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# TOOL COST REDUCTION IN CRI BY IMPLEMENTATION OF CB41 WHEELS

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**Abstract** — *Every Fuel Injector Consist of a valve set which contains valve piece and piston, this paper implies tool cost reduction of valve piece by replacing its grinding wheels used for carrying out top phase and seat hole grinding.*

***Keywords-*** *Fuel injector, Valve piece, CB41, Bahmuller, Voumard.*

## I. INTRODUCTION

High pressure fuel is entered into the injector through high pressure fuel inlet. The pressure through injector is equal throughout the injector. When the solenoid gets energized by electric current, it pulls the control plunger upward. The control plunger releases small amount of fuel which creates a pressure differential and allow the valve needle to come upward. The valve needle move upward and fuel is injected into the Cylinder. When the current is turned off, the ball reseats. Pressure above needle increase, and pushes nozzle closed. The body is the biggest part of assembled common rail injector. It has to resist high pressures up To 2,000bar. Moreover there is a zero tolerance for defected parts, because it is an element of the common rail system, which is a sensitive component of any vehicle. The project of dowel hole position shift is selected on the basis of internal and external customer complaints from customer. Dowel holes are the locating holes of dowel pins in assembly. Positional tolerance for dowel hole is 0.07mm. As per fine measurement room report the position of dowel hole is not as per specifications.

## II. IMPORTANT MACHINES AND CALCULATIONS

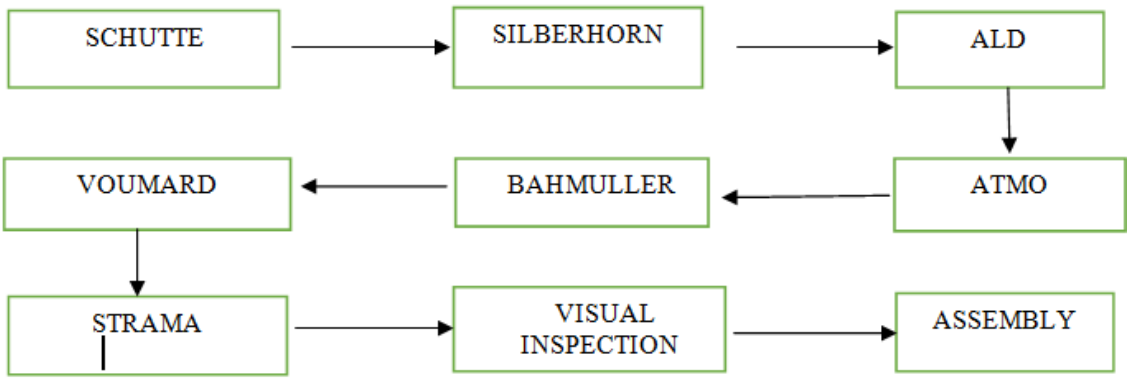
Bahmuller is the machine which is used to grind the seat of the valve piece. The Bahmuller machine of the valve piece and small grinding wheel is used to grind the seat hole of valve piece.

Machine = Bahmuller
Type: = B23 CNC

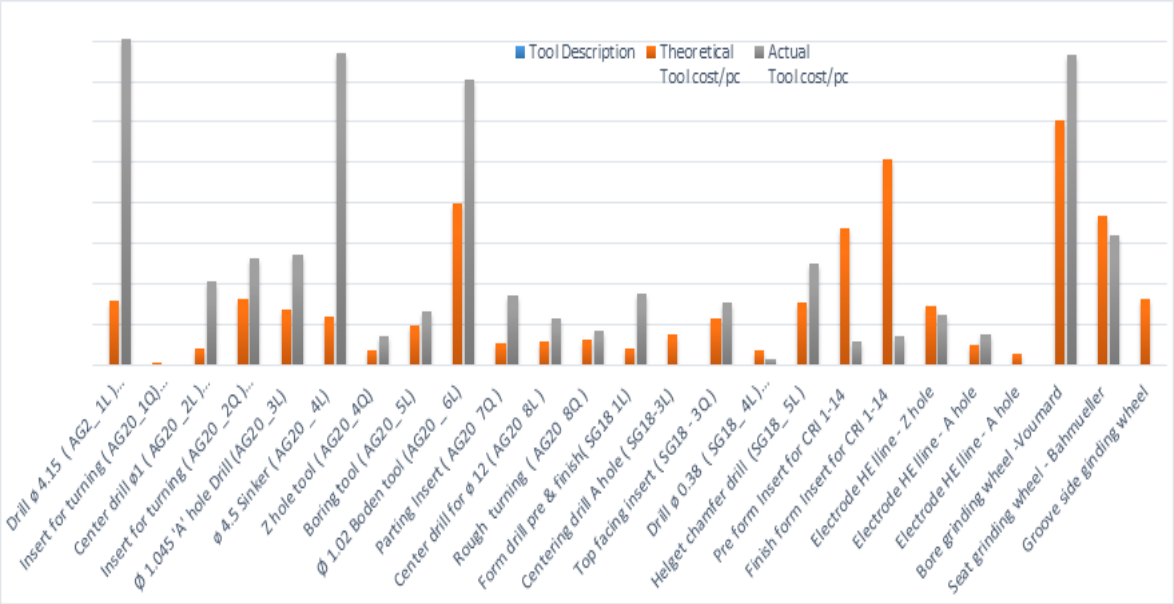
Seat Grinding Wheel
Measurements = Ø4.5× 4.1(length)
Seat Dressing Tool
Tool Type = Dressing Ring
Seat grinding spindle rpm = 90000 rpm
Work head rpm (spindle) = 1500
Seat wheel diameter = 4.8975 up to 3.5001 mm
Dressing frequency =12 parts
Depth of cut of grinding wheel = 4 micron (μ)
Seat material removes = (40 to 80 microns)
Seat angle = 120 degree± *0.5 degree*

Lubrication oil = TELUS 32
Slide lubrication oil = Marline 10
Coolant
Supplier = May-Lubrication
Specification = Emol-o-Grind 168/3




Flowchart No. 1




Tool cost per piece description from Start to end processes (Graph)

Calculations **(**Bahmuller – B23)
Calculate cost per piece =cost of grinding wheel no of parts obtain
Cost per piece = 3000/7192
=0.4171 Rs.
∴ No of parts
Seat wheel diameter (before use) = 5.8975mm
Seat wheel diameter (after use) = 3.5001mm
Use of wheel = 5.8975-3.5001 = 2.3974mm
So, we find no dressing carried =Use of wheel depth of cut (0.004)
=2.3974÷0.004
=599.35
Now as dressing carried after 12 parts
So, No of parts = no of dressing×12
= 599.35×12
= 7192 parts

Voumard
The Voumard machine is used to grind the internal surface of diameter 4.22. It is internal grinding Machine. The grinding process is done from first side hence we can't use Bahmuller machine as it Is machining on second side of valve piece.

Machine =Voumard
Type: = 100 CNC DUO CHS
Grinding Wheel
Supplier =Meister
Measurements: =4×4.2×M2
Dressing Tool
Supplier: - =Tyro lit/Meister
Tool Type =Dressing ring
Guide bore grinding spindle rpm = 90000 rpm
Work head rpm (spindle) = 1500 to 1800
Seat wheel diameter = 3.90 mm up to 3.40 mm
Dressing frequency =15 parts
Depth of cut of grinding wheel = 3 micron (μ)
Internal material removes = (60 to 80 microns)
Coolant
Supplier = May-Lubrication
Specification = Emol-o-Grind 168/3
Calculations (Voumard)
Calculate cost per piece =cost of grinding wheel÷no of parts obtain
Cost per piece = 2500/2500
=1 Rs.
∴ no of parts
seat wheel diameter(before use) = 3.90mm
seat wheel diameter(after use) = 3.40 mm
use of wheel = 3.90-3.40
= 0.5 mm
So , we find no dressing carried =Use of wheel÷depth of cut (0.003)
=0.5÷0.003
=166.66
Now as dressing carried after 15 parts
So, No of parts = no of dressing×15
= 166.66×15
= 2499 parts

**2.3 Important Parameters of Fine Measurement Lab**

Straightness
Flatness
Circularity
Angular sector
Cylindricity
Surface profile
Parallism
Perpendicularity
Angularity
Concentricity
Radial run out
Total run out

## III. CONCLUSION

The analysis of the CB 41 grinding wheel indicated superior performance when compared to CB 111 and CB 05 grinding wheels. The most strongly marked difference were found in the analysis of grains of grinding wheel, which demonstrated that the performance of CB 41 grinding wheel with high performance resin bond was many times superior to that of the CB 111 and CB 05 grinding wheel. In other words, the CB 41 grinding wheel tested here allows the removal of the same amount of material as the CB 111 and CB 05 grinding wheel. As for our findings on surface roughness the CB 41 grinding wheel shows better values under the same machining conditions.

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