CONTENTS

Introduction		7
PART I – Out	tside engine design environment: market, vehicle, hybridizatio	n and
components ov	rerview	
I-I	From worldwide market to the engine	13
I-II	Propulsion system features to support hybridization	25
I-III	Main engine components	64
I-IV	From vehicle to propulsion system performance	92
I-V	Reference	103
PART II – Inte	egrate engine design methodology	
II-I	Target definition	114
II-II	Engine breath capacity and ports design	123
II-III	Engine performance baseline	131
II-IV	Effects of exhaust engine breath capacity on engine performance	160
II-V	Turbochargers screening and its effect on engine performance	163
II-VI	Crankshaft design & Peak Firing Pressure	176
II-VII	Cam profile & Engine performance	192
II-VIII	Reference	194

302

314

PART III – M	ulti-body dynamics of valvetrain system and friction asso	essment for
cam-roller fol	lower valvetrain system subjected to non-Newtonian	regime of
lubrication		
III-I	Introduction to elasto-hydrodynamic lubrication	196
III-II	Valvetrain characterization	210
III-III	Valvetrain modeling	212
III-IV	Quasi-static model	212
III-V	Quasi-static model – Results and discussion	219
III-VI	Dynamic model	237
III-VII	Dynamic model – Results and discussion	241
III-VIII	Quasi-static and dynamic model - Results discussion and cor	nparison
		296
III-IX	Reference	302

Conclusion