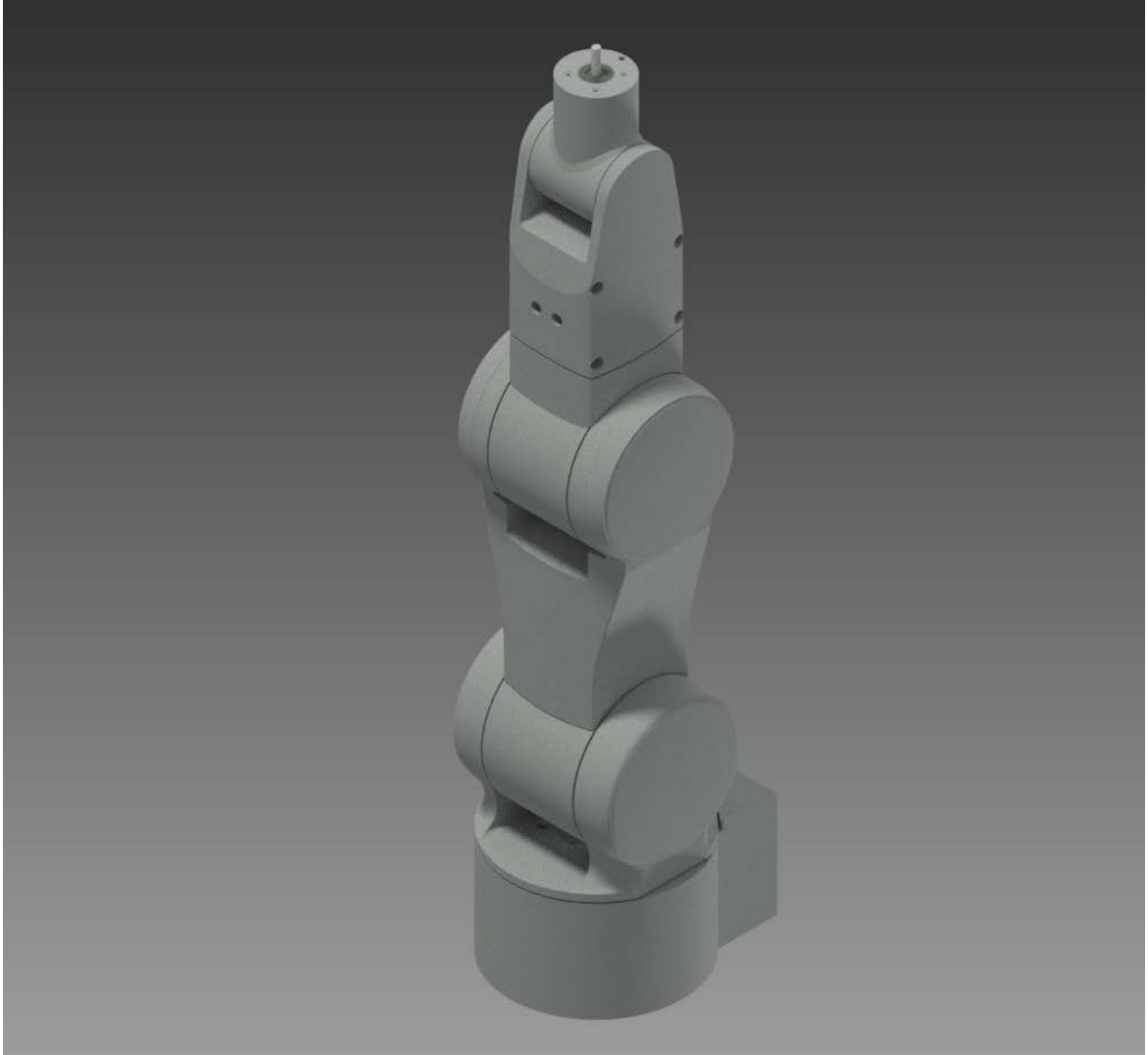
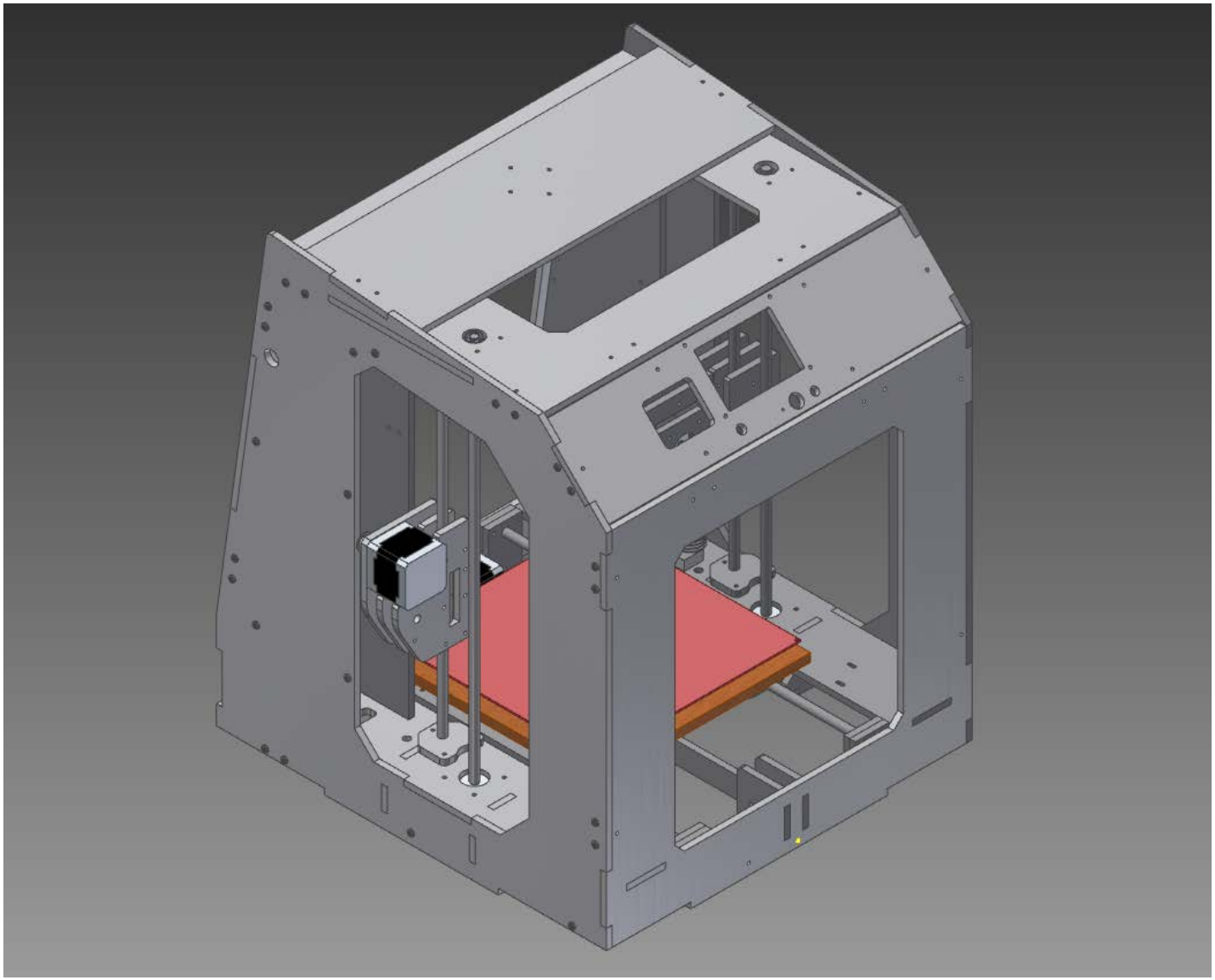
Настольный робот - манипулятор для лаборатории цифрового производства FAB LAB

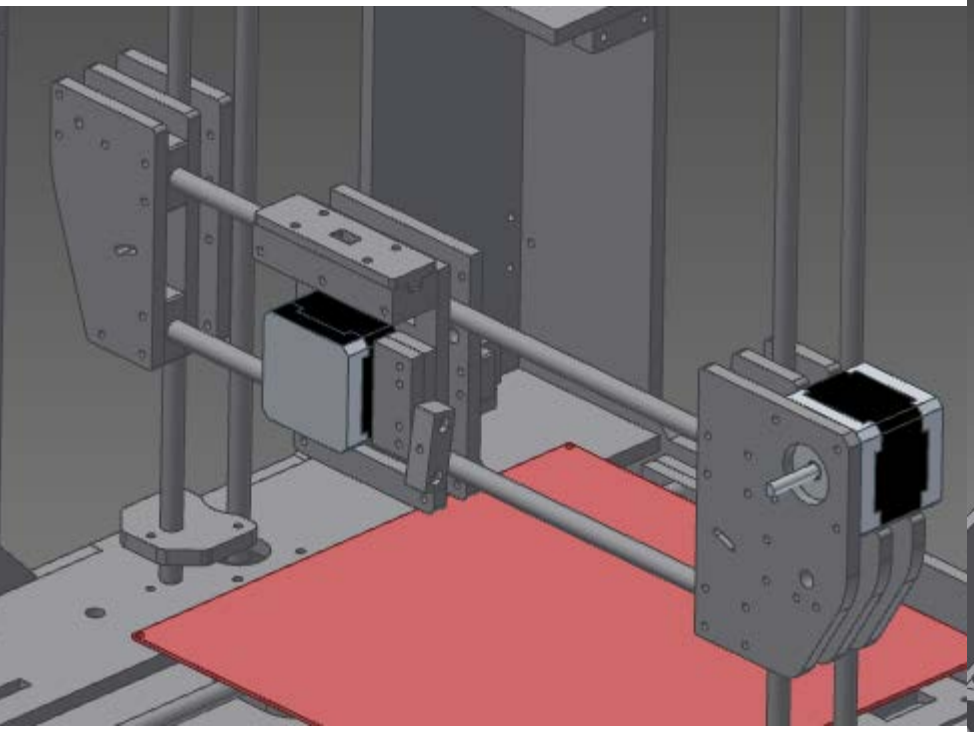
Автор: Зобов Олег

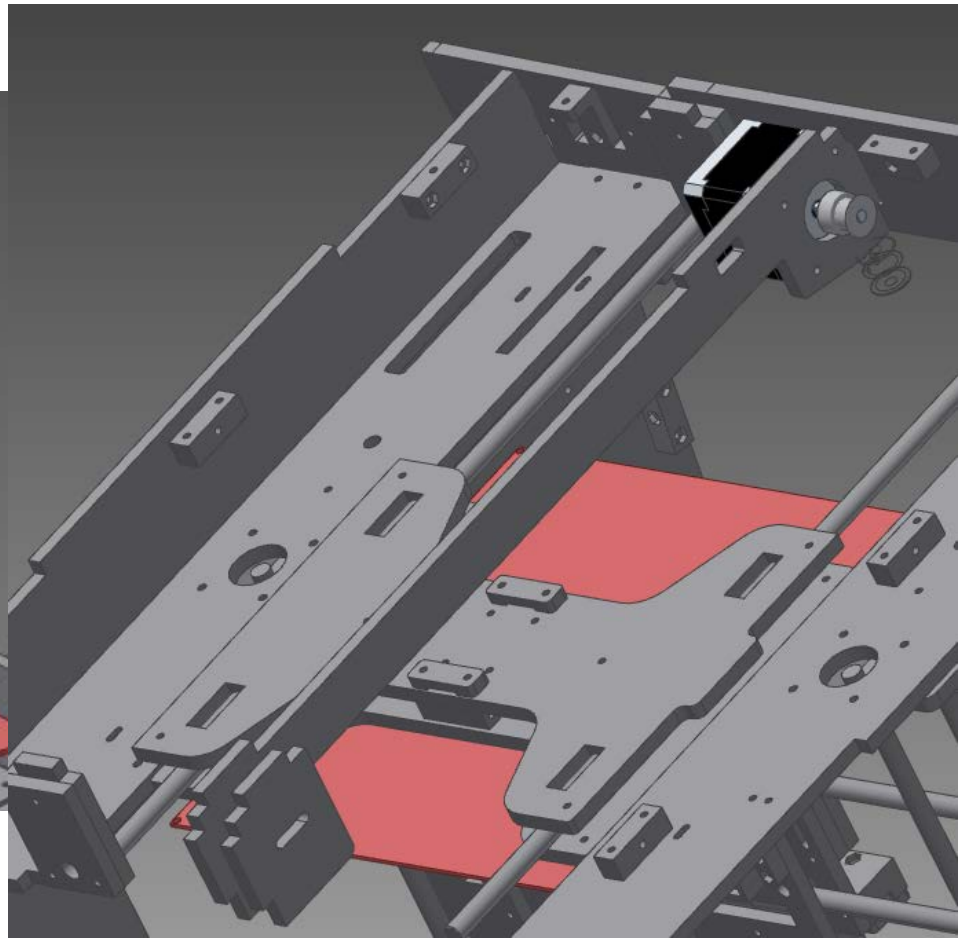
Науч.рук: Юдин Антон Владимирович

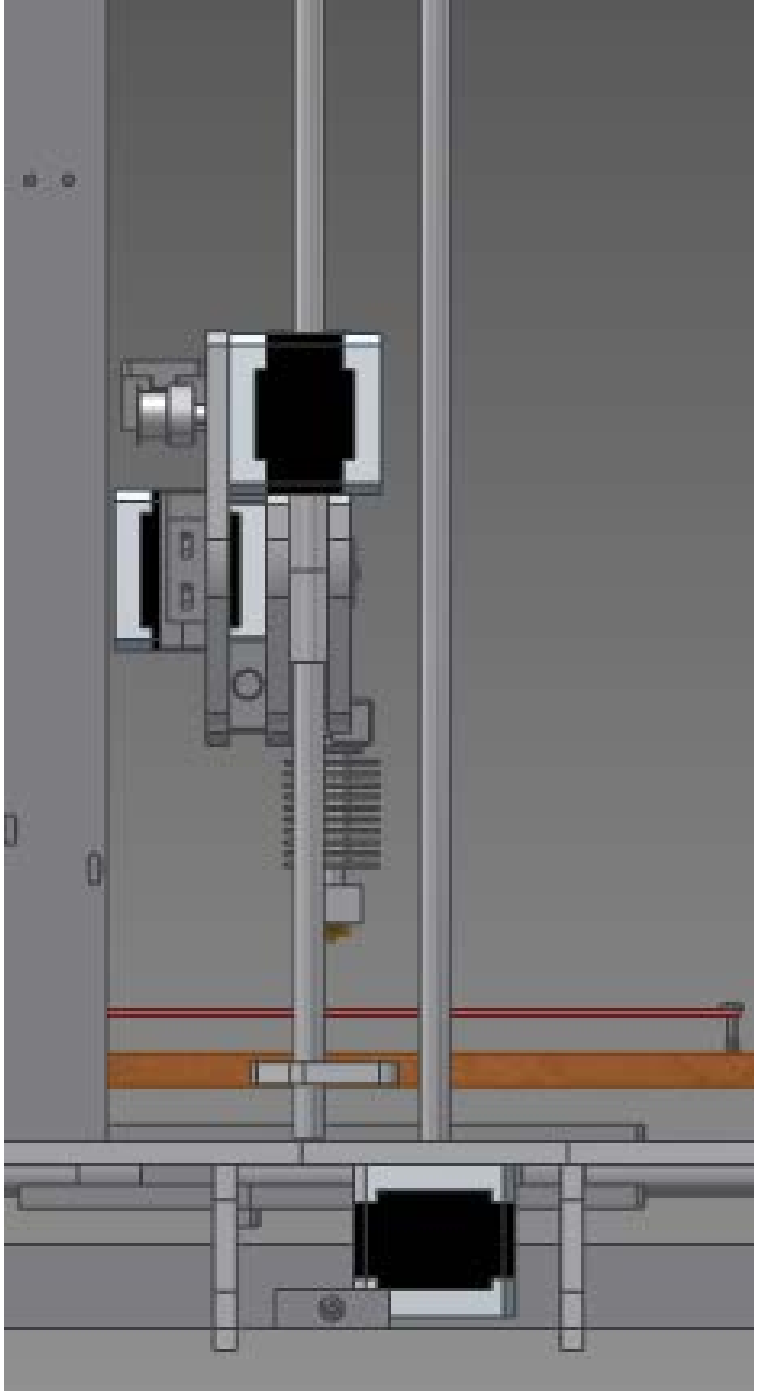


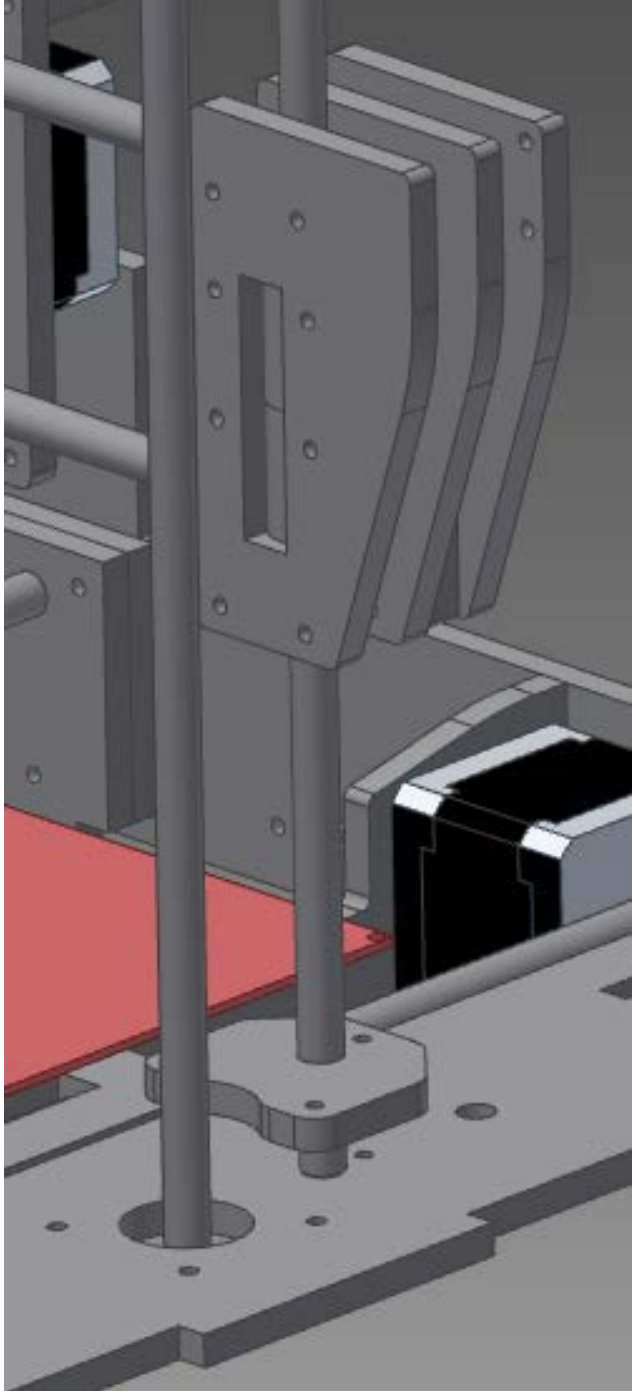
3Д-принтер.



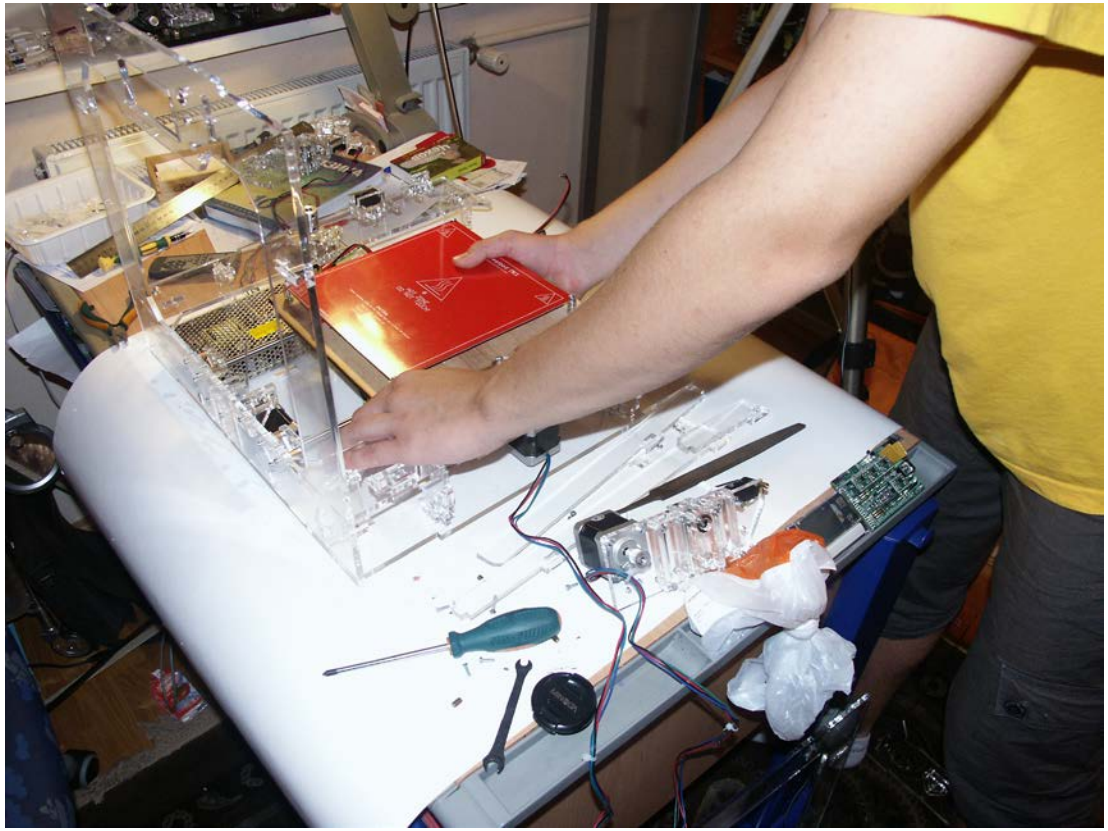


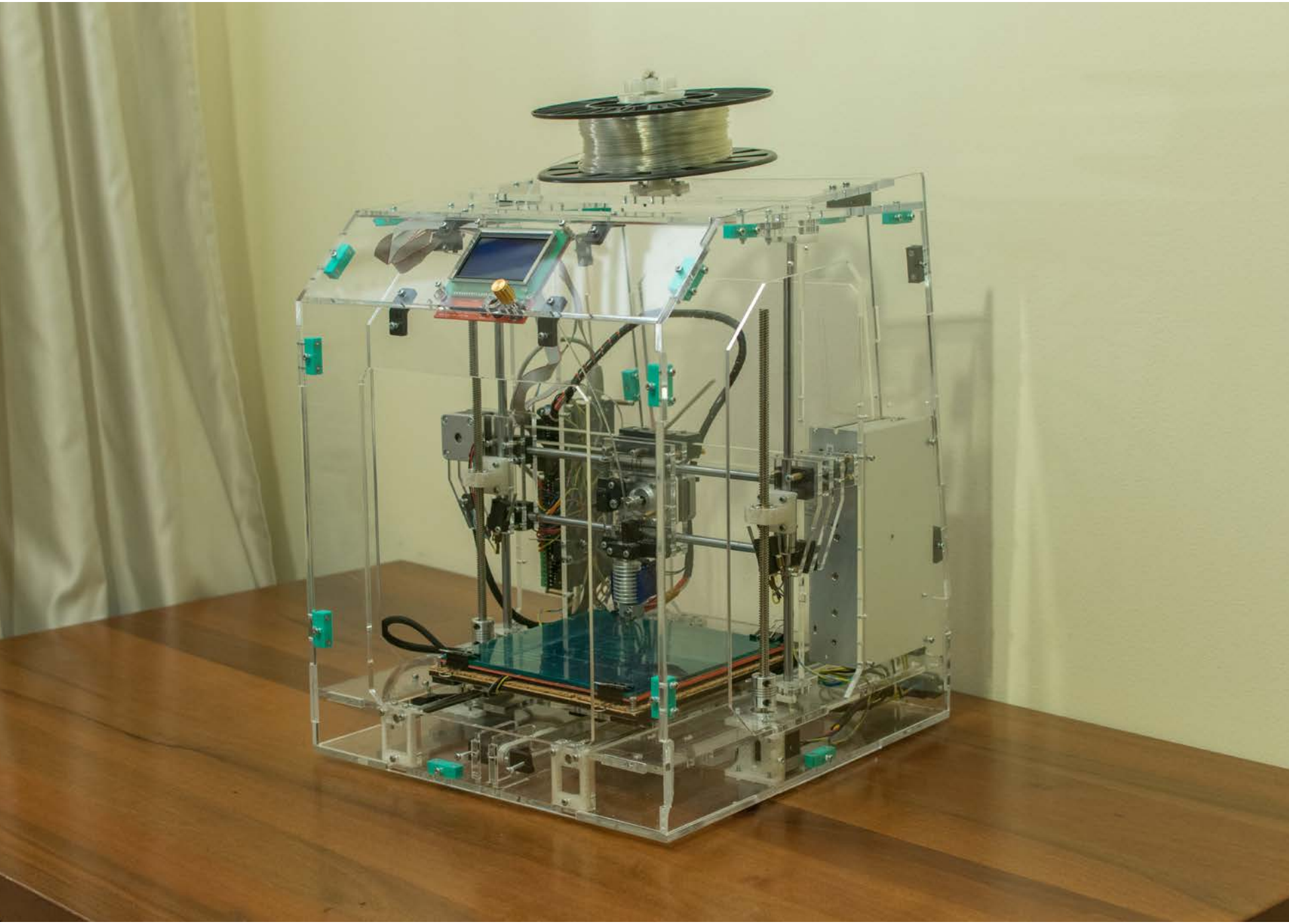




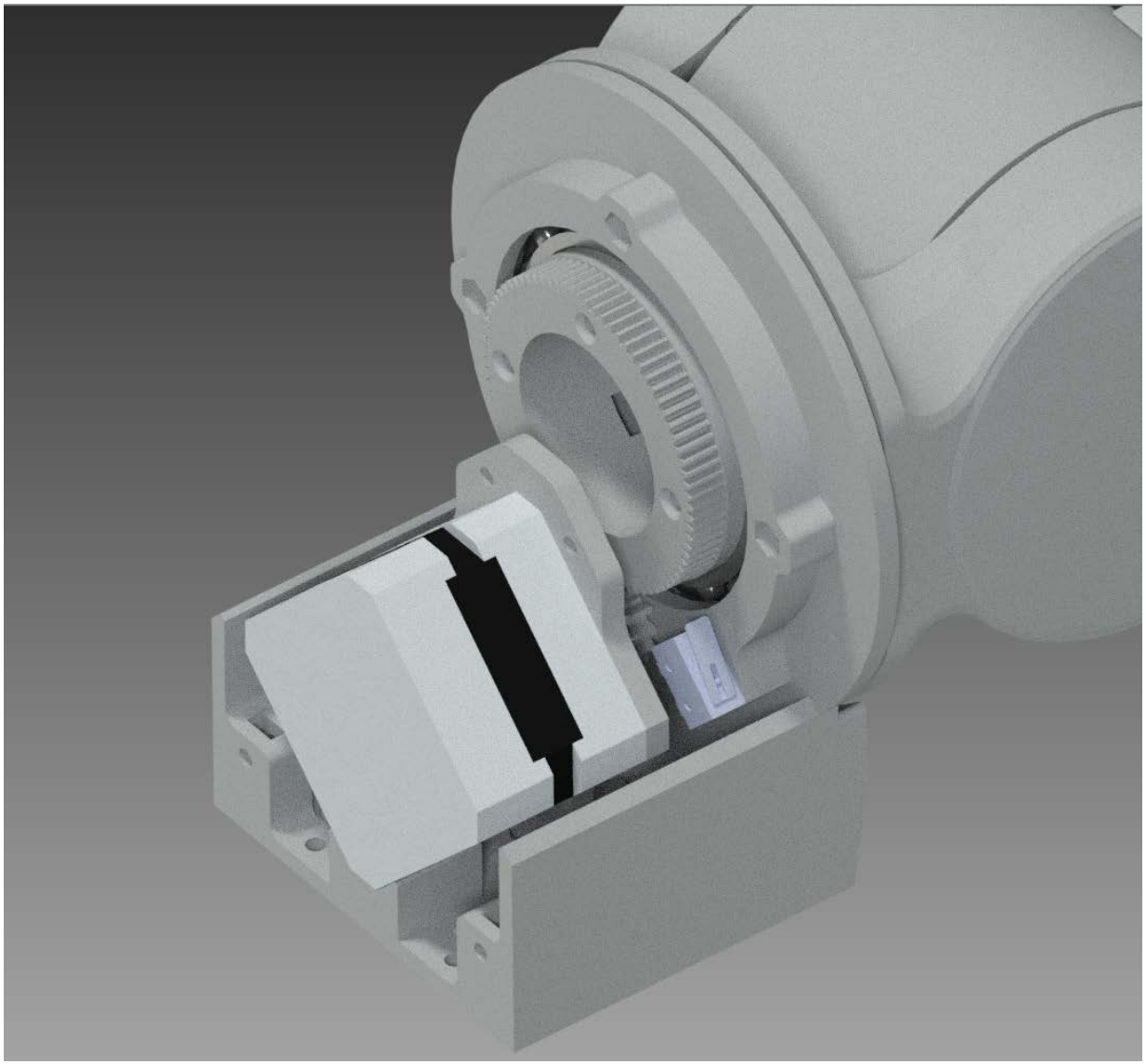


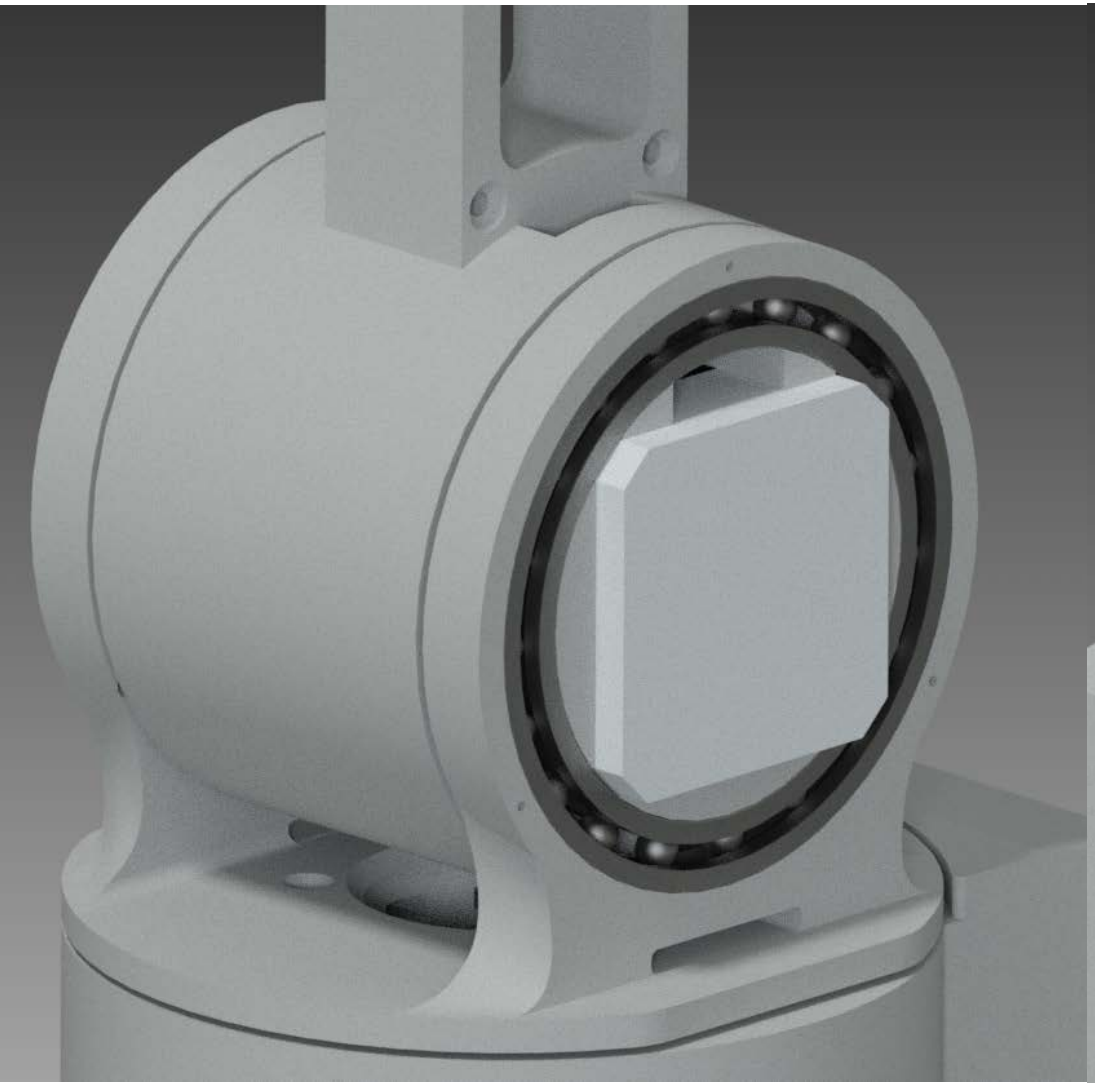
Изготовление станка.

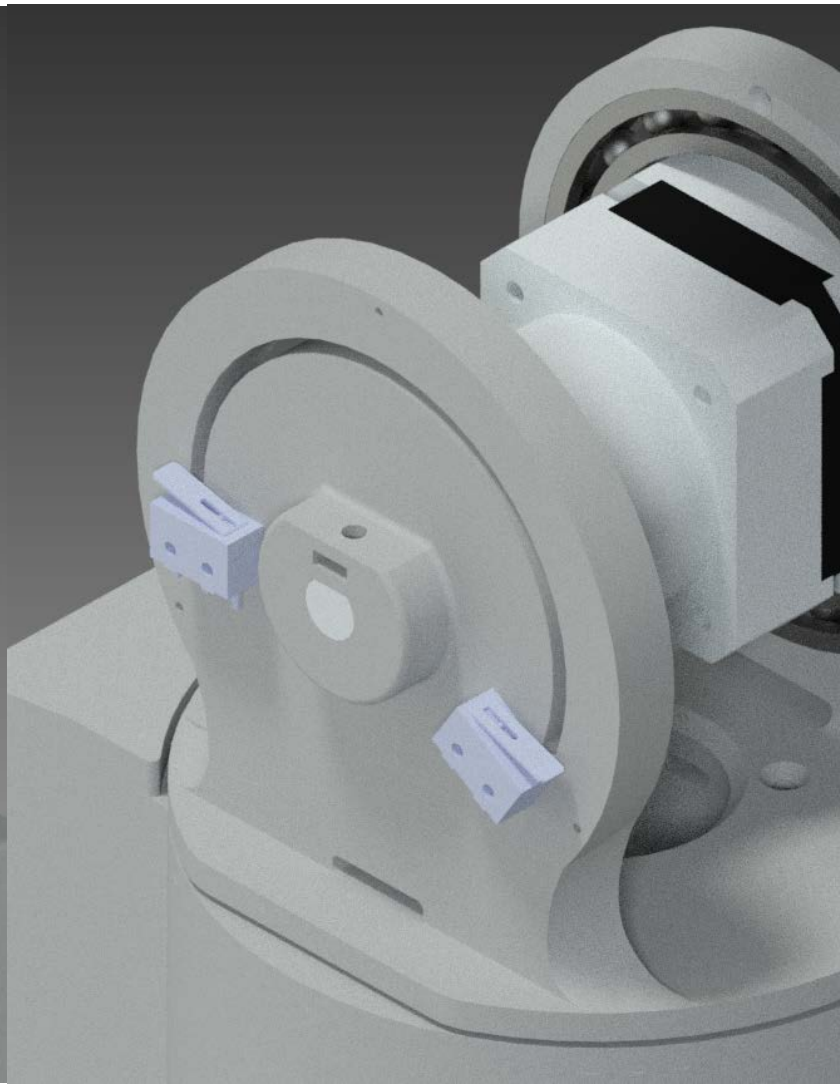


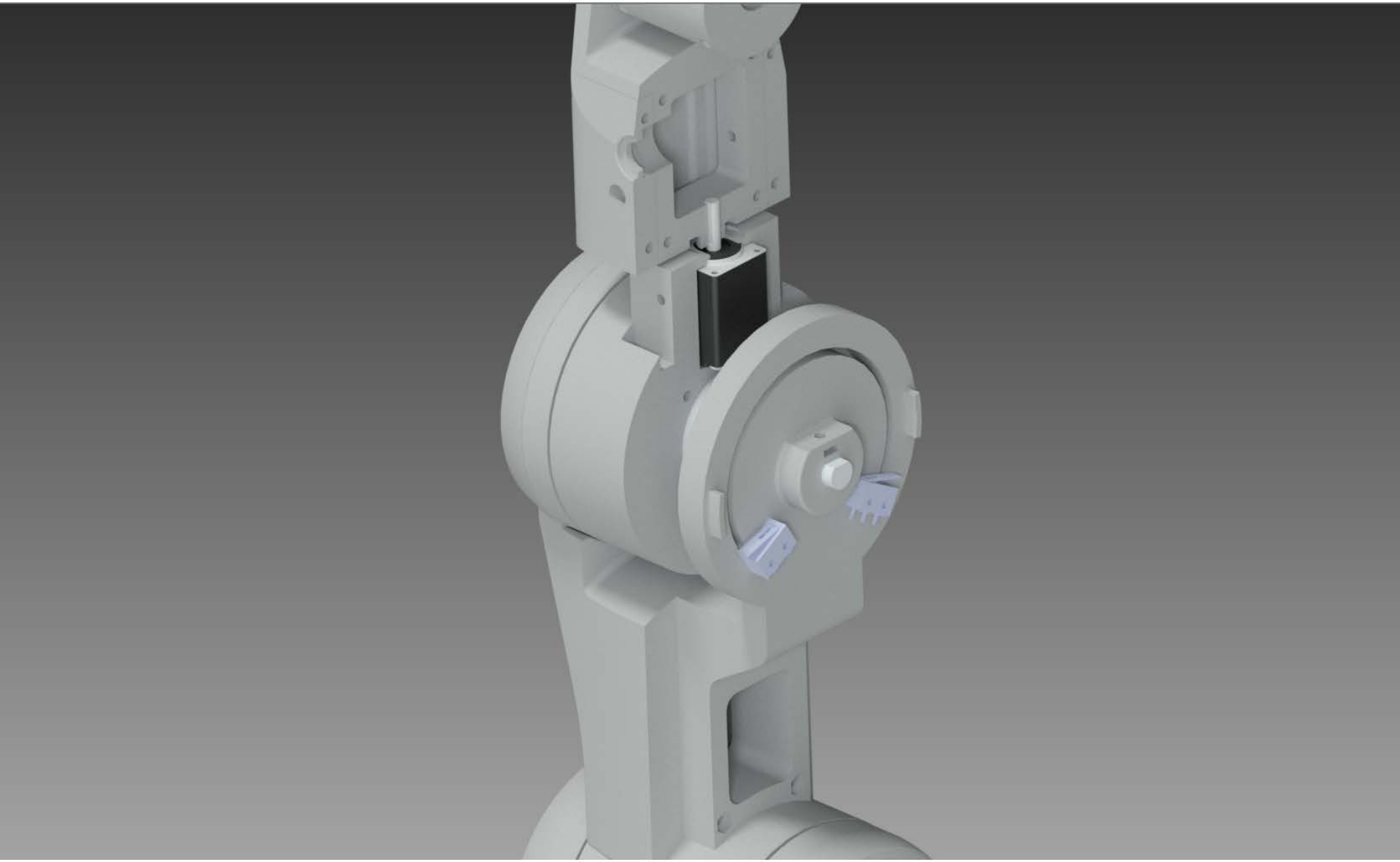


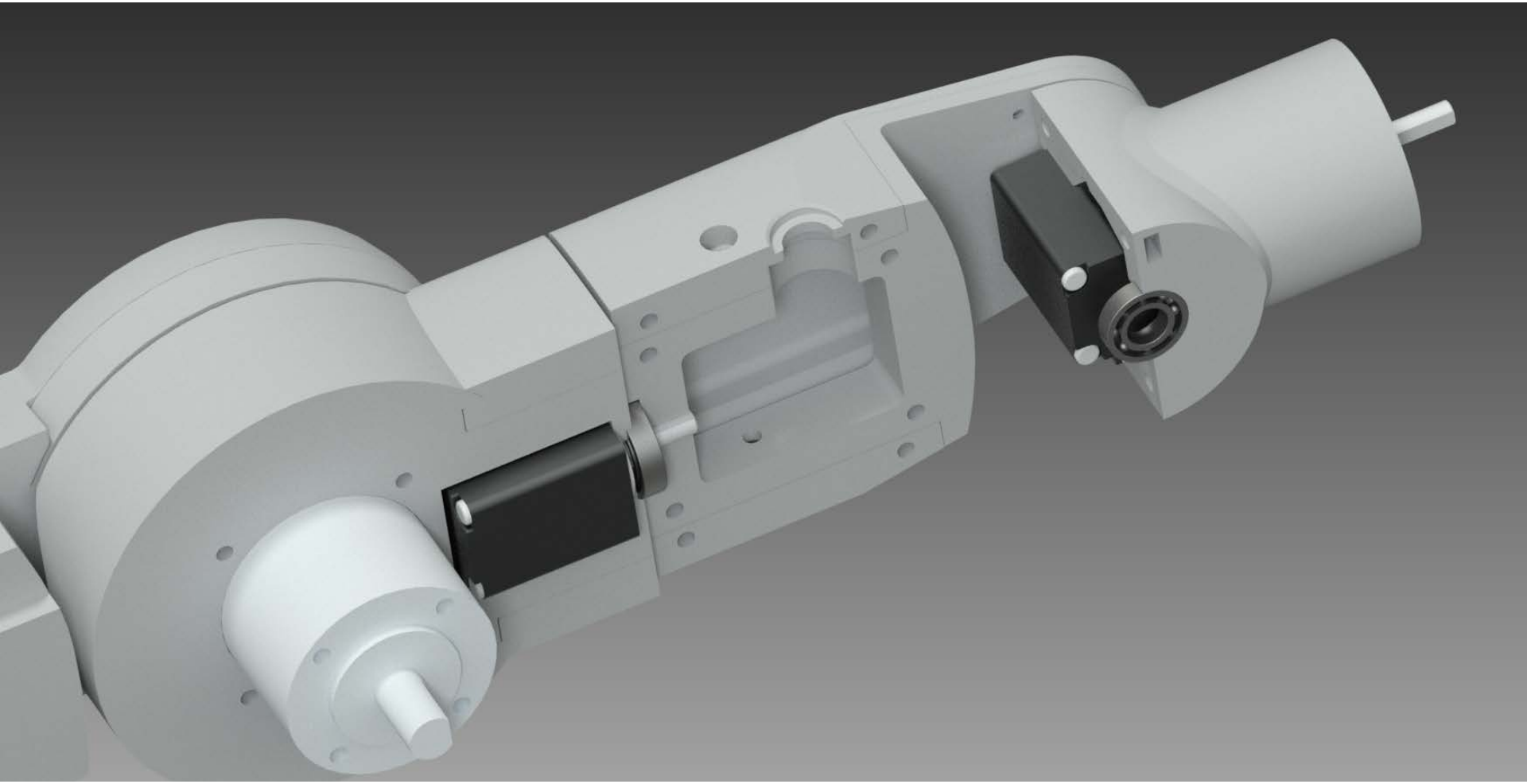
Конструирование манипулятора.



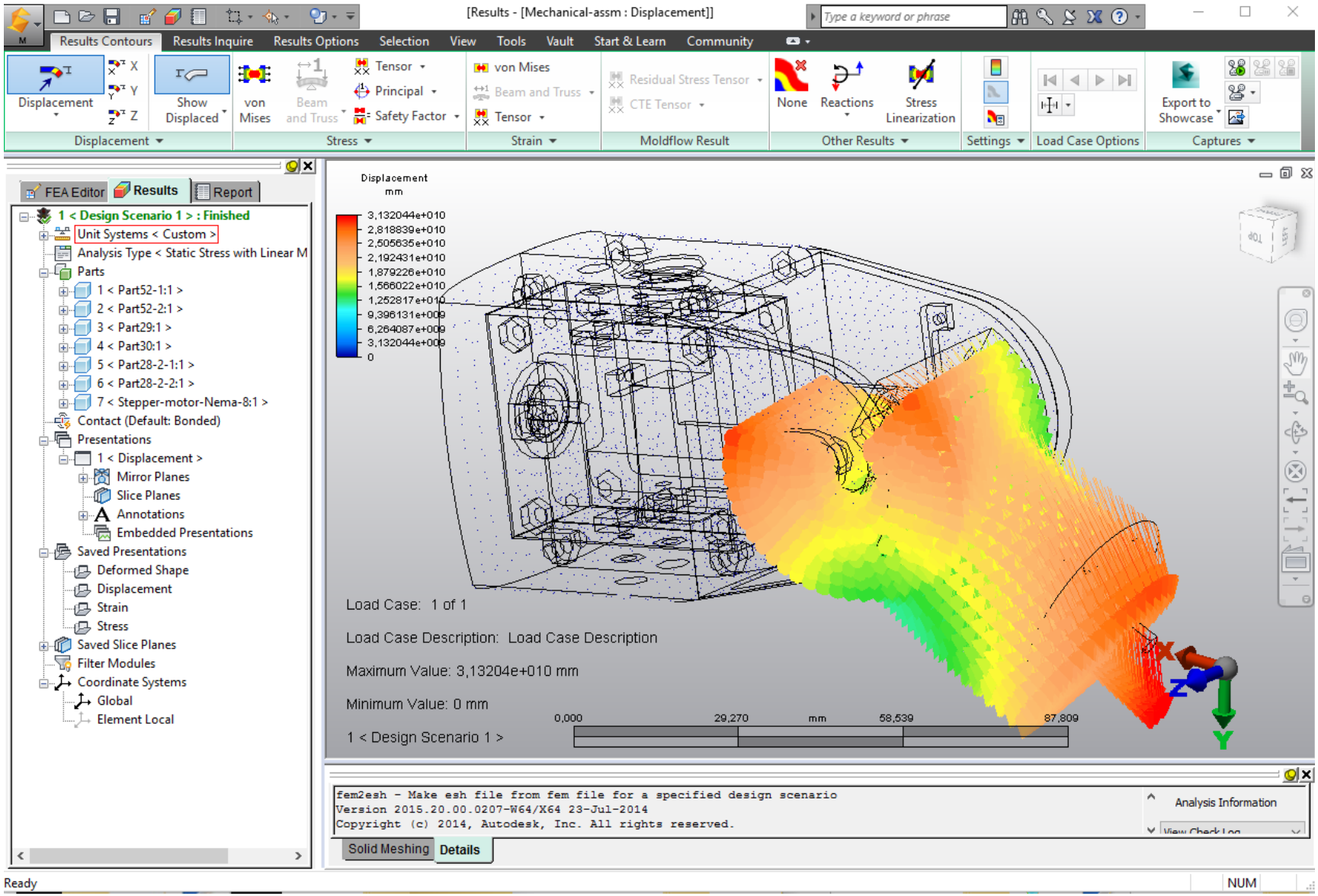




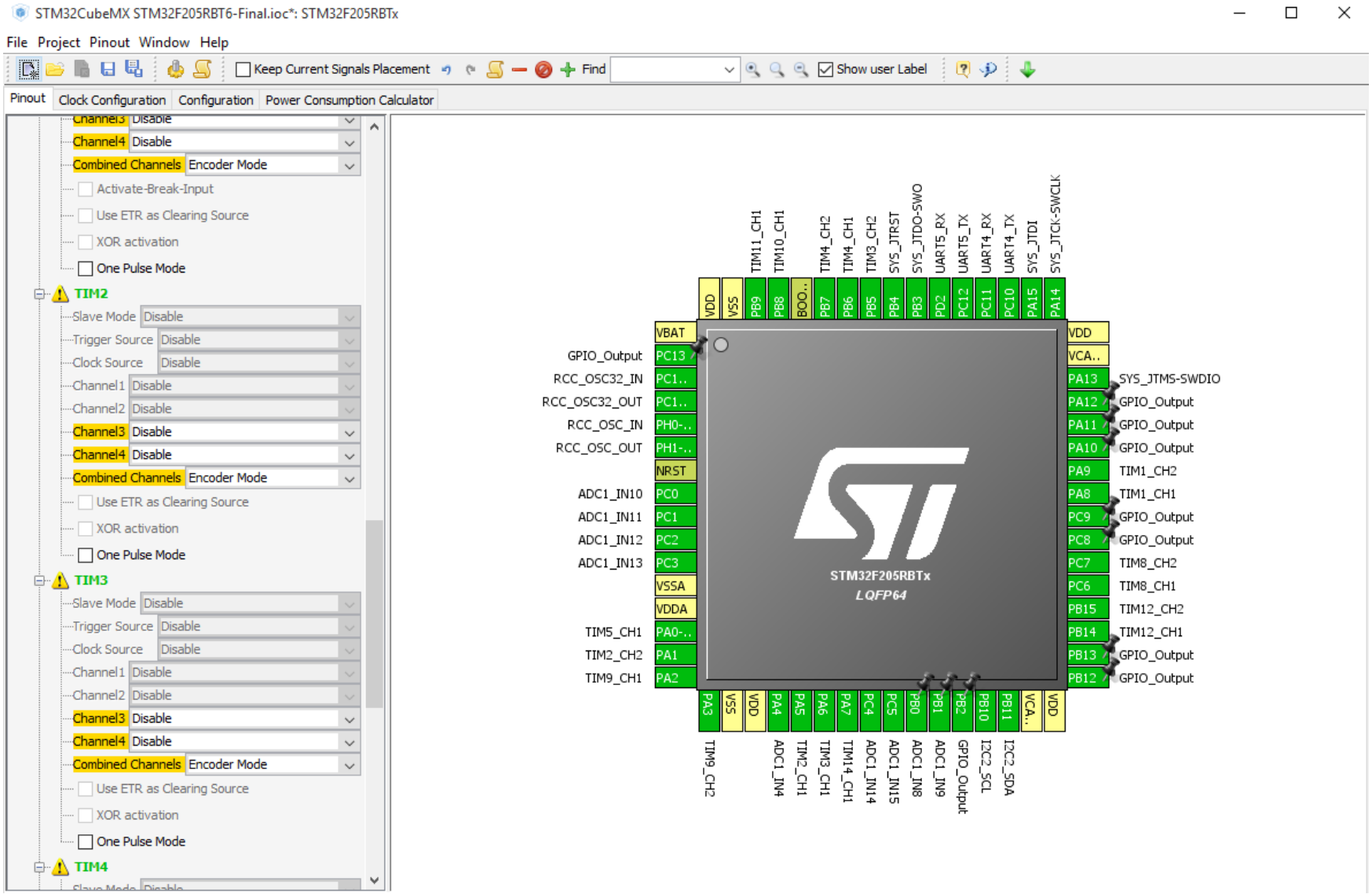


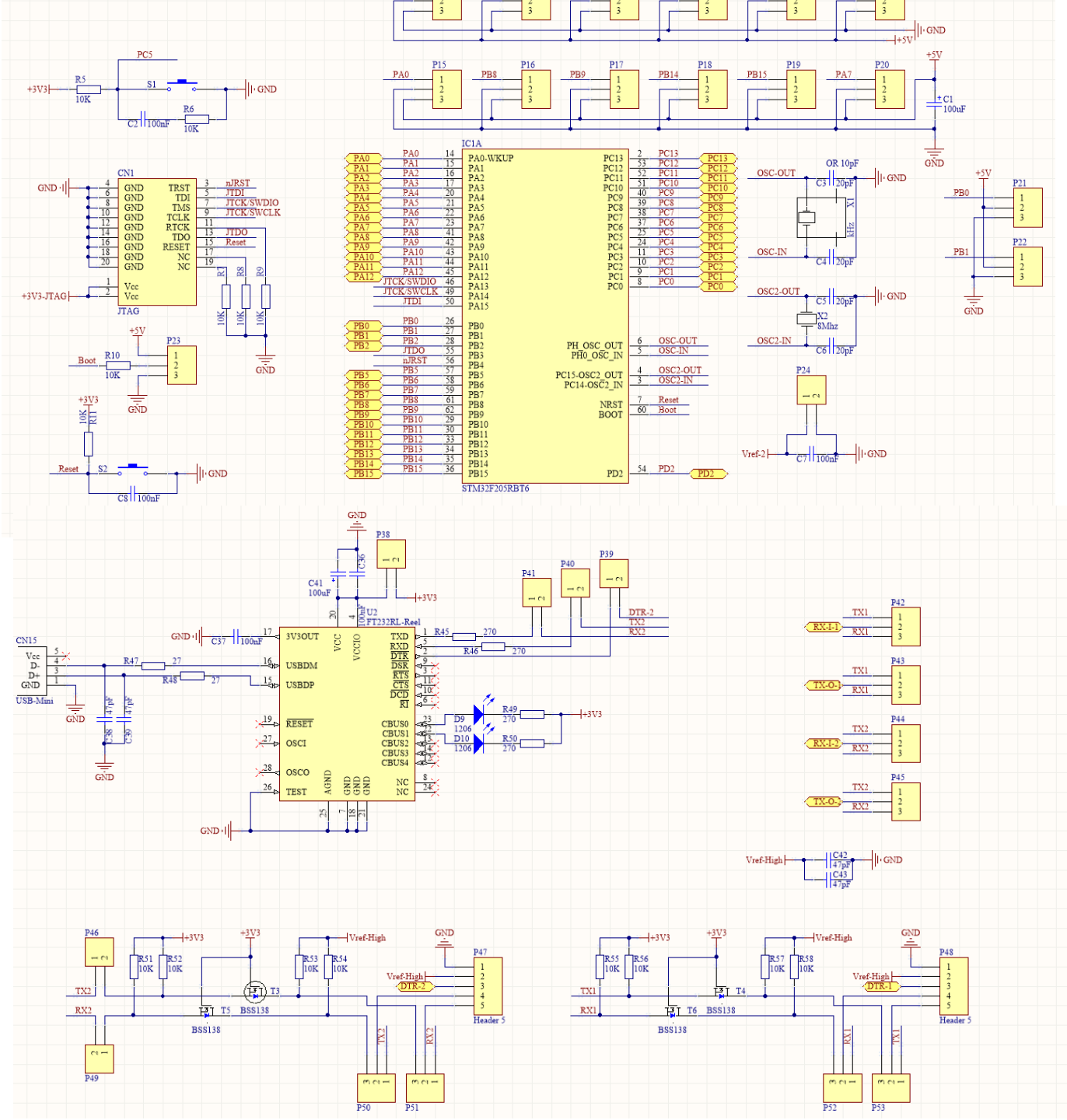


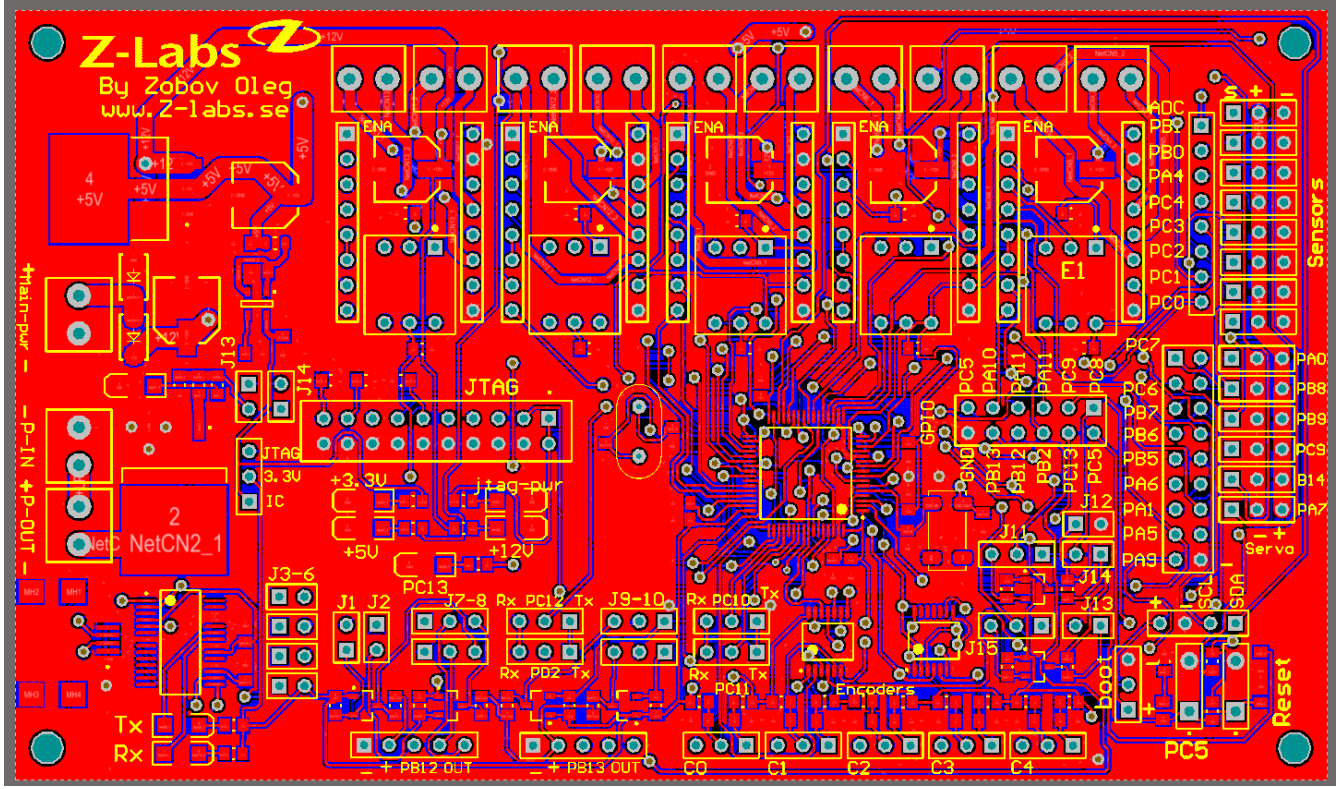
Расчёты.

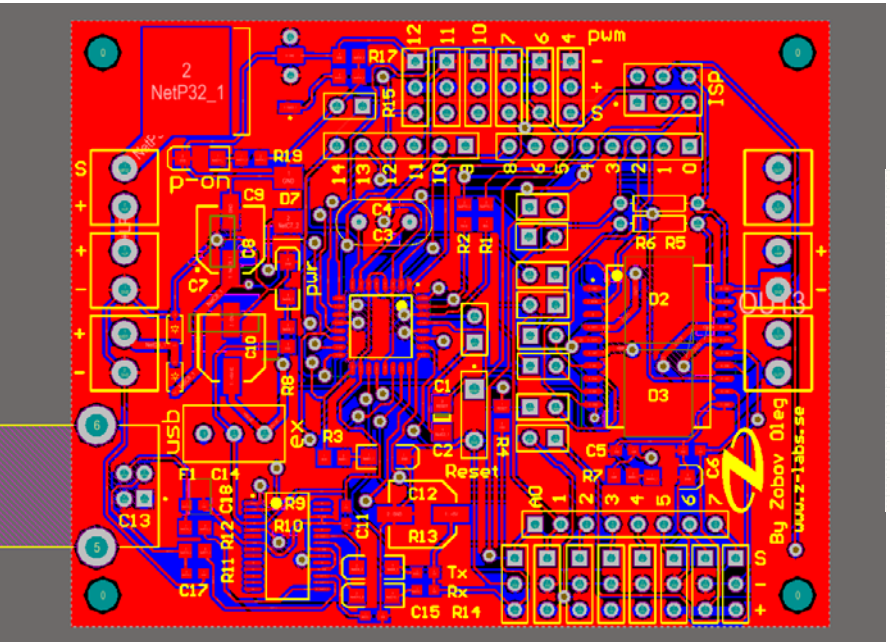

[Results - [Mechanical-assm : Displacement]]
Type a keyword or phrase
Results Contours
Results Inquire
Results Options
Selection
View
Tools
Vault
Start & Learn
Community
Displacement
Show Displaced
von Mises
Beam and Truss
Tensor
Principal
Safety Factor
von Mises
Beam and Truss
Tensor
Residual Stress Tensor
CTE Tensor
None
Reactions
Stress Linearization
Export to Showcase
Displacement
Stress
Strain
Moldflow Result
Other Results
Settings
Load Case Options
Captures
FEA Editor
Results
Report
1 < Design Scenario 1 > : Finished
Unit Systems < Custom >
Analysis Type < Static Stress with Linear M
Parts
1 < Part52-1:1 >
2 < Part52-2:1 >
3 < Part29:1 >
4 < Part30:1 >
5 < Part28-2-1:1 >
6 < Part28-2-2:1 >
7 < Stepper-motor-Nema-8:1 >
Contact (Default: Bonded)
Presentations
1 < Displacement >
Mirror Planes
Slice Planes
Annotations
Embedded Presentations
Saved Presentations
Deformed Shape
Displacement
Strain
Stress
Saved Slice Planes
Filter Modules
Coordinate Systems
Global
Element Local
Displacement
mm
3,132044e+010
2,818839e+010
2,505635e+010
2,192431e+010
1,879226e+010
1,566022e+010
1,252817e+010
9,396131e+009
6,264087e+009
3,132044e+009
0
Load Case: 1 of 1
Load Case Description: Load Case Description
Maximum Value: 3,13204e+010 mm
Minimum Value: 0 mm
1 < Design Scenario 1 >
0,000
29,270
mm
58,539
87,809
fem2esh - Make esh file from fem file for a specified design scenario
Version 2015.20.00.0207-W64/X64 23-Jul-2014
Copyright (c) 2014, Autodesk, Inc. All rights reserved.
Analysis Information
Solid Meshing
Details
Ready
NUM

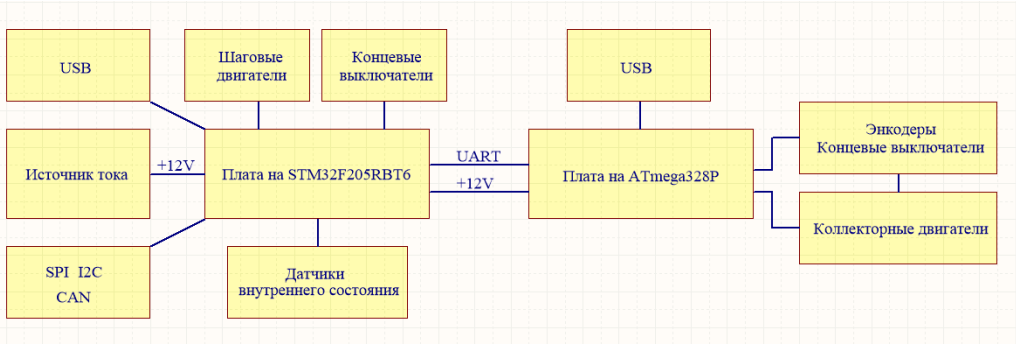
Электроника.

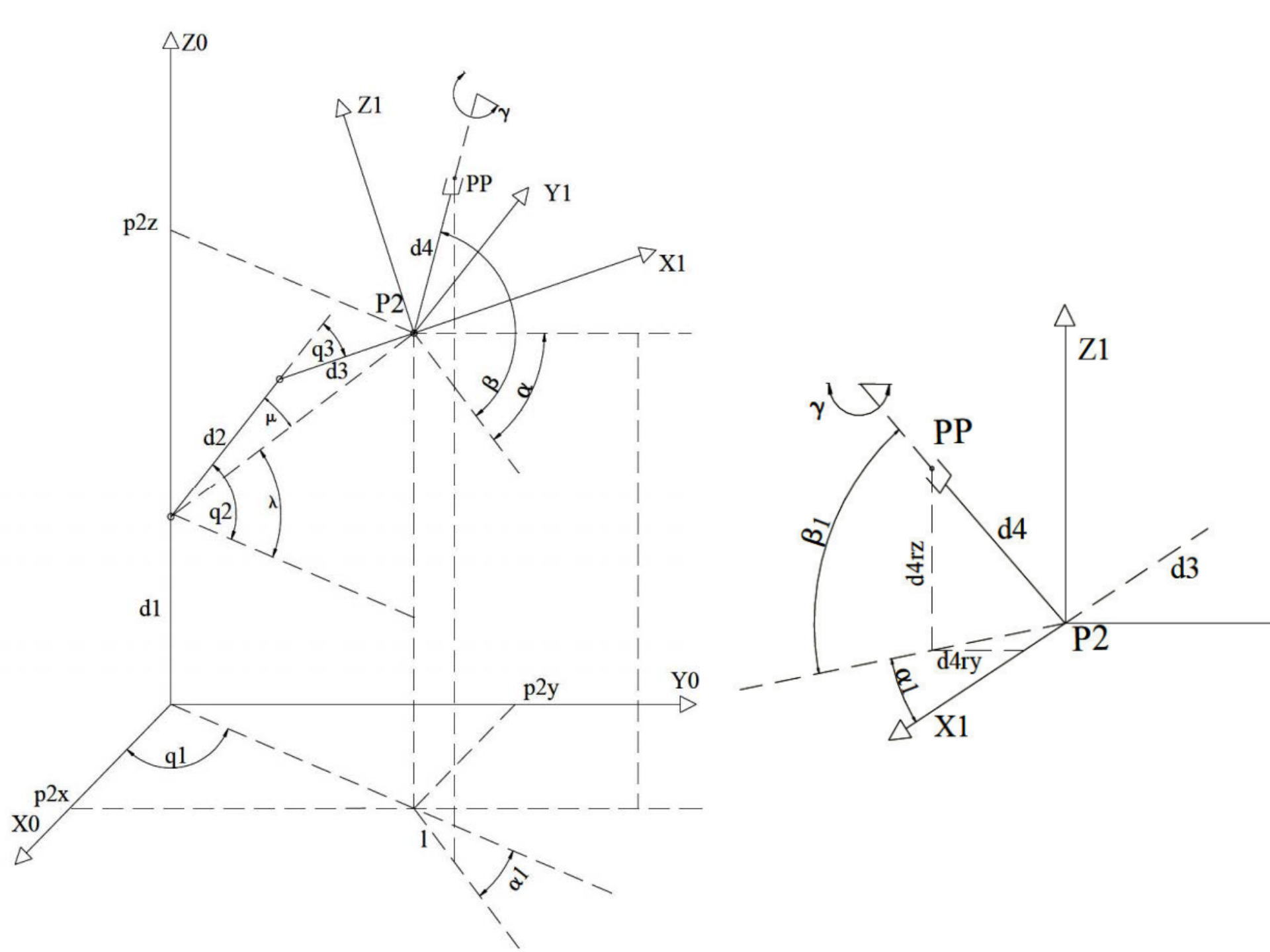


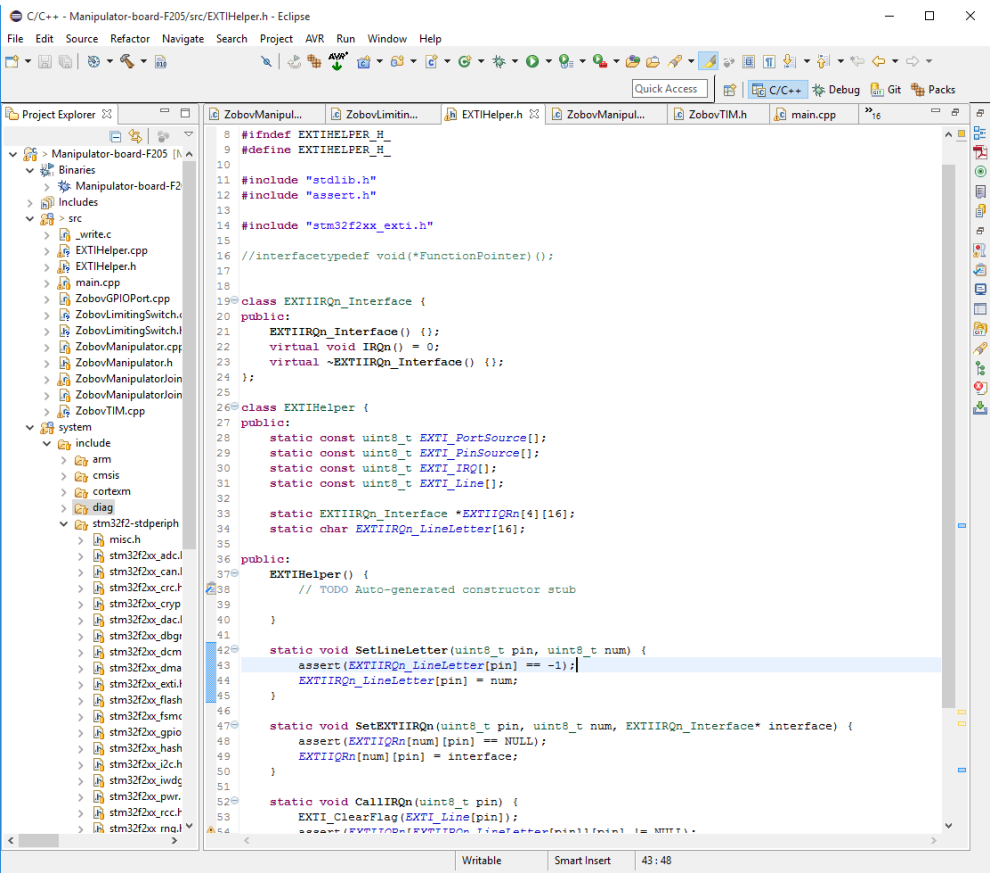

PC5
R5
10K
S1
R6
10K
C2
100nF
GND
+3V3
P15
P16
P17
P18
P19
P20
PA0
PB8
PB9
PB14
PB15
PA7
+5V
C1
100uF
IC1A
STM32F205RBT6
PA0-WKUP
CN1
JTAG
nJRST
JTDI
JTCK/SWDIO
JTCK/SWCLK
JTDO
Reset
+3V3-JTAG
R7
R8
R9
10K
OR 10pF
OSC-OUT
OSC-IN
C3
C4
20pF
X1
kHz
OSC2-OUT
OSC2-IN
X2
8Mhz
C5
C6
P21
P22
P23
Boot
R10
P24
Vref-2
C7
100nF
R11
Reset
S2
C8
100nF
PH_OSC_OUT
PH0_OSC_IN
PC15-OSC2_OUT
PC14-OSC2_IN
NRST
BOOT
P38
C41
100uF
C36
100nF
U2
FT232RL-Reel
3V3OUT
USBDM
USBDP
RESET
OSCI
OSCO
TEST
VCC
VCCIO
AGND
TXD
RXD
DTR
DSR
RTS
CTS
DCD
RI
CBUS0
CBUS1
CBUS2
CBUS3
CBUS4
NC
CN15
USB-Mini
R47
R48
27
C38
C39
47pF
C37
100nF
R45
R46
270
P41
P40
P39
DTR-2
TX2
RX2
D9
D10
1206
R49
R50
P42
P43
P44
P45
TX1
RX1
RX-I-1
TX-O-1
RX-I-2
TX-O-2
Vref-High
C42
C43
47pF
P46
P47
P48
P49
P50
P51
P52
P53
R51
R52
R53
R54
R55
R56
R57
R58
T3
T4
T5
T6
BSS138
Header 5
DTR-1

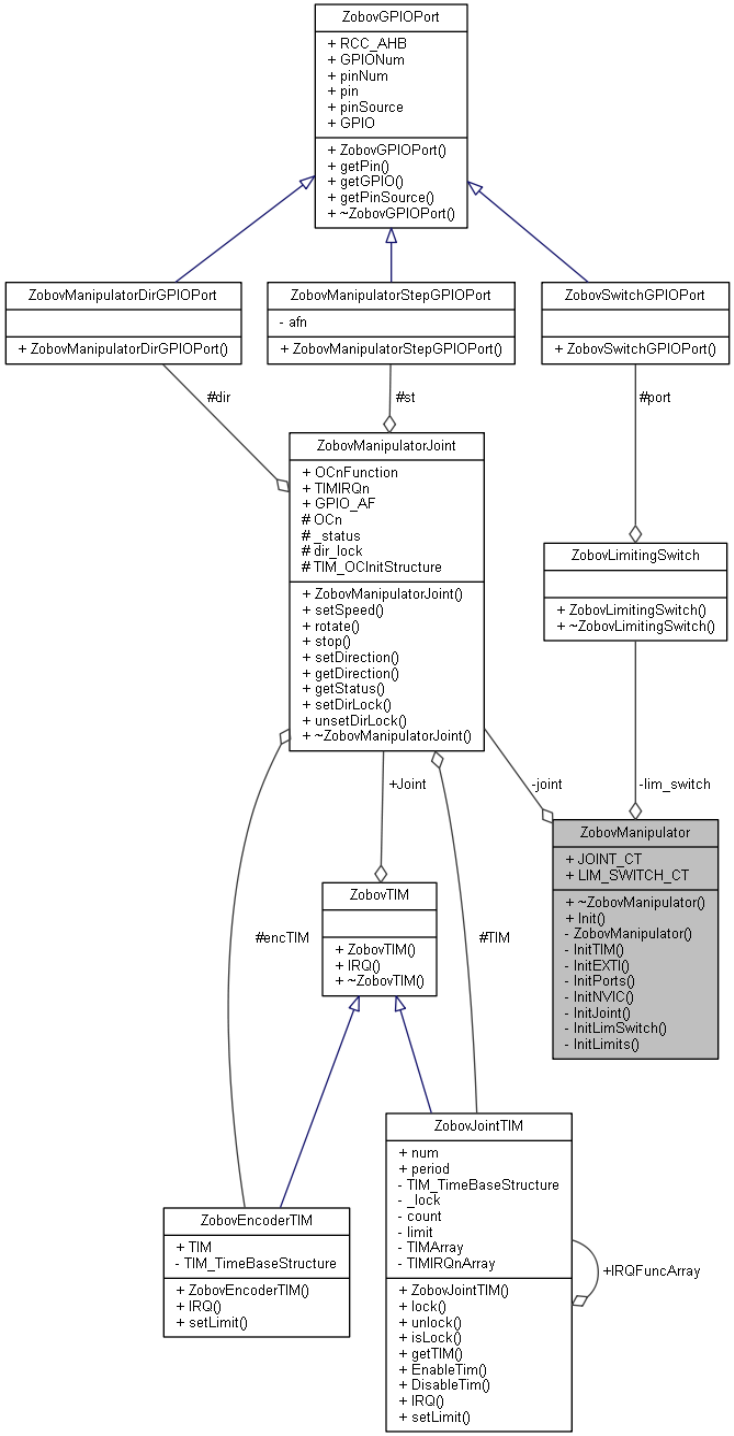

Z-Labs
By Zobov Oleg
www.Z-labs.se
JTAG
Sensors
Servo
Reset
boot
Encoders
PC5


NetP32_1
pwm
p-on
Reset
By Zobov Oleg
www.z-labs.se


USB
Шаговые двигатели
Концевые выключатели
USB
Источник тока
+12V
Плата на STM32F205RBT6
UART
+12V
Плата на ATmega328P
Энкодеры
Концевые выключатели
Коллекторные двигатели
SPI I2C
CAN
Датчики внутреннего состояния


Z0
Z1
γ
PP
Y1
p2z
d4
X1
P2
q3
d3
β
α
μ
d2
q2
λ
d1
Y0
p2y
q1
p2x
X0
l
α1
Z1
γ
PP
β1
d4
d4rz
d3
P2
d4ry
α
X1


C/C++ - Manipulator-board-F205/src/EXTIHelper.h - Eclipse
File Edit Source Refactor Navigate Search Project AVR Run Window Help
Project Explorer
Manipulator-board-F205
Binaries
Includes
src
_write.c
EXTIHelper.cpp
EXTIHelper.h
main.cpp
ZobovGPIOPort.cpp
ZobovLimitingSwitch.c
ZobovLimitingSwitch.h
ZobovManipulator.cpp
ZobovManipulator.h
ZobovManipulatorJoin
ZobovManipulatorJoin
ZobovTIM.cpp
system
include
arm
cmsis
cortexm
diag
stm32f2-stdperiph
misc.h
stm32f2xx_adc.h
stm32f2xx_can.h
stm32f2xx_crc.h
stm32f2xx_cryp
stm32f2xx_dac.h
stm32f2xx_dbgr
stm32f2xx_dcm
stm32f2xx_dma
stm32f2xx_exti.h
stm32f2xx_flash
stm32f2xx_fsmc
stm32f2xx_gpio
stm32f2xx_hash
stm32f2xx_i2c.h
stm32f2xx_iwdg
stm32f2xx_pwr.
stm32f2xx_rcc.h
stm32f2xx_rng.h
ZobovManipul...
ZobovLimitin...
EXTIHelper.h
ZobovManipul...
ZobovTIM.h
main.cpp
#ifndef EXTIHELPER_H_
#define EXTIHELPER_H_
#include "stdlib.h"
#include "assert.h"
#include "stm32f2xx_exti.h"
//interfacetypedef void(*FunctionPointer)();
class EXTIIRQn_Interface {
public:
EXTIIRQn_Interface() {};
virtual void IRQn() = 0;
virtual ~EXTIIRQn_Interface() {};
};
class EXTIHelper {
public:
static const uint8_t EXTI_PortSource[];
static const uint8_t EXTI_PinSource[];
static const uint8_t EXTI_IRQ[];
static const uint8_t EXTI_Line[];
static EXTIIRQn_Interface *EXTIIQRn[4][16];
static char EXTIIRQn_LineLetter[16];
public:
EXTIHelper() {
// TODO Auto-generated constructor stub
}
static void SetLineLetter(uint8_t pin, uint8_t num) {
assert(EXTIIRQn_LineLetter[pin] == -1);
EXTIIRQn_LineLetter[pin] = num;
}
static void SetEXTIIRQn(uint8_t pin, uint8_t num, EXTIIRQn_Interface* interface) {
assert(EXTIIQRn[num][pin] == NULL);
EXTIIQRn[num][pin] = interface;
}
static void CallIRQn(uint8_t pin) {
EXTI_ClearFlag(EXTI_Line[pin]);
Writable
Smart Insert
43 : 48


ZobovGPIOPort
+ RCC_AHB
+ GPIONum
+ pinNum
+ pin
+ pinSource
+ GPIO
+ ZobovGPIOPort()
+ getPin()
+ getGPIO()
+ getPinSource()
+ ~ZobovGPIOPort()
ZobovManipulatorDirGPIOPort
+ ZobovManipulatorDirGPIOPort()
ZobovManipulatorStepGPIOPort
- afn
+ ZobovManipulatorStepGPIOPort()
ZobovSwitchGPIOPort
+ ZobovSwitchGPIOPort()
#dir
#st
#port
ZobovManipulatorJoint
+ OCnFunction
+ TIMIRQn
+ GPIO_AF
# OCn
# _status
# dir_lock
# TIM_OCInitStructure
+ ZobovManipulatorJoint()
+ setSpeed()
+ rotate()
+ stop()
+ setDirection()
+ getDirection()
+ getStatus()
+ setDirLock()
+ unsetDirLock()
+ ~ZobovManipulatorJoint()
ZobovLimitingSwitch
+ ZobovLimitingSwitch()
+ ~ZobovLimitingSwitch()
+Joint
-joint
-lim_switch
ZobovManipulator
+ JOINT_CT
+ LIM_SWITCH_CT
+ ~ZobovManipulator()
+ Init()
- ZobovManipulator()
- InitTIM()
- InitEXTI()
- InitPorts()
- InitNVIC()
- InitJoint()
- InitLimSwitch()
- InitLimits()
ZobovTIM
+ ZobovTIM()
+ IRQ()
+ ~ZobovTIM()
#encTIM
#TIM
ZobovEncoderTIM
+ TIM
- TIM_TimeBaseStructure
+ ZobovEncoderTIM()
+ IRQ()
+ setLimit()
ZobovJointTIM
+ num
+ period
- TIM_TimeBaseStructure
- _lock
- count
- limit
- TIMArray
- TIMIRQnArray
+ ZobovJointTIM()
+ lock()
+ unlock()
+ isLock()
+ getTIM()
+ EnableTim()
+ DisableTim()
+ IRQ()
+ setLimit()
+IRQFuncArray