

Production and Cost Comparison Articulated Dump Trucks vs. Pull Pans

Introduction

The following comparison was put together using numbers from three separate, prominent Georgia and South Carolina contractors. All three have been operating pull pans along side Articulated Dumps for over three years on many different projects under many different conditions. The following numbers will factor all three company's results to achieve the average for both the trucks and the pull pans. The numbers are in no way a guarantee of cost or production, but are actual numbers pulled from superintendents books or provided by estimators, in some cases from company records, and is intended to help contractors choose the right machine for the application. Several different combinations of articulated dumps, excavators, and dozers were being used by the different companies; however Volvo was the dominant choice for articulated dump trucks. Other brands included Moxy trucks, CAT, and Komatsu dozers, JCB, Deere and Hitachi excavators.

Assumptions

- 14 bcy (16.4 LCY) per self loading pull pan = 28 bcy (32.8 LCY) per train, per load.
- 20 bcy per load for the 35 ton ADT
- JCB 460 excavator equipped with 4 cubic yard bucket
- CAT D6R dozer can effectively push excavated material for three trucks.
- Sakai 400 vibratory roller can effectively maintain compaction for three ADT's.

Since the ADT's are not as effective as a single unit operating with support equipment, we will figure three trucks on the job. The "Pull Pan" can operate as twenty units or as one unit with very little difference in production or cost efficiency, however we will figure two trains on this job to help production numbers to be approximately equal, with the haul roads being maintained by CAT 12H motor grader. Operating, and rental cost will be averaged from contractors records, CAT handbook, Kelly rental rate book, and Fleet Rents rental rates.

9520 John Deere (PULL PAN)

\$13,750.00 per month	
divided by 176 hours per month	
equals \$78.00 per hour	\$78.00
Fuel consumption, approx. 11 gph	
@ \$1.30 per gallon	\$14.30
Operator @ \$15.00 per hour	\$15.00
Misc. maintenance 48.00 per day	
@ 10 hour work day	\$4.80
Total	<hr/>
X 2	\$112.10 per hr
	\$224.20

Volvo 35 Ton Truck

\$11,500.00 per month	
divided by 176	
equals \$65.34 per hour	\$65.34
Fuel consumption approx 8 gph	
@ \$1.30 per gallon	\$10.04
Operator @ \$15.00 per hour	\$15.00
Daily misc. \$4.50 <u>.45</u>	
Total	\$90.83
X 3	\$272.49 per hr

CAT D6R

\$6,250.00 per month	
divided by 176	
equals	\$35.51
Fuel Consumption approx 15 gph	
@ \$1.30 per gallon	\$19.50
Operator @ \$15.00 per hour	\$15.00
Daily expense 25.00 <u>2.50</u>	
Total	\$72.51 per hr

Sakai 400 Roller

\$2,750.00 per month	
divided by 176 equals	\$15.62 per hr
fuel consumption approx 6 gph	
@ \$1.30 per gallon	\$7.80
Operator @ \$10.00 per hour	\$10.00
Daily expense \$4.00 <u>.40</u>	
Total	\$33.82 per hr

Deere 450 LC

\$12,000.00 per month	
divided by 176	
equals 68.18 per hour	\$68.18 per hr
fuel consumption	\$11 gph
@ \$1.30 per gallon	\$14.30
Operator \$15.00	\$15.00
Daily misc. expense \$100 per day	<u>\$10.00</u>
Total	\$107.48
Total of 3 trucks	
1 dozer/ 1 trachoe/ and 1 roller equals	\$486.30 per hr

12 H motor grader not included, as it can maintain the haul roads for both operations. However it should be noted the tractor-pull pan combo can maintain its own haul road by back blading every 3rd or 4th cycle.

Total for 2 pull pan trains	\$224.20 per hr
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Top speed of the Volvo truck is approximately 32 mph. Top speed of the "Pull Pan" 9520 is approx 28 mph., however on most sites, checks on both trucks and pull pans resulted in average speeds of approx 20 mph on long hauls of 3000 ft or more and approx. 10 to 15 mph on shorter hauls. On all jobs where ADT's and pull pans were running, the cut to fill cycle times were almost identical. Trucks were a little faster on the roads but took longer to load and unload.

The "Pull Pan" with Reynolds 17E pans will average approx 28 bcy per cycle. Multiply 28 bcy times 2 units equals 56 bcy per cycle. The Volvo ADT 35 will average approx 20 bcy per cycle, multiply by 3 units equals 60 bcy per cycle. If both teams are considered to be hauling 10 cycled loads per hour, the conclusion would be as follows:

<i>Volvo ADT's would average approx.</i>	<i>600 bcy per hour</i>
<i>The "Pull Pans" would average approx</i>	<i>560 bcy per hour</i>
Volvo ADT team cost per hour	\$486.30
The cost per bcy would be	\$ 0.81
\$486.30 / 600 bcy =	<u>\$0.81 per bcy</u>
The "Pull Pan" team cost per hour	\$224.20
The cost per bcy would be	\$ 0.40
\$224.20 / 560 bcy =	<u>\$0.40 per bcy</u>

Conclusion

The ADT's would have to haul twice as much dirt per hour to equal the 2 pull pan trains. As shown in this study, the "Pull Pan" will move dirt for at least 50% of the cost per bcy of ADT's, so for the same money you can effectively operate 3 pull pan trains and have money left over for support equipment that would increase the pull pans productivity in severe conditions. The real key to pull pan success is in operator training. Top pull pan operators can increase daily productivity by over 30% and decrease the need for support equipment. This allows large jobs to be done with minimal equipment, labor, and fuel cost.

As is stated on the Fleet Rents web site home page the Pull Pan is not the answer to all your dirt moving needs. The ADT will always have a place on many jobs. The fact is pull pans and ADT's work well together on many job sites, as many large dirt contractors in the coastal regions have discovered. It's important to understand where the limits of any piece of equipment lie. The "Pull Pan" may be top loaded and used as a truck, in extreme conditions a pull pan may be removed allowing the tractor to operate in extremely wet or soft conditions making it much more versatile than the ADT. When used correctly the "Pull Pan" will make your company much more competitive in the dirt moving industry.

COMPETITION PRICING

TRACTOR WITH PULL PANS NEW COST EST \$325K FOR JD 9520 TRACTOR & REYNOLDS 17E PANS

- RENTAL FROM DEALER RANGE FROM \$10,000 TO \$14,750 PER MONTH

SCRAPERS NEW COST EST \$650K FOR CAT 631G

- RENTAL FROM DEALERS RANGE \$16,500 TO \$22,500 PER MONTH
- RENTAL FROM USED EQUIPMENT COMPANIES RANGE \$14,500 TO \$18,000 PER MONTH

DOZERS NEW COST EST \$450K FOR CAT D-9R

- RENTAL FROM DEALERS RANGE \$17,500 TO \$19,550 PER MONTH
- RENTAL FROM USED EQUIPMENT COMPANIES RANGE \$13,500 TO \$16,900 PER MONTH

EXCAVATORS NEW COST EST \$325K FOR JCB 450

- RENTAL FROM DEALERS RANGE FROM \$9,000 TO \$12,000 PER MONTH
- RENTAL FROM USED EQUIPMENT COMPANIES RANGE FROM \$8,000 TO \$11,000 PER MONTH

ARTICULATED TRUCKS NEW COST EST \$275K FOR VOLVO A25

- RENTAL FROM DEALERS RANGE FROM \$7,500 TO \$8,500 PER MONTH
- RENTAL FROM USED EQUIPMENT COMPANIES RANGE FROM \$6000 TO \$8000 PER MONTH

COMPETITIVE EQUIPMENT METHODS FOR MOVING DIRT

- TRACTOR WITH PULL PANS
 - MODEL JOHN DEERE 9520 W/ REYNOLDS 17E PANS
 - SELF LOADING IN MOST APPLICATIONS
 - CAN EJECT LOAD TO GRADE
 - ELIMINATES EXTRA EQUIPMENT @ DUMP SITE
 - NEEDS LITTLE OR NO COMPACTION EQUIPMENT
 - NEEDS LITTLE OR NO HAUL ROAD SUPPORT EQUIPMENT
- CATERPILLAR MOTOR SCRAPERS
 - MODELS CAT 621, 627, 631, 637, 651 & 657
 - TO LOAD NEEDS A PUSH DOZER OR ANOTHER SCRAPER
 - CAN EJECT LOAD TO GRADE
 - ELIMINATES EXTRA EQUIPMENT @ DUMP SITE
 - NORMALLY NEEDS EXTRA COMPACTION EQUIPMENT
 - NEEDS HAUL ROAD SUPPORT EQUIPMENT
- ARTICULATED TRUCKS
 - MODELS VOLVO A-25, 30, 35 & 40
 - MUST BE LOADED BY WHEEL LOADER OR EXCAVATOR
 - CAN NOT EJECT LOAD TO GRADE MUST DUMP AT SITE
 - NEEDS DOZER OR EXTRA EQUIPMENT @ DUMP SITE
 - ALWAYS NEEDS COMPACTION EQUIPMENT
 - NEEDS HAUL ROAD SUPPORT EQUIPMENT

Fuel cost rated @ 1.50 per gallon
 Average current rental rates obtained from CAT dealers and Fleet Rents
 @ 176 hours per month

JD 9520 with 2 Reynolds 17E pans	\$14,000.00
CAT 631G Push Load scraper	\$18,000.00
CAT 637G Push/pull scraper	\$26,500.00
CAT 651 Push load scraper	\$32,000.00
CAT D-10R push dozer	\$22,000.00 w/ ripper
CAT 815 pad foot compactor	\$4,500.00
CAT D-9R Push Dozer	\$18,000.00

Rental rates will vary from region to region and production results will vary as well. These rates and production numbers were derived from 4 different equipment dealers and several prominent contractors who use either CAT scrapers and or John Deere/ Reynolds pull pans. They are in no way a guarantee of results you might obtain on your project.

With fuel cost rising dramatically and with the possibility of fuel shortages becoming a reality, fuel consumption should become a main concern. The following fuel per hour consumption rates are based on a typical job site with moderate grades. Conditions and operators will cause the rates to vary on different jobs.

John Deere 9520	11 g.p.h.
CAT 631 Scraper	18 g.p.h.
CAT 637 Scraper	31 g.p.h.
CAT 651 Scraper	38 g.p.h.
CAT D-10 Dozer	28 g.p.h.
CAT D-9R Push Dozer	25 g.p.h.
CAT D-6 Dozer	16 g.p.h.
Volvo 35 ton truck	12 g.p.h.
JCB 460 Excavator	10 g.p.h.
CAT 815 compactor	12 g.p.h.

	John Deere 9520		CAT 631G		CAT 637 G		CAT 651	
(Ft)	w/ 17E Pull Pans		Push load scraper		Push pull scraper		Push load scraper	
Haul length	2000	3000	2000	3000	2000	3000	2000	3000
Haul units	3	4	4	5	4	5	3	4
Unit Production cy/ hour	392	280	248	220	250	220	460	320
Crew Prod.	1176	1120	992	1100	1000	1100	*1200	*1200
Equip & labor	\$336.3	\$448.4	\$733	\$887	\$646	\$807.5	\$779	\$960
Cost per cubic yard	\$0.29	\$0.40	\$0.74	\$0.81	\$0.65	\$0.73	\$0.65	----
% Savings per cubic yard			61%	51%	55%	45%	55%	50%

*651 Scraper is limited by 40 dozer pushes per hour

*651 Scraper requires 2 push dozers for optimal loads

**631 Scraper can be push loaded with CAT D-9R

***Tractors and pull pans can typically achieve compaction without support equipment