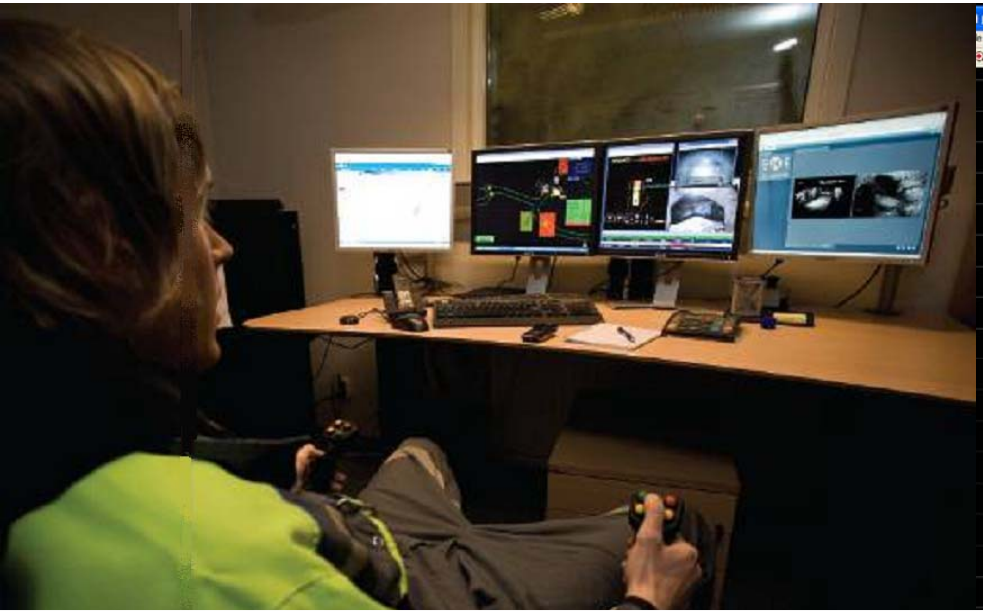
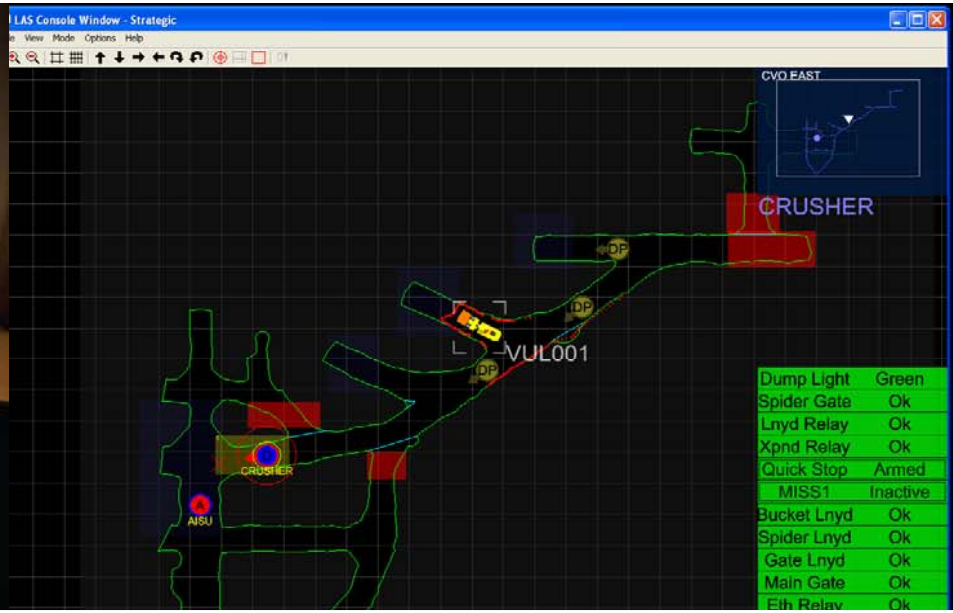
Mining Automation

Mining safely. Mining more. Mining right.

CATERPILLAR®

Mining's Production Robots





Automation Benefits:

Improved Safety

Fewer resources

Less machine damage

Higher utilization

Mining's Production Robots

Komatsu

Freeport

Rio Tinto / CRC Mining

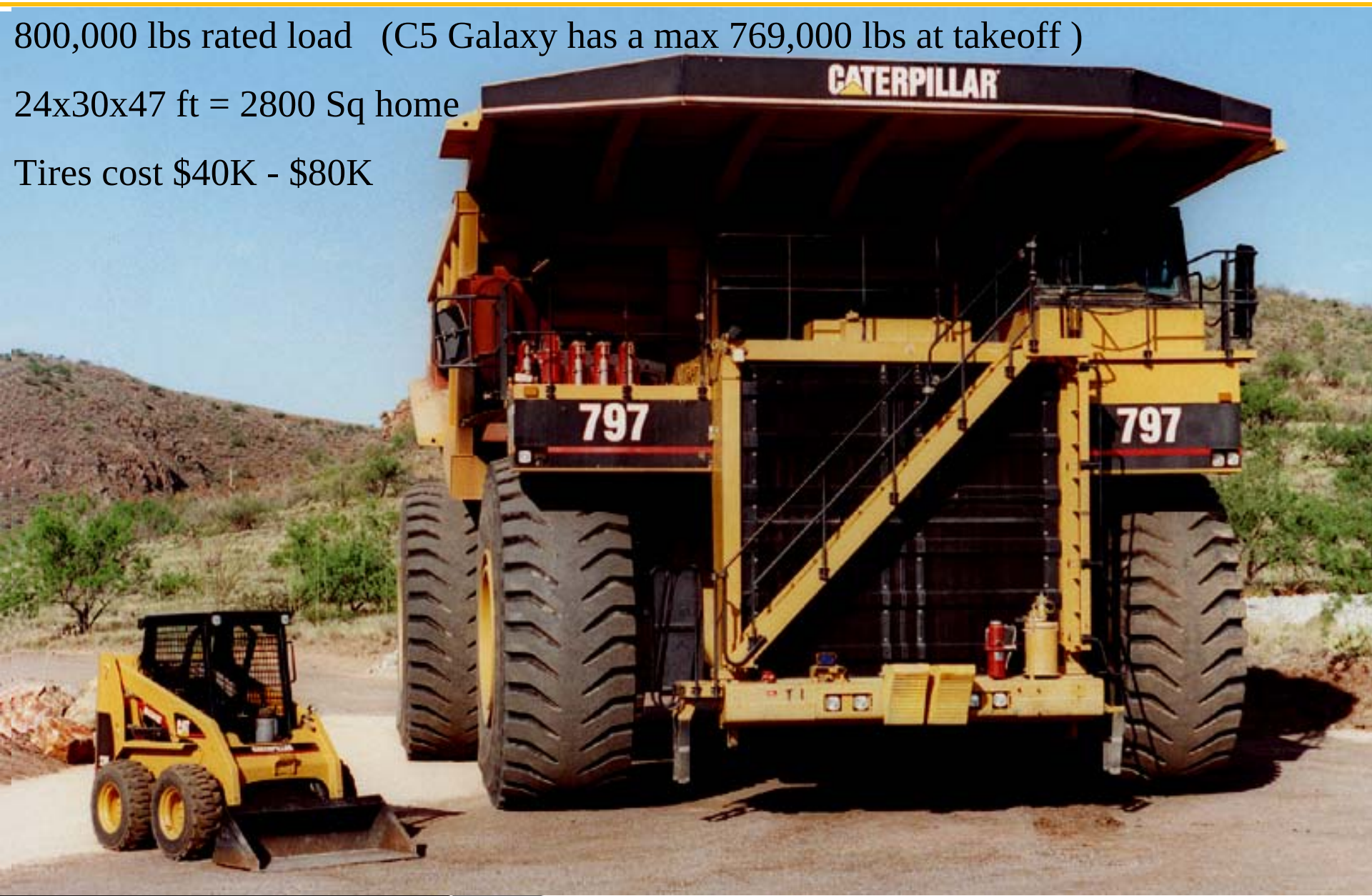
Cat D10T

Caterpillar's Robots in Development

800,000 lbs rated load (C5 Galaxy has a max 769,000 lbs at takeoff)

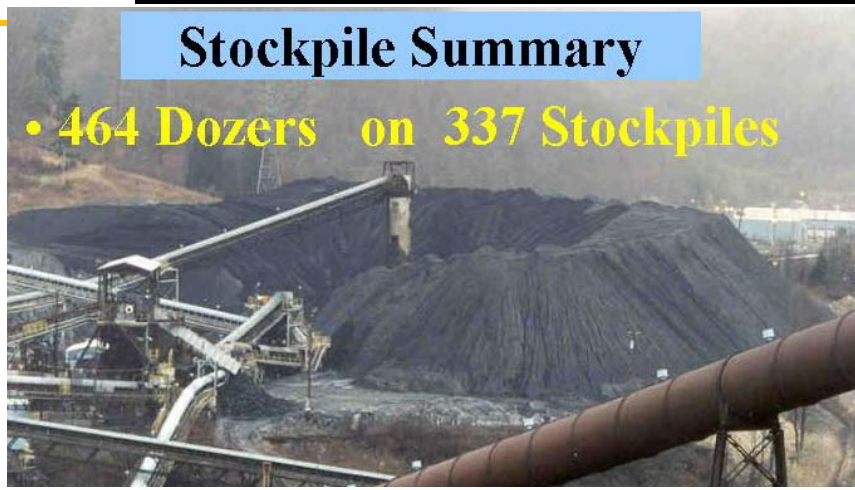
24x30x47 ft = 2800 Sq home

Tires cost $40K - $80K



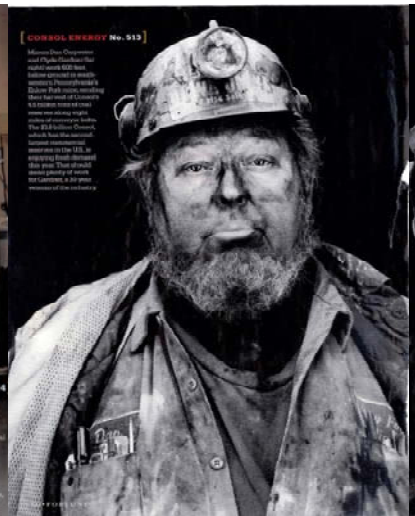
Drivers for Automation

NIOSH: 1 Fatality per Year



- Safety
- Lack of people / Location
  - Australian outback
  - 12,000 foot elevation
  - Canadian tar sands
- Utilization & Efficiency Gain
  - In a 24 hour operation, 15 – 16 hours of run time is the norm.
  - > 20% efficiency gain demonstrated in some cases




Future Vision

- Robots will certainly be the workhorse that drives future mining and allows the developing world to enjoy our standard of living.

- “FCS” like connectivity will provide transparency into the construction/mining operation to allow site level optimization – largely based on the consistency provided by automated machines & systems.

- Autonomous systems will work more efficiently with less environmental impact.
  - Up to 40% fuel savings per unit work
  - Increased utilization & productivity
  - Improved safety

Challenges

Product:

- In general our customers are not risk takers on technology
- Conditions are harsh > Mil Spec in many cases
- Reliability targets are high > 10X military
- Cost targets are low

Technical:

- Reliable Communications
- Reliable / consistent object detection (small rocks)
- Robust positioning in GPS shaded areas