



Southeast States Equipment Management Conference

Fleet Replacement Modeling North Carolina Department of Transportation

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June 12, 2011**



Overview of NC Department of Transportation East Carolina Study

- **HISTORY OF FLEET MANAGEMENT STRATEGIC PLAN**
- **FLEET REPLACEMENT MODELING:**
 - FOUR MAIN RESEARCH OBJECTIVES
 - METHODOLOGY USED BY ECU
 - FINDINGS OF THE STUDY
 - RECOMMENDATIONS
 - LESSONS LEARNED FROM THE STUDY





HISTORY OF THE NCDOT STRATEGIC FLEET MANAGEMENT PLAN

- The NCDOT Strategic Fleet Management Plan began in 2003.
 - In 2003 the Department replaced its core financial systems, including the fleet management system.
 - With the new system our ability to track costs and to report on utilization and depreciation rates improved significantly.
 - At the same time, we implemented a reorganization of the Unit's business processes.





HISTORY OF THE NCDOT STRATEGIC FLEET MANAGEMENT PLAN - continued

- First three years of data unusable due to carryover of legacy data and users lack of familiarity with the system.
- By 2006, we were comfortable with the data collected.
- Needed a minimum of 4 years of good data to conduct the equipment replacement modeling study.
- In 2010, the contract with ECU was signed.
- Data from 2006 through 2009 used.





FLEET REPLACEMENT MODELING

- **FOUR MAIN RESEARCH OBJECTIVES:**

- Identify what is an acceptable rate of depreciation for the fleet.
- Identify the optimum disposal point for 6 major class codes of equipment: pickups, single axle dumps, flatbeds, backhoes, motor graders, front end loaders.
- Identify utilization rate that justifies cost of ownership of those 6 class codes.
- Produce an algorithm that could be automated.





FLEET REPLACEMENT MODELING

- **Dataset Inputs # 1:**

Acquisition Value, PM labor costs, Repair labor cost, PM part costs, Repair parts, Cost of fuel, Cost of oil, Cost of tires, and Total Actual Costs.

- **Dataset Inputs # 2:**

Miles (for on road), Operating Hours (for off road), Rent Hours, Available Hours, % Utilization, Year End Date, and Age (Years)





FLEET REPLACEMENT MODELING

- **Dataset Inputs # 3:**

Cost per Mile or hour, Age - rounded (for plotting), Sales Report, Master Data, Upfit, Depreciation Capture.





FLEET REPLACEMENT MODELING

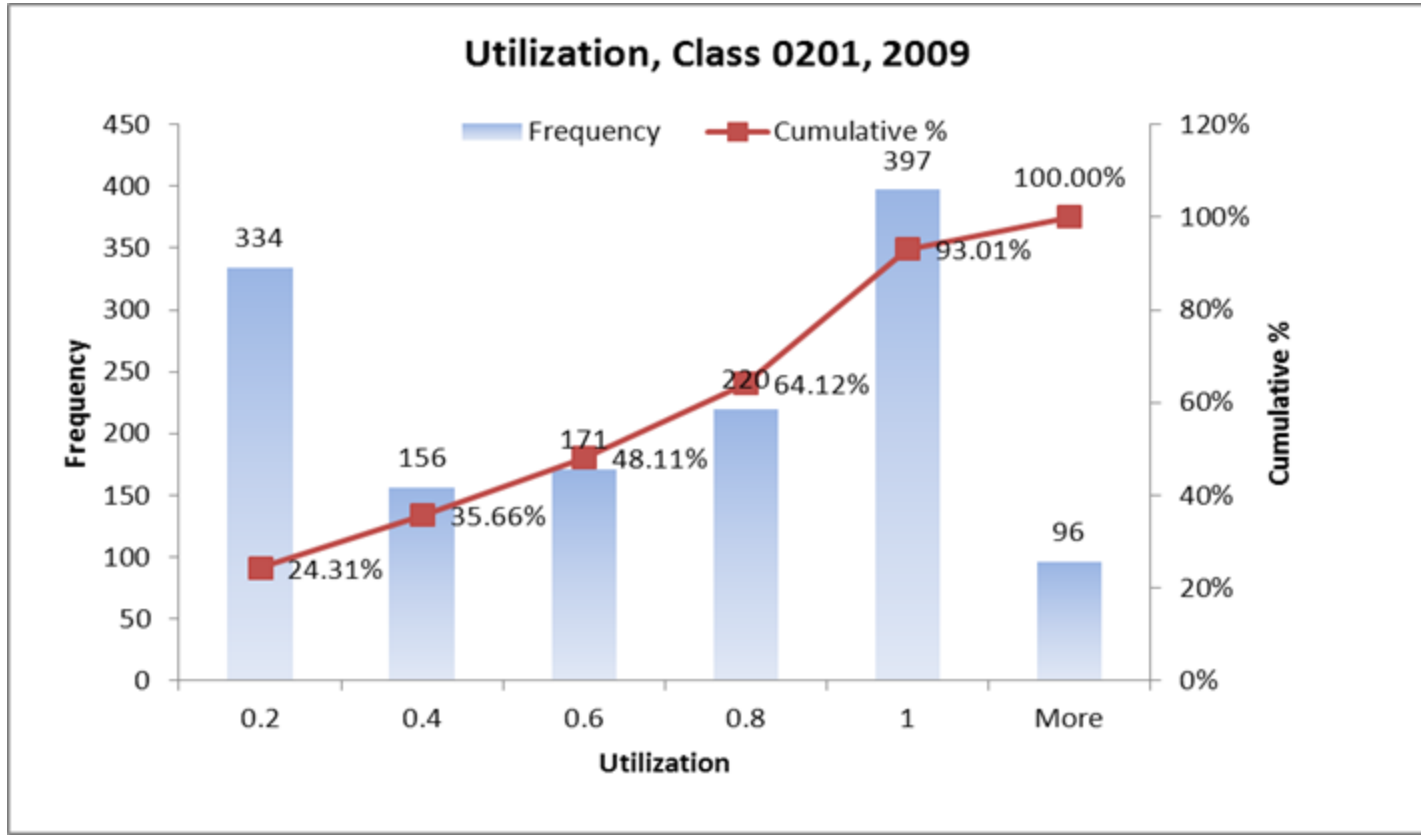
Example Summary Data Table:

- Number of Units
- Average vehicle miles / year
- Total miles
- Average Age of Fleet at Year End
- Average utilization
- Average Cost per Mile



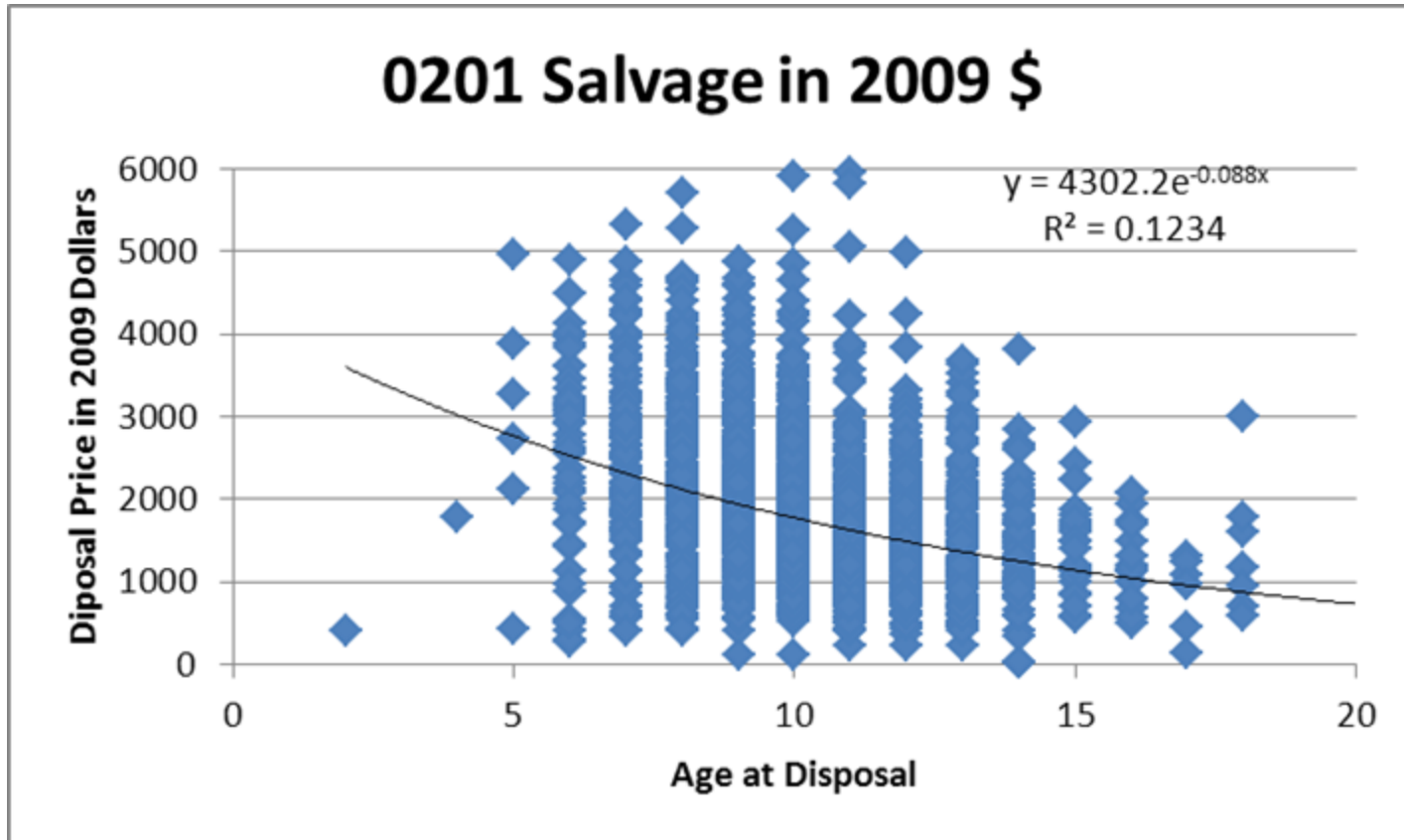


FLEET REPLACEMENT MODELING



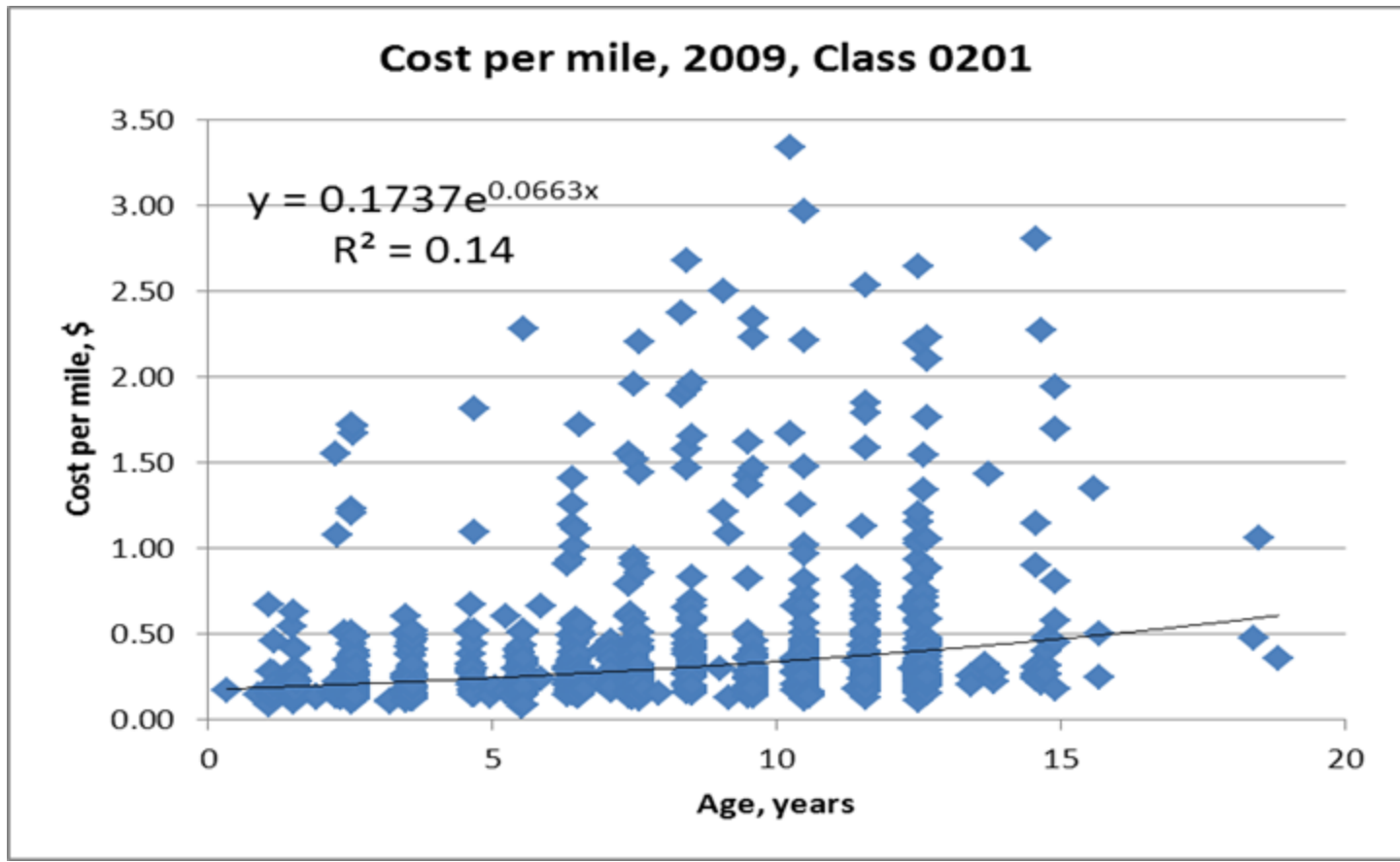


FLEET REPLACEMENT MODELING





FLEET REPLACEMENT MODELING





FLEET REPLACEMENT MODELING

Economic Life Model:

- Year
- Market Value
- Loss in Money Value
- Capital cost of Money Value
- Miles





FLEET REPLACEMENT MODELING

Economic Life Model (cont'd):

- Annual Operating Expense
- Total marginal cost for year
- Percent Value of marginal cost
- Total Percent Value
- Equivalent Uniform Actual Cost (through current year)





FLEET REPLACEMENT MODELING

Utilization Improvement Recommendation

- Class
- Fleet Size this year
- Utilization last year
- Target Fleet Size
- Target Utilization-Composite





FLEET REPLACEMENT MODELING

Pickup/SUV Truck Fleet

<u>Class</u>	<u>2009 Fleet Size</u>	<u>Proposed Size</u>	<u>2008 Utilization</u>	<u>Proposed Utilization Target</u>	<u>Economic Life</u>
0201	1366	1160	63%	75%	8-9 years





FLEET REPLACEMENT MODELING

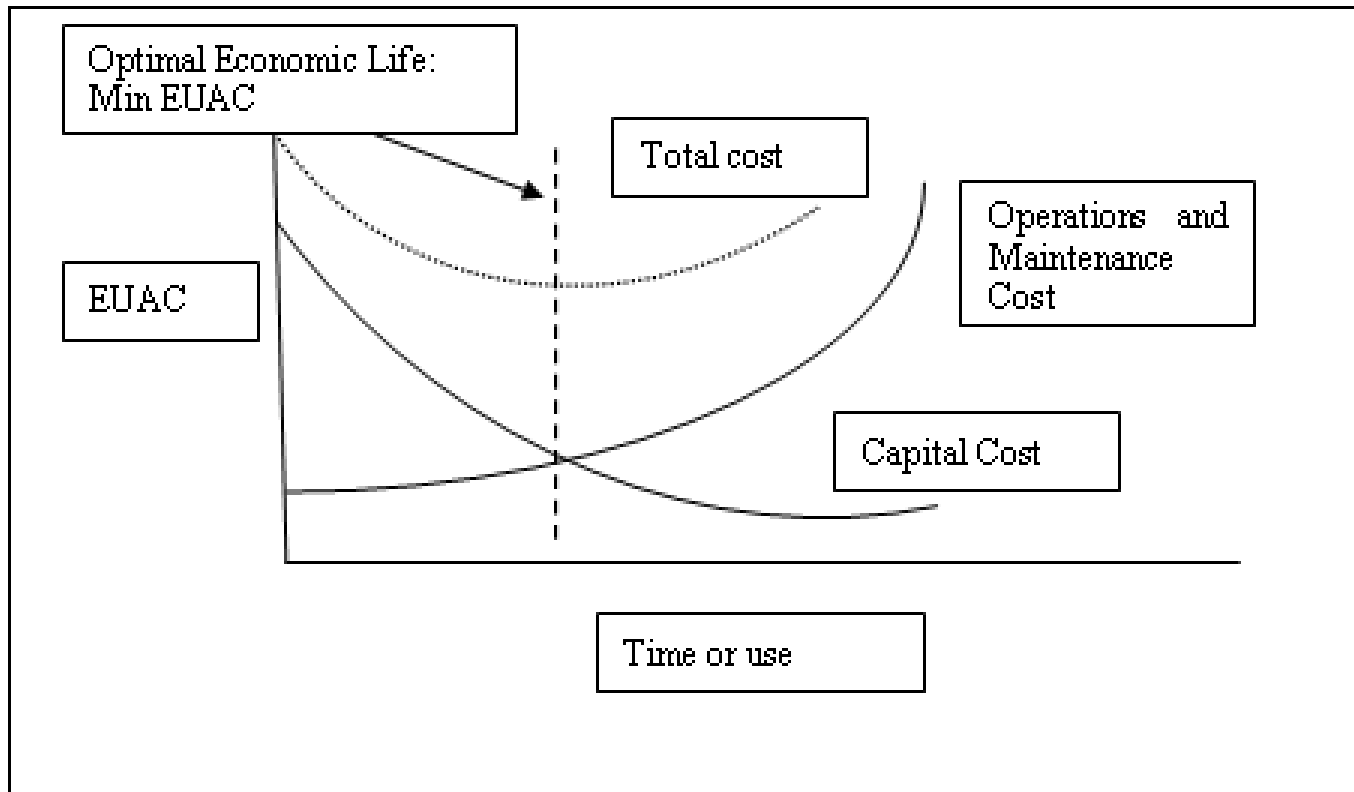
Equivalent Uniform Actual Cost: Existing Asset

- $EUAC \text{ (existing)} = (\text{annual O\&M and related expenses}) + (\text{CR: capital recovery cost})$
- $CR = P (A/P, i\%, n) - S (A/F, i\%, n)$





FLEET REPLACEMENT MODELING





FLEET REPLACEMENT MODELING

Lessons Learned:

Things to do:

- Continuous training on data input; ie. work orders, upfit costs, salvage values, etc.
- Continuous review and analysis of information that is being collected.
- Create and implement clear policies and procedures that provide consistency in reporting.





FLEET REPLACEMENT MODELING

Complete Study Can Be Found At:

<https://apps.dot.state.nc.us/Projects/Research/ProjectInfo.aspx?ID=2361>

FHWA 2010-04

Final Report (pdf)





FLEET REPLACEMENT MODELING

Questions/Comments

