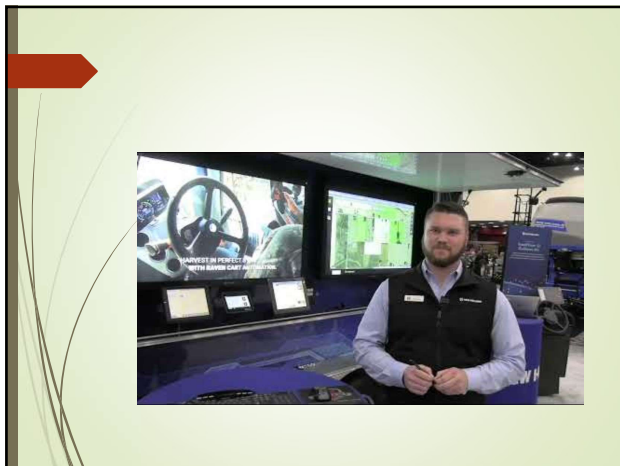


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AutoCart

- System includes software, hardware & communications
- Not just used for grain operations, also available for vegetable operations
- Eventual use with 80 crop varieties
- Benefits include less labor, quicker harvest times, less soil compaction in the field

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Burro

- Moving produce from field to pack line
- Augmenting – not replacing humans
- Uses indoor/outdoor lidar for operation
- New vehicle can haul up to 1500lbs or tow up to 5000lbs
- Pallet sizing the daily operations

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FL 00 20 and CG 00 01

- Both promise to defend and pay when the insured is liable for BI/PD, AI/PI
- Exclusions apply to aircraft, motor vehicles, motorized bikes or trikes
- Exclusions also apply to the ownership, maintenance, use, entrustment of such items
- These apply to vicarious liability as well

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FL 00 20 and CG 00 01

- One policy defines "motor vehicle" (FL) the other defines "auto" (GL)
- Neither definition includes "mobile equipment"
- Mobile equipment - in both forms - enjoys the inclusion of farm machinery, tractors and the like
- The exclusions do NOT apply to the use, maintenance (etc.) of these vehicles (robotic or autonomous)

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GI-2 AND AL 0001

- Essentially these work in a similar fashion to their ISO counterparts
- They too would have no issue with providing coverage to these types of equipment

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Property

- ISO forms
 - FP 00 13
 - FP 00 30
- AAIS Forms
 - FO-6

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FP 00 13 and FP 00 30


- Either form allows us to insure on either a scheduled or an unscheduled basis
- There are no apparent issues with coverage being provided
- Losses to be settled on an ACV basis
- ACV is not defined in the policy forms and relies upon various state definitions taken from case law or insurance statutes as to how it is applied

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FP 00 30 – Endorsement Use

- Does have one potential benefit not available to the FP 00 13 (at least from an ISO point of view)
- FP 05 21 Replacement Cost – Mobile Agricultural Machinery and Equipment
 - Items need to be scheduled on the endorsement
 - Does have an 80% requirement
 - Limited to five (5) model year machinery & equipment or newer in age


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FO – 6 Farm Coverage Form


- Used to provide coverage to farm machinery & equipment under Coverage **G** (unscheduled) or Coverage **F** (Scheduled)
- Suffice it to say that the distinctions between the application of coverage between these two advisory companies (ISO & AAIS) is minimal

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Other Considerations

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Cyber

- As more equipment becomes autonomous or robotic the need for Cyber will only increase
- Today it is a difficult sale to most farm accounts
- What has been your experience?


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When a Robot or Autonomous Injures Someone – Who's Liable

- The owner
- The operator
- The manufacturer
- The software developer
- Others

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Thank You



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