

Fabled Mercedes Reliability Or Is Mercedes Reliability Just A Fable?

Mercedes-Benz ML 320: Does it demonstrate fabled Mercedes reliability, or is Mercedes reliability just a fable? I am the owner of a Mercedes SUV ML 320. My name is Paul Barringer and I'm angry about failures requiring towing the SUV to the shop for repairs!

You can download a PDF copy of this Problem Of The Month by clicking [here](#).

I've had three major failures in 106,700 miles requiring my SUV to be towed into the repair shop! The 1998 Mercedes Benz ML 320 has VIN number 4JGAB54E7WA013425. The vehicle was delivered on November 22, 1997. It now has 106,700 miles (171,700 KM).

I agree with the Mercedes sponsored bold headlines on page A8-A9 of a two page advertisement in the **Wall Street Journal** on Friday, October 8, 2004 which reads:

“Nothing will make a driver more faithful to a car than a car that is faithful to its driver.”

You decide if the ML 320 is faithful based on the evidence shown below. As the tag line in the lower right hand page of the second page of the advertisement says:

“Unlike any other. Mercedes-Benz.”

Read the facts below. Then you decide which is true: 1) Reliability demonstrated, or 2) Reliability only in the advertisement.

Also consider facts shown in the **Wall Street Journal** on Friday, October 29, 2004 on page A3. Here is the quotation from Chief Financial Officer Manfred Gentz of DaimlerChrysler:

“... Quality problems have slowed the launch of the redesigned Mercedes M-Class sport-utility vehicle and other cars, which has a “double effect” of increasing costs and cutting into sales, Mr. Gentz said. ...”

Oh my, still having problems in 2004 with a product launched in 1997. Mercedes CFO in Germany is uncomplimentary about Mighty Mercedes M-class vehicles after a product launch in 1997 (2004-1997 = 7 years and Mercedes still can't get it right! Mercedes, you have a problem with your core values as will be shown below!). By the way, reliability is a quality measure involving the dynamics of time!

The **New York Times** business section, page C1 and C4 for Friday, October 29, 2004 contains this assessment followed by another quotation from CFO Gentz: On page C4 a paragraph says:

“Analysts say the most disturbing long-term issue for Mercedes is its quality. With complaints about glitches multiplying, Mercedes has undertaken a campaign to repair the problems. It has also delayed the introduction of some models so they are not sold with similar problems.”

In the following paragraph of the same **New York Times** article is this quotation from Gentz:

“Quality costs are significant, they are very significant,” Mr. Gentz said. But he added, “I think we can really say and prove that vehicles that left our factories in the last 12 months have had almost no problems.”

Now, let me set my personal standard for expected Mercedes reliability:

How many breakdowns, requiring a tow-in, do you think should be in the log book if the vehicle is reliable? Reliability is the absence of failures, i.e., absence of the need for towing the vehicle from a breakdown on the road.

If the vehicle is reliable, the answer is zero tow-ins.

My scorecard shows three failures of demonstrated unreliability. Less you wonder, I have maintained the vehicle in excess of the stated maintenance schedule.

Here’s the current unreliability scorecard:

Failure #1: 49,500 miles—torsional vibration damper fell off the crank shaft.

This failure occurred on a summer day, in the 5:00 PM rush hour traffic east bound on I-10 highway in Houston, Texas while I’m in the fast lane. It required a great deal of rudeness on my part to cross two more lanes of commuters inside of Beltway 8 while eastbound to reach the breakdown lane. Of course this failure means no power steering, no power brakes, and no air conditioning on a hot summer afternoon. For most people this failure is a hard down situation. After inspection of the problem, I lowered all windows and turned on the heater (yeah, like I needed more temperature when it’s 98 °F (37 °C) and 95% relative humidity) to prevent engine over-temperature. I used brute strength to force the dead beast back to the Mercedes dealer, Star Motors, a distance of 7 miles (11 KM) for repairs which were done under warranty. I commented to my service representative that since I’ve never in my life had such a failure nor have I ever know anyone who had a failure of a torsional vibration damper, this must be a rare event! No, he said, we had a similar situation almost a week ago on the same model at roughly the same mileage. OK, it’s a new model. I’ll be forgiving and not make world war III out of infant mortality due to a German manufacturing defect repaired under warranty for failure #1. I’m counting this failure as a tow because most drivers would have been disabled without knowledge of how to control engine high temperature.

Failure #2: 96,500 miles—fuel pump failure.

Long cranking cycles (usually less than 1.5 seconds) are very rare for the ML 320. I began having random occurrences of long cranking problems with up to 2 to 4 seconds duration. This was out of character. I launched for my dealer, Star Motor which is 3 miles (5 KM) from my office. I failed to reach my destination. I had to be towed the last 1 mile! From Mercedes Roadside service, I learned several upgrades had occurred to the fuel pump because of early failures. I understand entropy deteriorations. I could almost forgive the failure until I learned about multiple change notices on a fuel pump. I believe the short life is due to design errors. I would have thought German designed and German manufactured Mercedes fuel pumps would be obvious by now and not require design changes! After failure #2, I’m becoming angry with the lack of reliability!

Failure #3: 106,000 miles—ignition key failures.

This is the straw that broke my camel's back! Midnight arrival into the Houston, Texas airport and my "trusty" ML 320 would crank, start, and immediately shut down. I repeated this many times to no avail. The wrecker delivered the SUV and me to Mercedes dealer Star Motors at 3:00 AM on a hot, sweaty, night after mosquitoes had chewed on me for 2.5 hours while I waited outside for a wrecker. The diagnosis: a failed ignition key. Wait, it gets better! The reserve key would also not work (although it was functional just one week earlier!). So \$500 later I get a new key, and \$100 later I make a second trip for a second key as only one key was ordered to validate the problem. I commented that this must be a rare occurrence. I learned from my service representative this was more common than you'd expect and I should be happy with my combined mechanical-electronic key because the newer light-sourced electronic key failure occurs at a higher rate! I believe this failure had a common failure mode resulting in poor design of the antitheft system that disallowed me to even limp home at reduced speed (thieves want a fast get away, not a limp away, and Mercedes did not plan for an allowable alternative). Failure #3 of a German designed and German manufactured key system is now clear evidence of significant reliability problems with the ML 320!

Now you know why I'm angry!! The odds for having two mechanical keys with electronic anti-theft capability fail on the same day is very rare—unless the real cause for failure is a common cause. Of course Mercedes distributor Star Motors defense is always it's someone else's responsible for the problem just like the left rear seat rattle that I've been complaining about on almost every visit is now told to me "It is the result of bad tires"---yeah like I've had bad tires for 106,000 miles and my new top of the line Goodyear tires with 12,000 miles which are balanced and rotated every 6,000 miles are the source of the rattle!

I sent a draft copy (in PDF format) of this Problem Of The Month to Mercedes executives with some responsibility for reliability on October 5, 2004:

"I plan to post the attached draft PDF file to my list of [Problems Of The Month](#) by no later than the end of October 2004. The title of the article will be: "**Fabled Mercedes Reliability? Or Is Mercedes Reliability Just a Fable?**".

If you have rebuttal comments and wish your comments to be posted, I will post your response. However, if you do not want comments published, I will respect your wishes."

No response from four executives who received the Email:

- 1) Unger
- 2) Sopp
- 3) Karr
- 4) Balasubramanian

Please note that Professor Balasubramanian did pass the information to Linda Tognetti, Team Leader, Customer Relations. Ms Tognetti responded with a letter to me, [which you can download as a PDF file](#). You will find the last sentence of the 3rd paragraph to summarize Mercedes position:

"We do not believe that a vehicle requiring repairs at those mileages are in any way an indication of defect or lack of quality."

In other words:

Mercedes, you just don't get it! Reliability is a quality attribute!

Maybe Mercedes in Germany has failed to indoctrinate their employees with a reliability

culture (is this their fatal flaw?). Maybe it explains why customers are abandoning Mercedes over quality issues? I had hoped for a response to the questions below:

1. What is the design life of the vehicle?
2. What is the design criteria for tow-ins expected during the design life?
3. How many tow-in failures are expected during the design life?
4. **What should I do to avoid future tow-ins by preventive actions.**

It's clear, no answers are forthcoming from Mercedes.

When will failure #4 occur?

It's time to make a **"fearless forecast"** of the next failure using Crow-AMSAA reliability growth plots. Here's the data set for [WinSMITH Visual](#):

Cum_Time x	Cum_Failures
49500	1
96500	2
106000	3

You can download this data as an authentic WinSMITH Visual [file](#) and import it into a no-cost demo copy of [WinSMITH Visual demonstration software](#). When you open the authentic file in WinSMITH Visual the demo version will handle the data file with fidelity (however, if you manually input raw data the demo program will slightly randomize the data).

Figure 1 is a Crow-AMSAA reliability growth plot which is used to forecast the fourth failure. The next failure should occur about 135,000 miles (give or take ~10%) or 29,000 miles into the future. OK, mighty Mercedes, what failure should I head off so your name doesn't appear with another tow-in report?

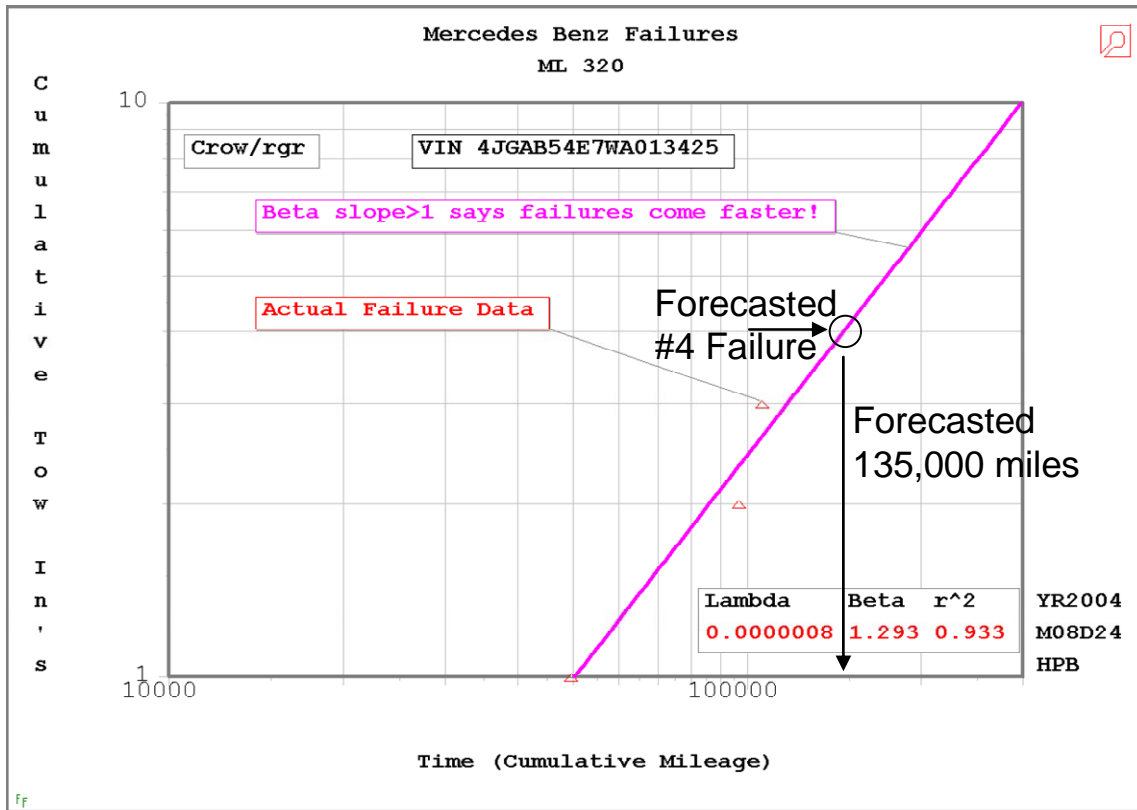


Figure 1: Crow-AMSAA Plot Predicting Future Failures

How do you interpret Figure 1?

1. The beta value is the slope of the reliability growth curve as explained in MIL-HDBK-189. Beta values less than 1 show the system is improving and failures are coming more slowly. See the USA space shuttle data in the [August 2004 problem of the month](#) for an example with beta = 0.459 with aging equipment which demonstrates the excellent reliability improvements NASA has made with old space craft. Beta values of ~1 show the system is neither improving or deteriorating. Beta values greater than 1 show the system is deteriorating and failures are coming more quickly even with all maintenance performed on schedule at a Mercedes dealership.

2. The r² value is the coefficient of determination. It shows a goodness of fit criteria with a critical value for three data points of 0.7707 so the actual r² = 0.933 far exceeds the critical value which tells of an excellent curve fit by regression techniques.

3. The lambda value is the inherent failure rate at time = 1. Lambda is needed for the curve fit line where $N(t) = 0.0000008t^{1.293}$. The trend line is extrapolated to N=4 to find the time (mileage) where the next failure will occur. The “fearless forecast” of future failure #4 is 135,000 miles or 29,000 miles into the future from the last failure.

I estimate the ML320 has a practical design life of 300,000 miles. Based on actual failures shown above, I’m predicting 7 more failures will occur before reaching vehicle design life. Assuming I drive 25,000 miles/year for the next 4 years and then 12000 miles/year there after, I will reach 300000 miles in ~11 years. The vehicle life and my

personal life will roughly coincide based on my current life expectancy (see [Table 1 at page 82](#) for my current age of 68) of 18.6 more years to be added to my age of 68 years. So, we both go out together and this supports my statement that I've bought my last truck. Of course if I need a new truck, I think I'll buy a Dodge Ram for reliability.

Transforming the Y-axis of Figure 1 produces cumulative MTBF results in Figure 2. The decline in MTBF drives my aggravation in Figure 2. You can also download this [MTBF file](#) for import into WinSMITH Visual.

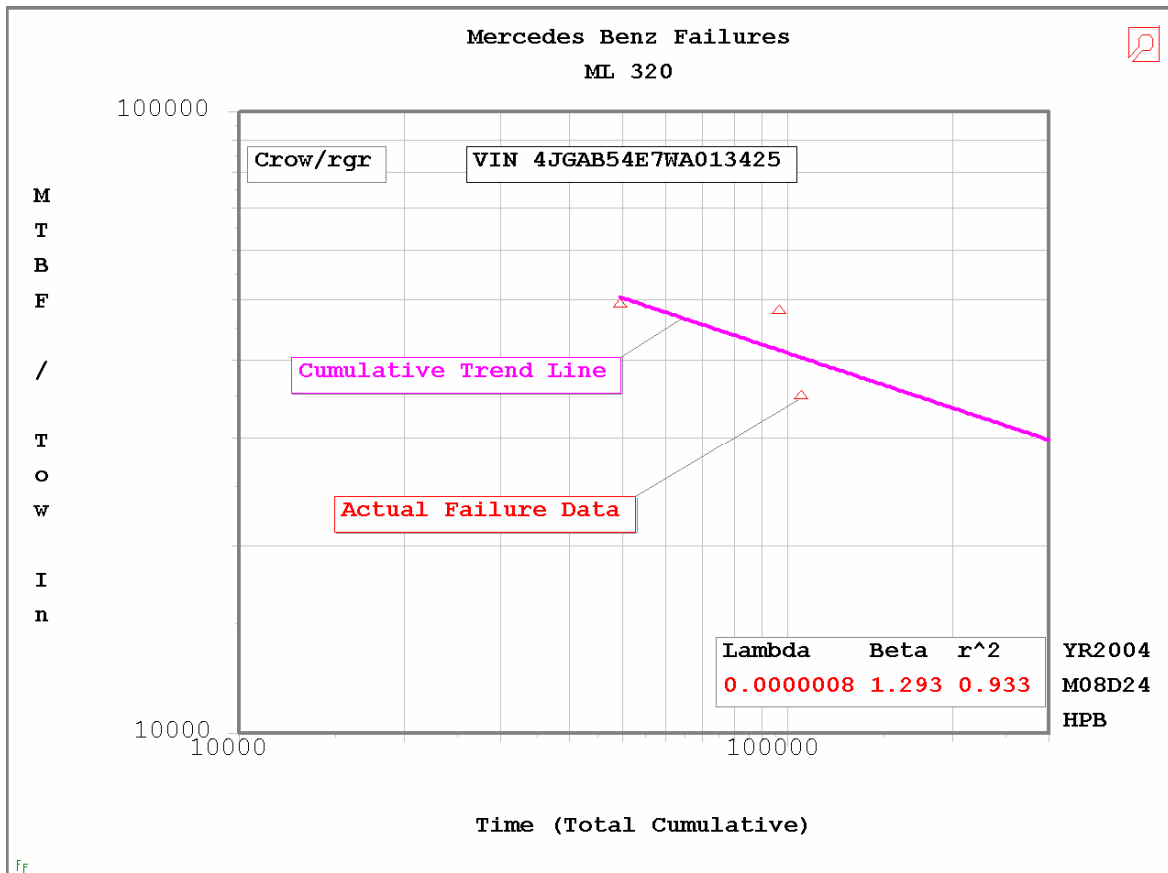


Figure 2: Mean Time Between Failure

Figure 2 shows the overall cumulative trend line. This says the long-term; mean time between failures is dropping as failures occur in shorter intervals of time.

The instantaneous failure rate curve is added in Figure 3. The instantaneous line shows why I'm **really aggravated** because it shows the local MTBF. Consumers are concerned about the instantaneous trend lines because that indicates what's happening today without including the long term history.

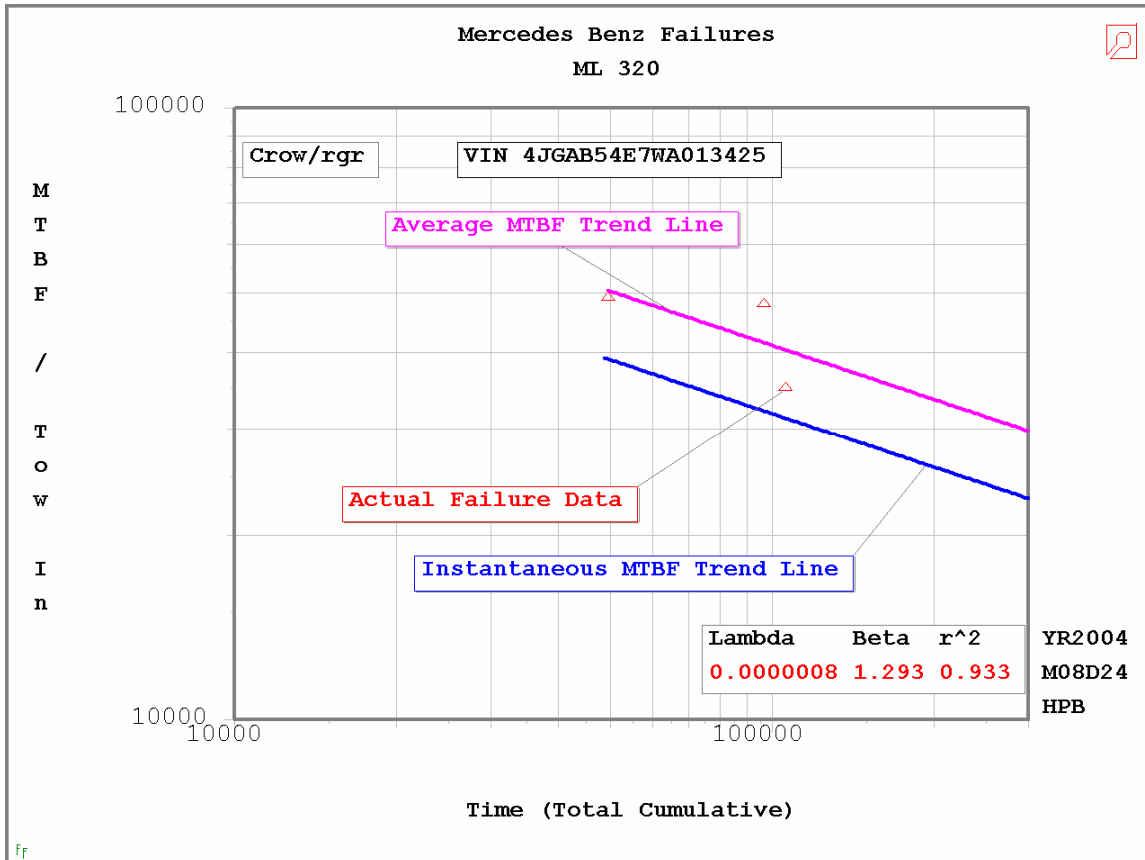


Figure 3: Instantaneous Mean Time Between Failure

Figure 3's instantaneous MTBF line says the local tow-in events are occurring at ~31,000 miles/failure and by 300,000 miles they will be occurring at ~23,000 miles per failure.

Mercedes Benz will describe a different failure rate for the 1998 shipments of ML 320 for their population. They will describe my failure events as samples (Mercedes, your sample is my total population! I'm angry about three tow-ins in 106,000 miles!).

I assume the demise of the ML 320 from Mercedes product line is silent admission that they would like to forget the inferior performance of the ML 320 as their current model is ML 350. I understand the ML 350 is reliable after over 4000 engineering change notices (I wonder how many Mercedes change notices were for substance and how many for style?).

Let's be clear about my tow-in expectations—I would accept a **10% chance** of having **up to one** tow-in failure in 300,000 miles—**NOT** three tow-ins in 106,000 miles.

Figure 4 shows my expectations for tow-ins. For example, at 106,000 miles the trend line says to expect a 3.65% chance of requiring a tow-in---IF the population of 1998 ML 320's is 10,000 SUV's that means 3.65%*10,000 = 365 vehicles requiring a tow by age 106,000 miles. Do you wonder how many Mercedes owners are incensed by a single tow-in event???

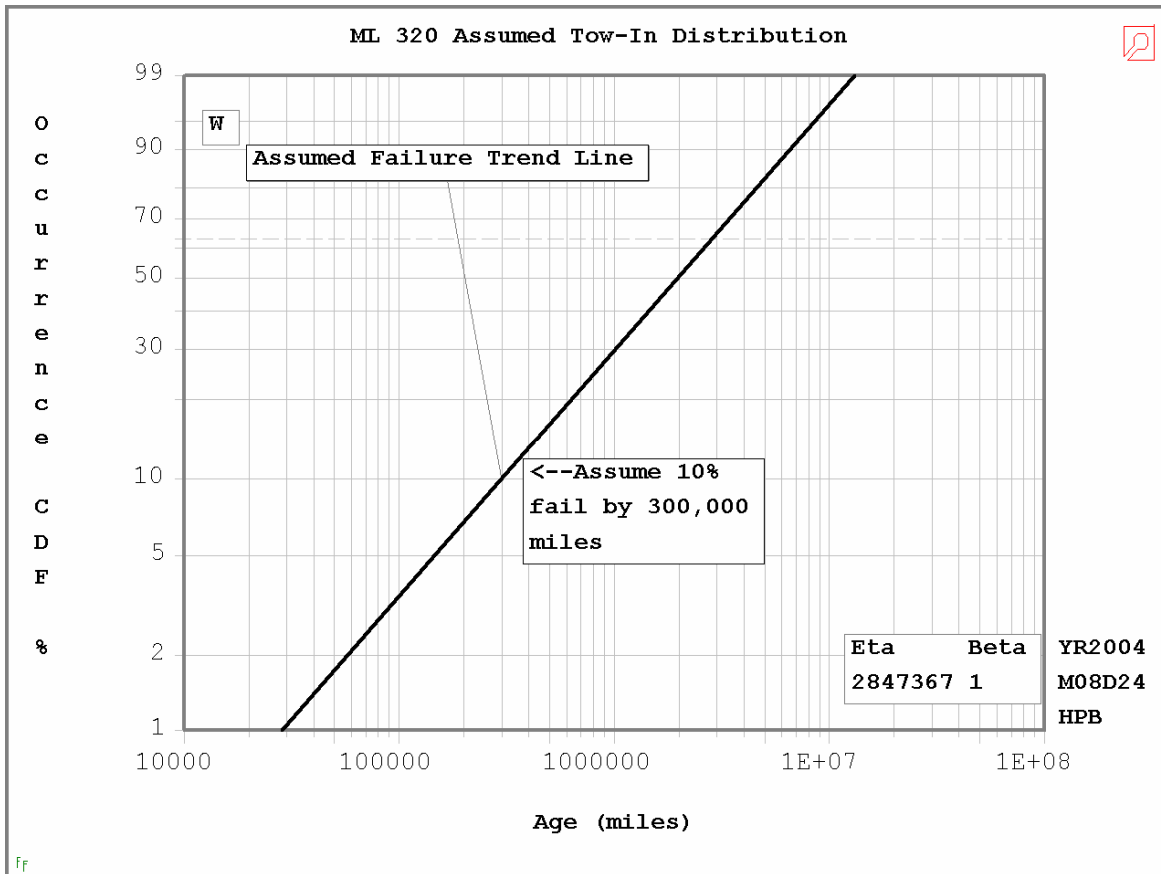


Figure 4: Assumed Tow-In Failure Rate

From Figure 4, what are the odds of needing three tow-ins by 106,000 miles based on my experiences?

Cum Time	Cum % Occurrence
49500	1.72%
96500	3.33%
106000	3.65%

The odds for my three failures is $(0.0172) \times (0.0333) \times (0.0365) = 0.0000209\%$ or ~1 chance out of 50,000. IF only 10,000 of the 1998 ML 320's were built, then I truly have an exceptional vehicle!—else the real problem designed into the German product with an American body is far more severe than my expectations.

Ordinary people often cannot voice displeasure with tow-in break downs. This problem of the month uses actual data showing others the results of poor equipment performance with numbers.

You decide: Based on my results to date: Does my ML320 display fabled Mercedes reliability? Or, is Mercedes reliability just a fable?

I have including the above graphs into my [Reliability Engineering Principles](#) training class. The graphs make great training examples for new reliability engineers. They

stimulate much speculation about what failure I should expect next? OK, Mercedes, perhaps you can answer the question of “**What fails next**”?

Am I mad at?:

1) **Mercedes**—yes, I’m very angry!

Mercedes, you leave me standing by the side of the road with breakdowns. Breakdowns on the road are terribly embarrassing for licensed professional engineers associated with reliability issues. I purchased a Mercedes vehicle for their “famed” reliability—what did I get?—you decide based on the evidence.

2) **Star Motors Mercedes** distributor—yes, I’m angry.

Star Motors, you stonewall fixing my problems. You charge me an arm and a leg for repairs. You leave me angry with your deprecating attitude.

3) **Mercedes service representative** at the dealership—yes, I’m sort of angry. You are not an ombudsman for resolving my complains.

4) **Mercedes salesman**—no, not at all!

He’s the only one at Mercedes in Houston who gives me a straight answer! If you decide to purchase a Mercedes, call [Curt Rich](#). Curt will give you a straight answer (I do recognize this statement of honesty is an obvious oxymoron for a car salesman—but he’s knowledgeable, good, and embarrassed by breakdowns of my ML 320)!

What do I expect from Mercedes? **Nothing--except information**, if I’m lucky. I want to anticipate future failures based on spare parts supplied for the ML 320 so I can take remedial action to prevent breakdowns.

Just in case I’m surprised and receive an authoritative answer from Mercedes, I’ll report the details here. Otherwise, stay tuned for future failure reports. Also stay tuned for the opportunity to see the accuracy of my “fearless forecast” for future failures.

Return to the list of problems by [clicking here](#). Search this site for additional articles on reliability growth plots and technical papers such as [Predicting Future Failures Using Your Maintenance Database](#).

Refer to the caveats on the [Problem Of The Month Page](#) about the limitations of the solution above. Maybe you have a better idea on how to solve the problem. Maybe you find where I’ve screwed-up the solution and you can point out my errors as you check my calculations. E-mail your comments, criticism, and corrections to: Paul Barringer by



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