Cost of ESD Damage

What percentage of electronic failures are latent defects? What's the cost to industry? According to the ESD Association "It is relatively easy with the proper equipment to confirm that a device has experienced catastrophic failure. Basic performance tests will substantiate device damage. However, latent defects are extremely difficult to prove or detect using current technology, especially after the device is assembled into a finished product." So there is the view that, by definition, it is impossible to quantify the amount of latent damage. However, for most companies, the cost of customer returns and field service warranty expense greatly exceeds in-house scrap & re-work expense.

Per the ESD Association: "The age of electronics brought with it new problems associated with static electricity and electrostatic discharge. And, as electronic devices became faster and smaller, their sensitivity to ESD increased. Today, ESD impacts productivity and product reliability in virtually every aspect of today's electronics environment. Industry experts have estimated average product losses due to static to range [up to] 33%. Others estimate the actual cost of ESD damage to the electronics industry as running into the billions of dollars annually." From ESD Association web site at http://www.esda.org/basics/part1.cfm

Some major companies report that 25% of all identified electronic part failure is due to ESD. As an ESD Control Program improves, a resulting decrease in unidentified field failures and "no problem found" returns should occur. Reducing latent defect field failures is what allows companies to report return on investments of 10:1 from their ESD Control Programs.

From ESD Association web site at http://www.esda.org/basics/part1.cfm
"Despite a great deal of effort during the past decade, ESD still affects production yields, manufacturing costs, product quality, product reliability, and profitability. Industry experts have estimated average product losses due to static to range from 8-33%. Others estimate the actual cost of ESD damage to the electronics industry as running into the billions of dollars annually. The cost of damaged devices themselves ranges from only a few cents for a simple diode to several hundred dollars for complex hybrids. When associated costs of repair and rework, shipping, labor, and overhead are included, clearly the opportunities exist for significant improvements."

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Table 1
Informal Summary of
Static Losses by Level

Static Losses Reported			
Description	**Min. Loss**	**Max. Loss**	**Est. Avg. Loss**
Component Manufacturers	4%	97%	16-22%
Subcontractors	3%	70%	9-15%
Contractors	2%	35%	8-14%
User	5%	70%	27-33%

Source: Stephen Halperin, "Guidelines for Static Control Management," Eurostat, 1990.

From page 27 White Paper on Electrostatic Discharge (ESD) Phenomena LIMITATIONS AND TRENDS

Introduction
Electrostatic discharge (ESD) component/device/IC level stress testing continues to be a critical step in the qualification process of electronic products like integrated circuits (ICs). In 1998, SEMATECH rated ESD as the #3 in the list of future problems related to yield and device reliability. Technology development is making ESD testing more challenging because the testers must continue to improve to account for the demands of large pin counts of the devices. Pin counts have gone from 168 to greater than 1000 pins in the last 10 years. The SEMATECH roadmap points to IC packages with as many as 5000 pins in a few years.