oduct Name	HPV				Page No	of			
System Name Subsystem Name Component Name			Count =	36	FMEA Number Date				-
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Subsection	Part # and Functions	Potential Failure Mode	Potential Effect(s) of Failure	(S)	Occurance	Current Design	Detection (D)	RPN	Recommended Action
Subsection		Potential Failure Mode	Potential Effect(s) of Failure [1-10		(O) [1-10]	Controls Test	[1-10]		
Braking	Lever	Sheared lever due to impact	Impaired ability to actuate brake	7 Large impact force	2		1		14 Brake away lever
	Cable	Loss of tension in cable	Loss of brake force	5 Plastic Deformation	4		3	1	60 Cable Maintence
	Caliper Clamps	Brake pad wear	Loss of brake force	6 Large fricition	1		5		30 Maintain & replace pads as needed
	Brake Mount	Bending or fracture under load	Plastic deformation	4 Large load	1		5		20
	Bolts	Loosens over time	Impaired ability to actuate brake	7 High cycle life	1		4	:	28
	Wheel	Deformation of rim	Loss of effecive braking	3 Bent rim due to impact	3		4		36 Larger wheel treadwall
	Tires	Tread decay	Loss of traction to brake	5 High cycle life	5		2		50 Maintain tires & replace as necessary
	Brake disk	Bent disk	Impedes wheel from spinning, dam	5 Impact to disk causing it to bend	3		3		45 Protect with frame or gaurd
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Drive-train	Chain Slipped teeth	Sprocket over- or under-slipped chain	Loss or inefficient Power	3 Inaduquate tensioning	2		5	:	30 Set Tensioner
	Chain slipped off sprocket	Chain skipped teeth and fell of spocket	Loss of Power	9 Inaduquate tensioning or maintence	3		1	:	27 Set Tensioner and Lubricate Chain
	Broken Chain	Chain broke at pin or link	Loss of Power	9 Lack of maintence	3		1	:	27 Lubricate Chain
	Loose Sprocket	Sprocket seperated from axis of rotation	Inefficent power output	3 Poor Manufacturing	2		7		42 Ensure adequate sprocket Seating
	Corroded Sprocket/Chain	Rust fatiguing sprocket and chain	Broken chain (Loss of Power)	6 Enviromental Effects	2		5	1	50 store HPV inside
	Tensioner Misalligned	Chain slip or broken chain	Slipped chain (Loss of Power)	8 Tensioner not parrallel to drivetrain	1		5		40 Ensure tensioner is inline
	Tensioner not Calibrated	Chain slip teeth or sprocket	Slipped chain (Loss of Power)	6 Tensioner under or over tensioned	2		3		36 Set Tenioner
	Crank Arm	Deformation, bending, fracture	Loss of operational efficiency	3 Large loads, high cycle life, poor material selection	2		5		30 Reinforce Crank Arms
	Pedals	Fracture, plastic deformation	Loss of operational efficiency	1 Large loads, high cycle life, poor material selection	2		2		4 Reinforce Pedals
	Gears	Fracture, corrosion	Slipped chain (Loss of Power)	5 High cycle life, poor material selection	3		4		60 Maintain gears & replace as necessary
Steering	Design	Alingment	excess tire wear, decrease efficien	2 Excess compression forces, impact	8		2		32 Plan alignment in CAD design
	Handlebar	Crack propagation	Broken handlebars	5 Sharp corners in design (especially with Aluminum)	2		6		60 Reinforce as needed (fillets)
	Handlebar clamp	Loss of grip	Unalligned handlebars	4 Incorrect clamp or dimensioning	5		2		40 Design correct diameters, make one piece with
	Tie rod	Deformation underload	Loss of allignment	3 Impact to wheel or tie rod	5		2		30 Design to handle compression
	Fastners	Losen or fracture	Loss or allignment or function	5 Impact, incorrect harware/ installation, fatigue	4		2		40 Use correct grade and fastners, locktite
	Fork	Bending, fracture under load	Part failure	8 Excess braking force or impact	2		3		48 Design for impact, caliper rim brakes
	Fork	Crack propagation	Part failure	8 Sharp corners in design (especially with Aluminum)	2		6		Reinforce as needed (fillets, camfer)
	Spindle	Deformation under load	Part failure, out of allignment	6 Fatigue, poor design for load,	3		3		54 Design for correct load, mount wheel close to a
	Welds	Weld failure	Part failure	6 Fatigue, poor weld, impact	3		4		72 Preform pratice welds, inspect welds
	Handlebar linkage	Deformation, or failed connection	Loss of steering	4 Impact, or excess force	5		4		30 Use correct fastners, limit excess parts
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rame/Rollcage	Base Frame	Bending due to loading	Frame can't support weight	8 Loading, inadequate supports/geometry	3		2		48 Testing and proper geometry
	Roll Cage	Fracture, bending, plastic deformation	Offers no protection, hazard	7 Large Impact force, weak material, cracks	2		2		28 Testing, geometry, material
	Cross Members	Fracture, bending, plastic deformation	Stability and supports weaken	6 Large loading, critical joint angles	1		2		12 Geometry, material
	Joint Members	Crack Propagation	Material strength decrease	8 Fatigue/ cyclical loading	5		7		Geometry, material, fillet reinforcement
	Seat/Seat Post	Plastic Deformation	Unable to properly sit	5 Large cyclical loading	1		4		20 Geometry, material
	Fork Leg	Plastic Deformation, fracture, bending	Compromised Stability	4 Weak material, loading cycles	1		4		16 Geometry, material
	Head Tube	Cracking, fracture, bending	Unsupported operator load	5 Large loads at concentrated joints	2		8		30 Geometry, material
	Weldments	Weld failure	Part Failure	9 Improper Weldments	6				70 Weldment Standards
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