Here’s a breakdown of the cost factors, and I’ll reiterate that obtaining precise numbers is challenging.

**Cost Factors:**

1. **Purchase Price of the Redundant Masks:**
   * A standard passenger oxygen mask (not the quick-donning type used by pilots) can cost anywhere from $100 to $400 per mask, depending on the manufacturer, features, and quantity purchased. Let’s estimate an average of $250 per mask for the purposes of this exercise.
   * A commercial aircraft (like a 737) could have a large number of passenger seats, which directly relates to the number of masks.
2. **Installation/Integration Costs:** This is where the expenses can significantly escalate.
   * **Engineering Design and Certification:** Modifying an aircraft’s oxygen system requires engineering analysis, design modifications, and FAA (or equivalent aviation authority) approval. This is a complex and expensive process. You’d need to demonstrate that the redundant system meets safety regulations. The cost of this engineering work alone can be in the tens of thousands of dollars, potentially exceeding $50,000 to $100,000 or more.
   * **Plumbing and Routing:** Additional oxygen lines would need to be run to each seat, which requires careful routing to avoid interference with other systems and to ensure safety.
   * **Storage and Deployment:** Figuring out how to store and reliably deploy the extra masks is another challenge. The existing overhead bins might not have enough space, or a new deployment mechanism would need to be engineered.
   * **Labor Costs:** The physical installation (drilling, routing lines, connecting masks, etc.) requires skilled technicians, and the labor costs can be substantial.
3. **Maintenance and Inspection:** A redundant system adds complexity, which will increase ongoing maintenance and inspection costs.

**Rough Estimate of a Redundant System:**

Let’s assume, for simplicity, we’re just considering the *extra* cost to have one *additional* mask per seat and are only looking at the purchase of masks for a 150-seat aircraft and *not* modifying or creating a new installation of another oxygen system.

* Extra masks: 150 seats \* $250/mask = $37,500

If we needed to modify or alter the oxygen system and installation.

* Engineering & Certification: $50,000 - $100,000+
* Parts and Materials: $5,000 - $20,000+
* Labor: $10,000 - $30,000+

**Therefore, the total cost of adding a redundant face mask system could potentially range from $37,500 (if only the purchase of additional masks) to $92,500 to $187,500 (or higher) when including engineering, installation, and certification.**

**Important Considerations:**

* **Regulatory Approval:** Any modification to an aircraft oxygen system *must* be approved by the relevant aviation authority (FAA in the US, EASA in Europe, etc.). This approval process can be lengthy and expensive.
* **Safety Analysis:** A thorough safety analysis would be required to ensure that the redundant system doesn’t introduce any new hazards.
* **Practicality:** Airlines might find it more cost-effective to simply ensure that the existing oxygen system is meticulously maintained and regularly inspected rather than investing in a redundant system.
* **Weight:** Adding extra masks and plumbing will increase the aircraft’s weight, which can slightly impact fuel efficiency.