Jellinbah Mining

Dozer Ripper Box Fuel Tank

Need for Larger Fuel Tanks

Why Larger Fuel Tanks?

•Adoption of twelve hour shift
•Wish to only fuel dozers once per shift
•Existing D11 fuel tanks would not last twelve hours

Safety Benefits of Larger Fuel Tanks

•Less pressure on servicemen
•Less interaction of dozers and service trucks
•Less often serviceman has to crawl over dozers

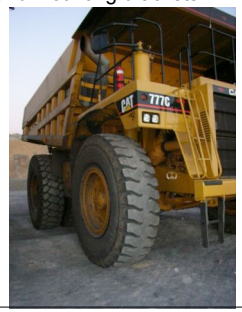
Disadvantage of Larger Fuel Tank

•Decreased visibility to rear and sides of dozer

Extending Mining Equipment Fuel Tank

Extending Truck and Loader Tanks

- Extend fuel tank outwards to increase fuel capacity
- Modification does not obstruct operator vision
- Modification does not create unsafe maintenance access issue
- Structural checks need to be done on chassis and mounting brackets

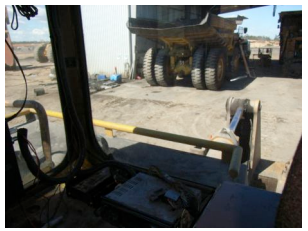


Increasing Dozer Fuel Tank Capacity

Extending Dozer Fuel Tanks

- Fuel tanks can be extended backwards and beveled edges filled in
- A D11 fuel tank is immediately to the rear of the operator's cab
- Operator vision particularly around the rippers and to the rear corners is obstructed

Extended D11 fuel tank



Obstructed view from Operator's cab

The Challenge

The Challenge

- Increase the dozer fuel capacity to allow twelve hours operation between refueling
- Not further obstruct the operators field of vision especially around the rippers
- Not create a new unacceptable safety issues

Alternatives Considered

Several solutions to the challenge were considered

- Designs of extended tanks from other operations were collected and reviewed. Operator's assessed the loss of visibility unacceptable for our operation.
- Cardboard extensions were stuck to a dozer tank. The extensions were in the shadow of the line of vision around the standard tank. The increase in capacity did not provide for twelve hours operation.
- Several locations were considered for attaching of second fuel tank with plumbing connecting the two tanks together. All locations were unacceptable because of issues such as fire risk, integrity of structure, maintenance access, operator vision.

Hollow Structural Sections

What if we used a hollow section of the chassis as a fuel tank?

- Blade
- Side arms
- The ROPS
- Ripper support frame
- Ripper box

Selection of Hollow Section

The Ripper Box was chosen as the most suitable hollow section to use as additional fuel storage

- Close to existing fuel tank and fuelling connector
- Away from machine in the event of fire
- Away from operator's escape path in the event of fire
- Time proven 20mm plate steel construction
- More than sufficient fuel capacity for twelve hours operation
- In the event of a fuel leak, fuel goes to ground and is far away from turbo's
- It has been proven that you can safely run fuel/hydraulic hoses in this area

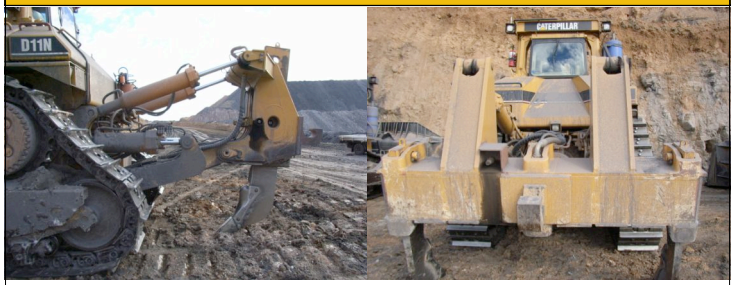
Plumbing Difficulties

There were several challenges in plumbing the two tanks together

- Only wished to have the one fuel point and existing breather for both tanks
- Did not wish to have to use a pump to move the fuel between the tanks
- Depending on what the dozer is doing, the ripper box alternates between being above and below the fuel tank (Fuel only travels down hill)
- A multi shank ripper box is wide and squat whereas a single shank ripper box is narrow and tall
- Did not wish to run fuel lines in areas where there was a high probability of being damaged by rock

Fuel lines were located only where paintwork was unmarked after years of operation

Dozer Ripper Box Fuel Tanks

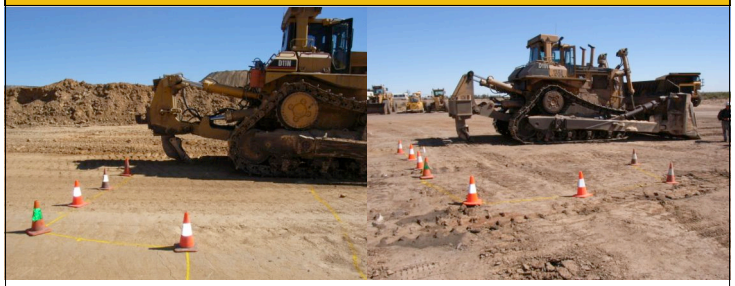


•Dozer ripper boxes converted to fuel tank.
•Single shank on the left, multi shank on the right.
•The dirty mark from spilt fuel indicates where the Wiggins fuel connector has been relocated onto the ripper box.
•A large fuel line can be seen coming out of the top of the ripper box which links the two tanks together.

Operator Visibility

•Both these dozers have twelve hours fuel capacity
•Dozer on the left has a ripper box fuel tank
•Dozer on the right has had the fuel tank extended
•White line indicates operators line of vision of the ripper area

Operator Blind Spot



•The witches hats and yellow line indicate the size of the operator's blind spot to the rear of the dozer
•Dozer on the left has a ripper box fuel tank
•Dozer on the right has an extended fuel tank
•The extended fuel tank creates a much larger blind spot

Problems Encountered

Ripper box fuel tanks have been in use for five years. There have been minor problems.

- Sandblast material after the conversion blocked up fuel filters
- An additional hose clamp had to be added to the large fuel line to prevent a screw connection coming loose due to the action of the ripper
- A section of weld was porous and caused a leak. The weld was not part of the conversion and was easily repaired
- On single shank machines, the operator has to remember to shorten the shank for the service man to be able to reach the fuel connector
- The fuel gauge only shows the amount of fuel in the main tank, not the amount of fuel in the ripper box

Benefits / Effects

Benefits of the Ripper Box Fuel Tank

- Fuelling interval extended to twelve hours
- Operator's field of vision not impaired. There is a continuous stream of incidents involving dozers reversing over lighting plants, vehicles, etc
- Less frequent refueling means less risk of serviceman being injured during services and less interaction of service truck with mining equipment
- Reduced risk of dozer running out fuel on the job and having to be refueled in a difficult to access location

Transferability

Transferability Across Industry

- Hollow structural sections can be used for fuel storage on other mining equipment as well as any vehicle or cycle
- Other fluids such as oil and coolant can also be stored in hollow structural sections. Additional oil storage has been employed at Jellinbah to extend engine oil changes out to 500 hours
- Employing hollow structural sections for fluid storage has a less obvious benefit. If a crack starts to develop in a structural section, it is immediately evident by the tell tale leak

Innovation and Cost

Innovation

Utilisation of hollow sections of existing frame structure for additional fuel storage as an alternative to increasing the size and restricting the vision around the standard fuel tank

Cost

The cost of the conversion on a D11 is less than ten grand

Looking Forward

Now that we have proven we could meet the challenge

- Dozer fuel tank with twelve hours capacity
- Does not obstruct operator's field of vision
- Does not create other unacceptable risks

What will be the next challenge?

Jellinbah Mining

Safe
Non-Obstructive
Twenty-Four Hour
Dozer Fuel Tank

Thank you