Determining Optimal Vehicle Replacement Cycles and Specifications for Higher Residual Values

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About the Instructor

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- More than 38 years' experience
- Fleet management consultant
- Served as a Journey Technician at Utah Transit Authority, local and state government fleet manager (City of West Jordan, States' of Utah and Georgia)
- Successfully transitioned from wrench tuner to manager of a $1.5 billion (annual capital and operating budget), 50,000-unit fleet
- Former Vice President of Fleet Operations at Republic Services, Coca-Cola over 43 states and Canada
- NCSFA Distinguished Service Award, 2009
- Honda Leadership Award, 2005

Session Learning Objectives

Learn how:

- Vehicle technology advancements are driving up life cycle costs by 25-30%.
- Utilizing a selective approach to specifications and developing empirical life cycles, fleet organizations can proactively reduce overall operating costs.
- Modeling costs associated with acquiring, operating and disposing of an individual vehicle class over various replacement cycles, and then determining which cycle results in lowest total cost of ownership.
- Specific strategies and specification techniques for creating optimal life cycle standards to reduce total cost of ownership over the life of a given vehicle asset class.

Determining Optimal Vehicle Replacement Cycles and Specifications for Higher Residual Values

All you need to know:

- Purchase "white" vehicles with moderately spec'd option packages
- Set and enforce policies and procedures for employees to care for vehicles
- Maintain vehicles in accordance with the OEM's recommended maintenance and service interval guidelines
- Keep vehicles only during its optimally recommended life cycle
- De-logo, fix minor problems, and dispose vehicles in the fall or spring when residual values are at their peak
- Sell vehicles to your employee's for the highest return

Some Spec'ing Questions to Consider

- What assets should be purchased?
- When should assets be purchased?
- What upfitter should be used?
- When should assets be sold?
- What are the market supply and demand factors?
- What asset color should be purchased?
- What asset options should be selected?

Growing Technological Complexity of Fleet Assets

- In the early 1980s,vehicles with embedded computers had upwards of 50,000 lines of software code; vehicles in 2016 generally have more than 100 million lines of code
- Increasing demand for more and varied features
- Items once considered options only available on luxury models eventually will be incorporated across model lines
- The trend of ever expanding electronic functionality shows no sign of slowing down, continued progress in vehicle automation further accelerates the complexity and dependence on embedded controllers
- For many fleet owner employees, their vehicle is far and away the most sophisticated electronic device they operate to perform their job functions and missions

Why are Modern Vehicles Costs Higher?

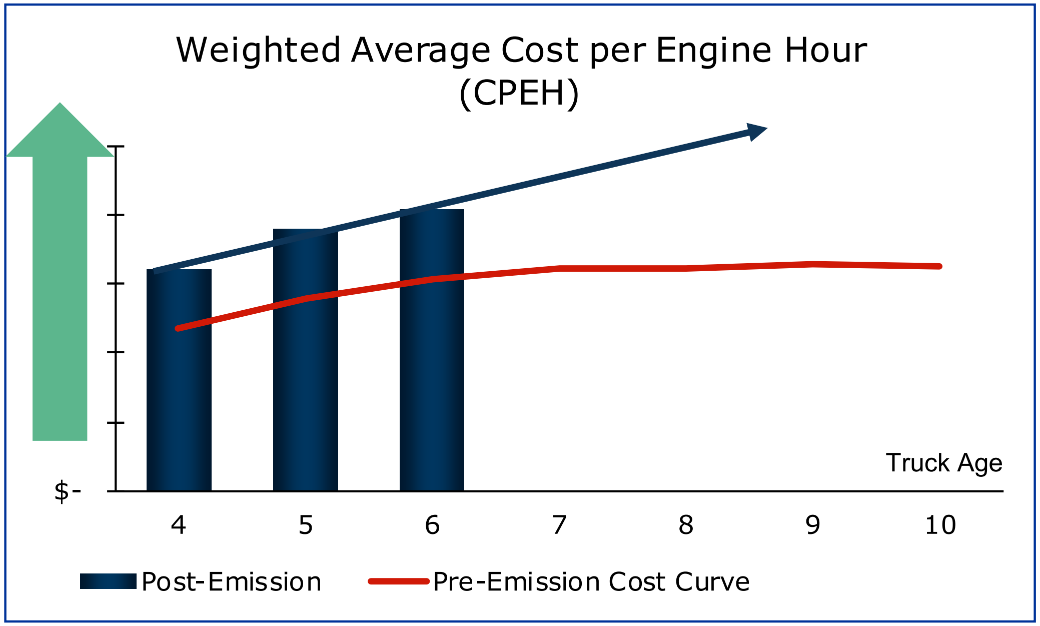
Driver support
- Navigation
- Collision warning/avoidance
- Augmented vision

System automation
- Dynamic EV charging
- Computer control of engine, brakes, etc.

Telematics
- Remote control (locks, start)
- Remote diagnostics
- Remote repair (updates)

Content and communication
- Voice and data
- Information and entertainment

Technology and Regulations Driving Up Asset TCO

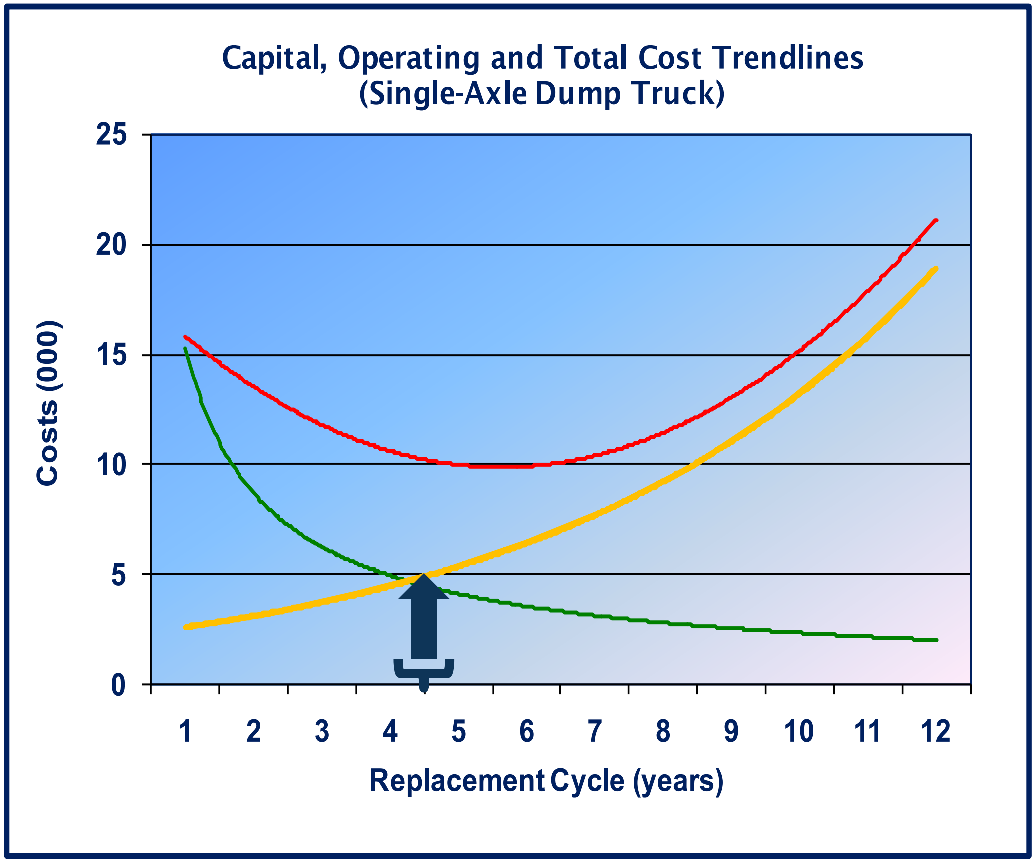


Examples of emissions complexity:

System	Part Description	Pre-Emission	Post-Emission
Emissions/Exhaust After Treatment	Muffler vs. Diesel Particulate Filter Assembly	$ 95	$ 4,719
	Diesel Particulate Filter Only	$ -	$ 2,258
	Turbo vs. Variable Geometry Turbo	$ 967	$ 3,294
	EGR cooler vs. no EGR cooler	$ -	$ 1,096
Engine	Fuel Injector E6 vs. MP7	$ 106	$ 695
	Cylinder Head E6 vs MP7	$ 1,779	$ 3,674

- Government emissions regulations and new engine technologies introduced between 2007 and 2010 continue to increase truck maintenance costs
- On average, a post-2007 emissions asset costs 25% to maintain when it comes off warranty
- Capital costs are up 30% since 2007 emissions regulations
- Parts costs and total number of parts on vehicles needing to be replaced is expanding
- Need to mitigate cost impact for training technicians on new technologies to higher cost 3rd party repair vendors and downtime

Principles of Vehicle Fleet Replacement



1. Empirically validated vehicle replacement cycle guidelines (ORCA), using historical vehicle cost data minimizing total cost of ownership (TCO)
2. Long-term fleet replacement plan using recommended replacement cycles that predicts costs
3. Capital financing method that provides sufficient funds yearly to acquire replacement vehicles in accordance with the replacement plan
4. Budgeting process enabling fleet organizations to consistently secure the amount of funds needed to adhere to the replacement plan

Optimal Replacement Cycle
EXAMPLE: 6-7 YEARS = Lowest TCO*

Replacement Cycle (years)	1	2	3	4	5	6	7	8	9	10
Year-End Odometer Reading	12,272	24,544	36,816	49,088	61,360	73,632	85,904	98,176	110,448	122,720
CAPITAL COST										
ar-End Fair Market Value Percentage	78.90%	67.10%	57.00%	48.50%	41.20%	35.00%	29.80%	25.30%	21.50%	18.30%
Year-End Fair Market Value	$275,052	$233,795	$198,726	$168,918	$143,581	$122,044	$103,738	$88,178	$74,951	$63,709
Annual Capital Cost	$73,489	$41,257	$35,068	$29,808	$25,337	$21,537	$18,306	$15,560	$13,226	$11,242
OPERATING COSTS										
Annual M&R Cost	$21,884	$24,910	$28,355	$32,276	$36,739	$41,820	$47,603	$54,186	$61,680	$70,209
Annual Fuel Cost	$20,985	$21,833	$22,715	$23,633	$24,588	$25,581	$26,615	$27,690	$28,809	$29,973
Total Annual Operating Cost	$42,869	$46,743	$51,070	$55,909	$61,327	$67,401	$74,218	$81,876	$90,489	$100,182
Avg Annual Operating Cost (2014$)	$42,869	$44,125	$45,463	$46,888	$48,408	$50,030	$51,763	$53,614	$55,594	$57,713
TOTAL COST										
Annual Total Cost	$116,358	$88,000	$86,138	$85,717	$86,664	$88,938	$92,524	$97,437	$103,715	$111,425
Cumulative Total Cost	$116,358	$204,358	$290,496	$376,214	$462,878	$551,816	$644,340	$741,777	$845,492	$956,917
Equivalent Annual Cost	$116,358	$102,389	$97,131	$94,403	$92,945	$92,326	$92,352	$92,924	$93,986	$95,507

*Refuse Truck

Lowest TCO

Optimal Replacement Cycle
EXAMPLE: 7-8 YEARS = Lowest TCO*

Replacement Cycle in Years:	1	2	3	4	5	6	7	8	9	10	11	12
Accumulated mileage at replacement	3,865	7,730	11,595	15,460	19,325	23,190	27,055	30,920	34,785	38,650	42,515	46,380
CAPITAL COST												
Projected Residual Value	$ 71,187	$ 58,625	$ 50,250	$ 46,062	$ 41,875	$ 39,362	$ 36,850	$ 34,337	$ 31,825	$ 29,312	$ 26,800	$ 24,287
Annual Depreciation	$ 12,562	$ 12,562	$ 8,375	$ 4,187	$ 4,187	$ 2,512	$ 2,512	$ 2,512	$ 2,512	$ 2,512	$ 2,512	$ 2,512
Total Annual Capital Cost	$ 12,562	$ 12,562	$ 8,375	$ 4,187	$ 4,187	$ 2,512	$ 2,512	$ 2,512	$ 2,512	$ 2,512	$ 2,512	$ 2,512
OPERATING COST												
Annual Maintenance and Repair Cost	$ 171	$ 551	$ 1,106	$ 1,828	$ 2,718	$ 3,778	$ 5,015	$ 6,434	$ 8,044	$ 9,853	$ 11,871	$ 14,109
Annual Fuel Cost	$ 2,380	$ 2,476	$ 2,576	$ 2,679	$ 2,787	$ 2,900	$ 3,017	$ 3,138	$ 3,265	$ 3,396	$ 3,533	$ 3,675
Total Annual Operating Cost	$ 2,551	$ 3,027	$ 3,681	$ 4,507	$ 5,505	$ 6,678	$ 8,031	$ 9,572	$ 11,308	$ 13,249	$ 15,404	$ 17,784
TOTAL ASSET COST												
Annual Total Cost	$ 15,113	$ 15,589	$ 12,056	$ 8,695	$ 9,692	$ 9,190	$ 10,544	$ 12,084	$ 13,821	$ 15,761	$ 17,916	$ 20,297
NPV of Cumulative Annual Total Cost	$ 14,258	$ 28,132	$ 38,255	$ 45,142	$ 52,384	$ 58,863	$ 65,875	$ 73,457	$ 81,638	$ 90,439	$ 99,877	$ 109,964
Equivalent Annual Cost	$ 14,686	$ 14,702	$ 13,524	$ 12,144	$ 11,438	$ 10,866	$ 10,573	$ 10,464	$ 10,485	$ 10,602	$ 10,794	$ 11,047

*Dump Truck

Lowest TCO

Example: Optimal Life Cycles

Asset Types:

1. Tractors – Sleeper Cab, OTR = **4-5 Years**
2. Sweepers = **3-5 Years**
3. Refuse Trucks = **7-8 Years**
4. Straight Truck S/A – Day Cab, DSD = **6-7 Years**
5. Straight Truck T/A – Day Cab, DSD = **5-6 Years**
6. Trailers = **7-10 Years**
7. Sedans = **4-5 Years**
8. Pickup trucks = **6-7 Years**
9. SUVs = **5-6 Years**
10. Vans = **6-8 Years**

Resources: ATRI, Navistar, Penske, Industry articles, Mercury fleet manager experience, and client data.

Best Practices Ensuring Higher Residual Values

- Establish an annual specification committee comprised of company stakeholders with OEM participation
  - ✓ Research new innovation and options
  - ✓ Solicit vehicle operator's feedback
- Evaluate the asset needs versus wants and use financial modeling to justify costly options
- Set optimal lifecycles based on empirical TCO data
- Sell vehicles when they reach their optimal life cycles
- Partner with a "Remarketing" company who understands the market and uses various selling channels to maximize values
- Use standard metrics to measure and track disposal and adjust for continuous improvement

Ensuring Higher Values - Remarketing Metrics

- Number of days from pick up to sale date
- Number of days to pick up from notification
- Total Days to sell / Compared to industry
- Salvage Value Relative to Published Wholesale Price (85-90%)
- Average sale price by year/type
- Percent of Sale price versus total fees (5-8%)
- Percent of sell price by sale method (auction, employee sale, scrap, etc.)
- Sale price by geography/type. (Regions)
- Sale price by make/model/color
- Sale price by time/year
- Percent return by type compared to industry guide (blue book, black book AMR)
- Sell price comparison proceeds in other markets. (Benchmark to other fleets)

Parting Thoughts: Entropy - Second Law Of Thermodynamics

Definition: *Gradual decline into chaos or disorder*

- Assets are subject to the effects of entropy
- Assets must be maintained properly to avoid entropy
- Assets must be used continuously (not sit idle) to prevent entropy.

Parting Thoughts:
Asset Rule of "*Always*"

- Assets are ***always*** impacted by "Entropy": The second law of thermodynamics
- Assets ***always*** depreciate (sit or not)
- Assets must ***always*** be tracked in a system
- Assets are ***always*** worth more today than tomorrow
- Assets ***always*** consume space (i.e., parking, etc.)
- Assets values ***always*** correspond to market timing (Purchase and resale)
- Asset residual values ***always*** depend on the specifications

For More Information

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