



OFFER

DESIGN AND PROTOTYPE

OF A NEW

EL. ACTUATED LAUNCH CLUTCH

FOR CONE AND FLAT PLATES

QISS

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Contents

1	Introduction.....	3
2	Project Content and Scope of Work.....	4
2.1	Design mechanical parts (A1).....	4
2.2	Design electrical parts (A2).....	4
2.3	Calculation and simulation mech. (A3).....	5
2.4	Calculation and simulation electric. (A4).....	5
2.5	Design test bench application with rigs (A5).....	5
2.6	Project management and reporting (A6).....	5
2.7	Travelling costs (A7).....	5
2.8	Prototypes mechanical parts (B1).....	5
2.9	Prototype electrical parts with control system (B2).....	5
2.10	Procurement (B3).....	5
2.11	Tools and pattern mech. and el. parts (B4).....	6
2.12	Parts for test bench rig and installation (C1).....	6
2.13	Basic test shift comfort (C2).....	6
2.14	Basic test durability and temperature (C3).....	6
3	Project Progress – Delivery Time.....	7
3.1	Price and Payment Terms.....	7
3.2	Price Terms.....	7
3.3	Price Basis, Validity.....	7
3.4	Technical Changes	7
3.5	Guarantee.....	8
3.6	Bank Data and Place of Jurisdiction.....	8

1 Introduction

QISS is a new patented el. shifting system for automotive applications.

Q uick
I nductive
S hifting
S ystem

This is the first full electrical actuated shifting system worldwide.

The general advantages used in a vehicle are:

Eliminating of current hydraulics
with all elements like hydraulic pump
valves
filter

switching operation less complicated and easier to control and integration in CPU

less production costs because reduction of parts, assembling time, maintenance

lower weight

fewer hydraulic oil

reduced installation space

3% better efficiency like current DCT's (no hydraulic circuit)

Target is a simulated operating launch clutch with testing of all necessary mechanical and electrical functions for a launch clutch used in a vehicle with 1800 kg, 200 HP, 6000 min⁻¹ and 350Nm input.

2 Project Content and Scope of Work

Step I single launch clutch for test bench

	Descriptions	number	hourly rate	sum
A1	Design mechanical parts	600	90	€ 54.000
A2	Design electrical parts and control unite	600	120	€ 72.000
A3	Calculation and Simulation mech.	250	100	€ 25.000
A4	Calculation and Simulation electric	500	120	€ 60.000
A5	Design test bench application with rigs	500	80	€ 40.000
A6	Project management and reporting	400	120	€ 48.000
A7	Travelling	10	4.000	€ 40.000
A	Sum			€ 339.000
B1	Prototype mechanical parts	2	15.000	€ 30.000
B2	Prototype electrical parts with control system	1	180.000	€ 180.000
B3	Procurement	250	80	€ 20.000
B4	Tools and pattern mech. and el. parts	1	25.000	€ 25.000
B	Sum			€ 255.000
C1	Parts for test bench rig and installation	1	25 000	€ 25.000
C2	Basic test shift comfort	350	290	€ 101.500
C3	Basic test durability and temperature	250	290	€ 72.500
C	Sum			€ 199.000
A+B+C	Sum STEP I			€ 793.000

In the following the several points are shortly explained:

2.1 Design mechanical parts (A1)

Complete design of the prototype with 3D CAD-System *Pro-Engineer Wildfire 2* as well as 2D drawings of all parts for prototype manufacturing.

Included is also a housing and an application for simulating the mass moment of inertia.

All 2D manufacturing drawings will be done according to DIN-Standards, in English language and with GHM-Engineering standard drawings formats and title blocks.

2.2 Design electrical parts (A2)

In this package the dimensioning of the required QISS actuator and the free programmable control system is integrated.

2.3 Calculation and simulation mech. (A3)

Calculation of mechanical parts by FE simulation.

Calculation of expected temperatures and deformations under mech. and thermal influence.

Investigation of different friction materials and evaluation of optimal cone angle.

Investigation of applicability of flat plate discs and evaluation of friction materials.

2.4 Calculation and simulation electric. (A4)

Dimensioning of a free programmable electrical control unit.

Simulation of shifting operations.

Necessary el. energy for the QISS actuator under different conditions.

Development of test cycles.

2.5 Design test bench application with rigs (A5)

Lubrication and cooling circuit.

Installation of necessary sensors.

2.6 Project management and reporting (A6)

All reports in English language.

2.7 Travelling costs (A7)

The costs for travelling e.g. for project coordination or some clarifications and meetings.

2.8 Prototypes mechanical parts (B1)

For procurement of prototypes we recommend 1 unit for cone clutch and 1 unit for flat plate clutch.

Also each 2 sets of cone clutches with different friction materials and 2 sets of flat plate clutch with also different friction materials are required.

2.9 Prototype electrical parts with control system (B2)

It is a free programmable control unite with a GHM developed program to run the different load cases and conditions.

2.10 Procurement (B3)

This package includes the costs for the complete procurement process for the prototype parts with therefor required travelling costs.

2.11 Tools and pattern mech. and el. parts (B4)

Necessary tooling for produce prototype parts.

2.12 Parts for test bench rig and installation (C1)

Installation of the prototype on test bench with all cooling and sensor applications.

Installation of the inertia simulator.

2.13 Basic test shift comfort (C2)

In this package the functional tests with the verification of the shifting comfort at launching and shift conditions. Necessary lubrication and cooling of the clutch on GHM inclination test bench are done.

Using of different friction materials, testing shifting time and shift comfort under different load conditions.

All is done with different friction materials, flat plates and cone clutches.

In this optional package an static overload test is done where the maximum load (overload) and the weakest point of the clutch will be determined and compared with the calculation results. This test takes the unit up to its strength limits, where irreversible deformations and/or breakage of the weakest part will happen.

Finally a report of this crash tests will be delivered.

2.14 Basic test durability and temperature (C3)

In this optional package the durability of the clutch under the specified load conditions and load spectrum will be tested under harsh actuating. The therefore needed load spectrum, which will also be used for basic calculations (A2), will be specified by GHM. The friction unites will afterwards checked for wear, correct material selection and tolerances.

In this optional package an static overload test is done where the maximum load (overload) and the weakest point of the clutch will be determined and compared with the calculation results. This test takes the unit up to its strength limits, where irreversible deformations and/or breakage of the weakest part will happen.

Finally a report of this durability tests is delivered.

3.5 Guarantee

GHM-Engineering assure for the technical and scientific correctness of work fulfillment according to the performance agreement which is extracted corresponding to the last a GHM-Engineering known state of the art. GHM-Engineering is not liable for escaped asset or losses in consequence of the use of project results, as well as for the consequential charges due to incorrect or not on schedule delivered documents and instructions from the customer.

3.6 Bank Data and Place of Jurisdiction

Payable and actionable in Steyr. Austrian legislation is considered.

Up to the final and complete payment remains all delivered goods in absolute property of the service provider. The decision over intangible items is only permitted after complete payment.

Bank:	VKB Steyr- Neulust
Bank Code:	18600
Account Nr.:	15.421.746
IBAN:	AT 621860000015421746
SWIFT:	VKBLAT2L
VAT Nr.:	ATU44236108

Steyr on 03rd of May 2010

Jegel Franz-Peter

General Manager
