GM Presentation

Cadillac DTS Door Closer

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Mission Statement

Product description

System for enabling easy closure of a Cadillac DTS side door by a person seated inside the vehicle.

Secondary product use is a door opening system if our design is conducive to this operation.

Key Business Goals

Wide appeal to the luxury market – 20% of DTS buyers purchase this option within 2 years of introduction

Option sales must cover at least 50% of the cost

Easily integrated into the manufacture of existing product (some doors will still be manual and must be built on same production line)

Assumptions and Constraints

Operator-attended system

Traditional front hinge door

Traditional door frame

Market analysis

Primary Market
Buyers of the Cadillac DTS
Average customer age is 55yrs, 150K annual income
This luxury car sells about 80,000 units a year (relatively high volume in this segment)

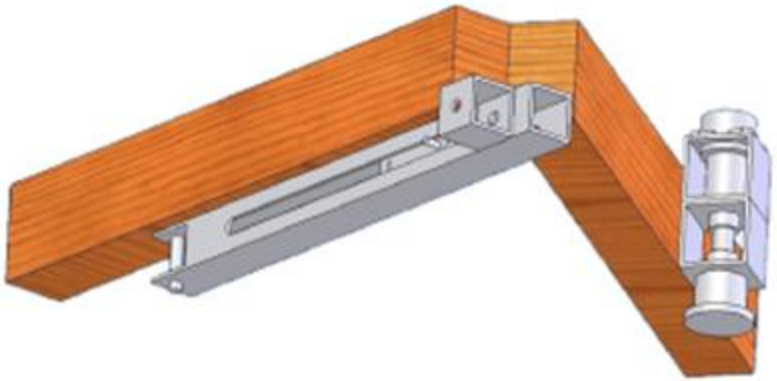
Secondary Market
Customers using other GM vehicles
Other GM owned large vehicles such as the Hummer
Car customization businesses

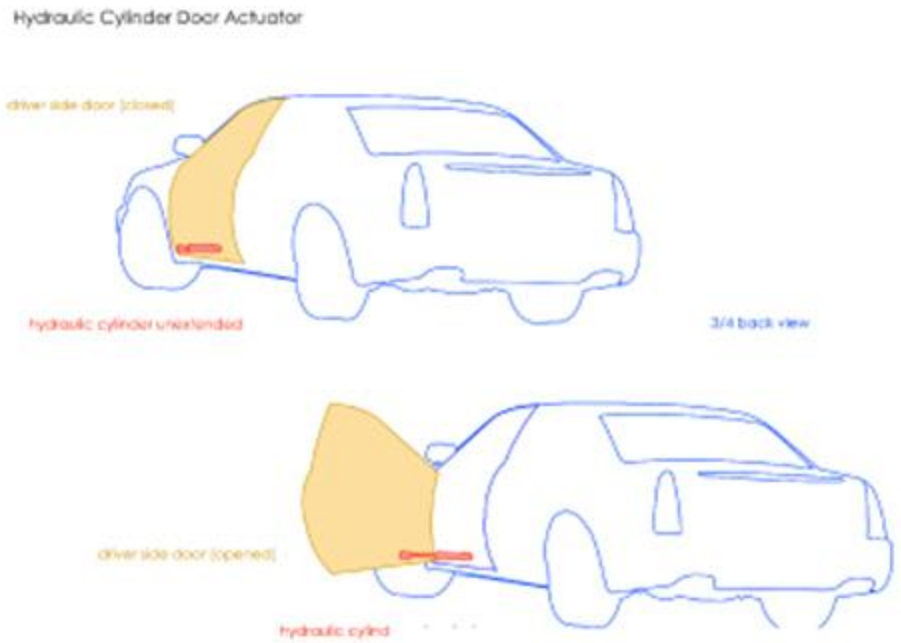
Project Stakeholders
GM
Car owners and users
Resellers
Mechanics
American Association of Retired People (AARP)

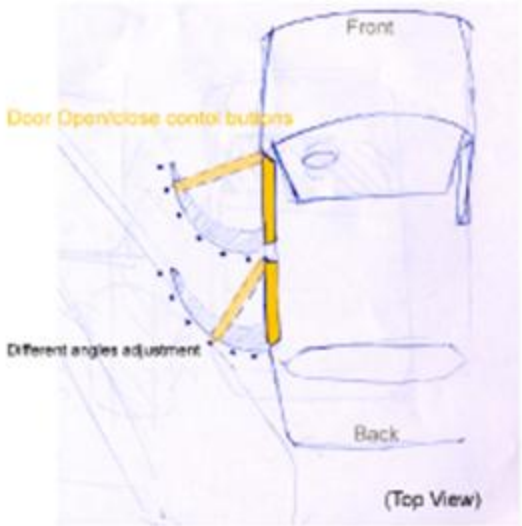
Customer needs

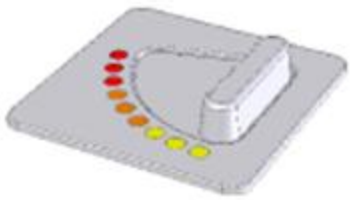
Closes at least to within reach
Operates quickly
Does not close on hands/limbs
Can be manually operated
Operates when parked on an incline
Controls are easy to understand and use
Controls are arthritic friendly
Controls are not inadvertently activated
Functions in adverse weather conditions
Operates when car is off
Is Modular (optional equipment)

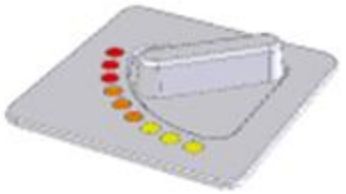
Original Ideas. . .











Financial assumptions

Demand Assumptions	
Number of DTS sold/yr	80,000
Quarterly growth rate	1%
Penetration rate in Q1	5%
Quarterly growth rate	20%
Number of doors puchsed	1.8

GM Benchmarks	
Profit margin	50%
Payback period (years)	1
Other Assumptions	
GM Discount rate	10%
Supplier gross margin	30%
Transportation costs	10%
(% of price paid to supplier)	
Marketing expense to promote adoption	
year 1	$1,500,000
year 2	$1,000,000
year 3 onward	$500,000
Service cost per incident	$100
(% of installed based needing service)	2%

Production Costs		
Mechanical system		
Motor	$124.00	
Door Bearing Box	$5.00	
Car Bearing Box	$5.00	
Coupling Box	$5.00	
Door Bearing Box Bracket	$3.00	
Car Bearing box Bracket	$3.00	
1/2" Rod	$2.00	
3/8" Rod	$1.00	
1/2" Flange Bearings	$5.00	
3/8" Flange Bearings	$6.00	
Spiral Spring	$20.00	
Spider Coupling	$18.00	
Subtotal	$197.00	$39.40
Control System		
Pushbutton Switch	$2.79	$0.20
Limit Switch	$2.69	$0.20
DPDT Relay	$8.39	$0.50
Wire	$5.99	$0.10
Subtotal	$19.86	$1.00
Beta Prototype		$3.00
Sensors		$30.00
Soft-close		$33.00
Subtotal		
Production subtotal	$216.86	$73.40
Carrying cost of inventory (% of production cost)		5%
Supplier's Production TOTAL COST		$77.07
Supplier Gross Margin		30%
Supplier Sales Price (GM COGS)		$110.19

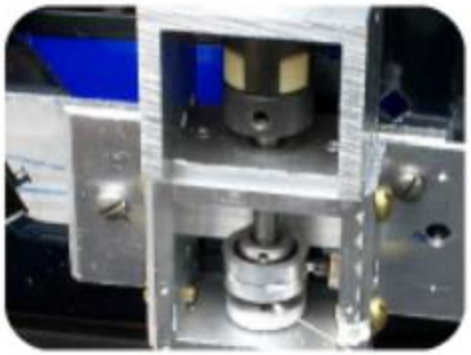
Financial model

GM Financial Model ($ in thousands)

NPV $4,573
IRR 31%

	2006	2007	2008	2009	2010
CAPEX					
Production development					
Supplier tooling/cells					
GM tooling/cells					
Income Statement					
Revenue					
DTS Sales		81,208	84,505	87,937	91,507
Penetration rate on new sales					
Quarterly penetration growth rate					
Total new door customers					
Installed base of total customers		5,461	17,246	34,833	53,134
avg # of doors purchased					
Total Doors Purchased		9,830	21,212	31,657	32,943
avg price per unit					
Total Revenue		**$3,539**	**$7,636**	**$11,397**	**$11,859**
COGS					
Price Paid to Supplier		$985	$2,125	$3,172	$3,301
Transportation Cost		$98	$213	$317	$330
% of installed base needing service					
Service Cost ($100 per incident)		$18	$97	$225	$370
Total COGS		**$1,102**	**$2,435**	**$3,714**	**$4,000**
Gross Profit		**$2,437**	**$5,202**	**$7,682**	**$7,859**
Gross Margin		*68.9%*	*68.1%*	*67.4%*	*66.3%*
Marketing Expense		$1,500	$1,000	$500	$500
OPERATING CASH FLOW		$937	$4,202	$7,182	$7,359
FREE CASH FLOW	**($500)**	**($563)**	**$4,202**	**$7,182**	**$7,359**
CUMULATIVE CF (used for payback period)	**($500)**	**($1,063)**	**$3,139**	**$10,321**	**$17,680**

Component photos



Production Version vs. prototype

More customer testing
Safety Sensors – Pinch & Proximity
Smaller, more concealable components
Retraction Mechanism
Silent operation
Larger Motor
Infinite Linkage
Design for manufacturing

Q & A

Thanks GM!!

15.783J / 2.739J Product Design and Development

Spring 2006