

PMR3411 - Projeto de Máquinas

Mecatrônica - EPUSP

Controlador CNC

LinuxCNC

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<https://youtu.be/tn0EKtLOVx4>

<https://youtu.be/c8cY42-qMcM>

Controlador CNC

Modos: manual e automático

Manual: seleciona eixo, define velocidade, movimentação manual do eixo , define zero peça, liga/desliga eixo árvore, etc.

Automático: seleciona programa, executa programa.



<https://youtu.be/gWCsuGFWXWs>

Controlador

PC com Linux CNC (www.linuxcnc.org)

Controle através da porta paralela e joystick

Linux PC

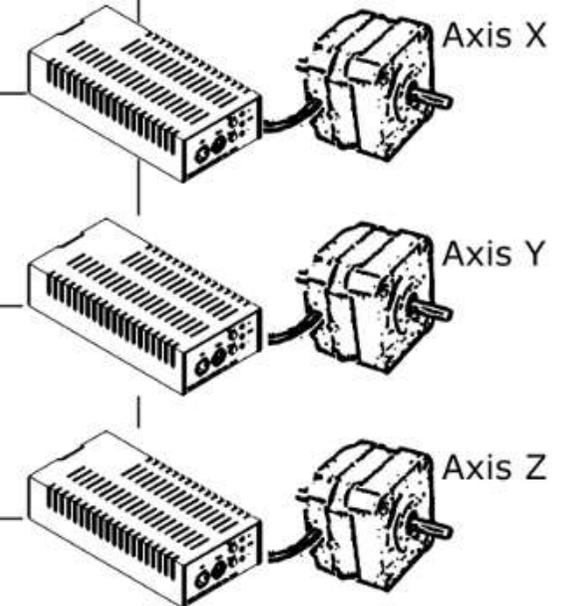


Power supply



Step/Dir

Parallel port



Stepper drives

Stepper motors

joystick



USB

LinuxCNC

Documentação: **Getting Started V2.6.12-79-g2e52efe, 2016-08-22** (73 páginas)
User Manual V2.6.12-79-g2e52efe, 2016-08-22 (268 páginas)

Requisitos mínimos do PC

- 700 MHz x86 processor (1.2 GHz x86 processor recommended)
- 384 MB of RAM (512 MB up to 1 GB recommended)
- 8 GB hard disk

Teste de latência

Configuração da máquina

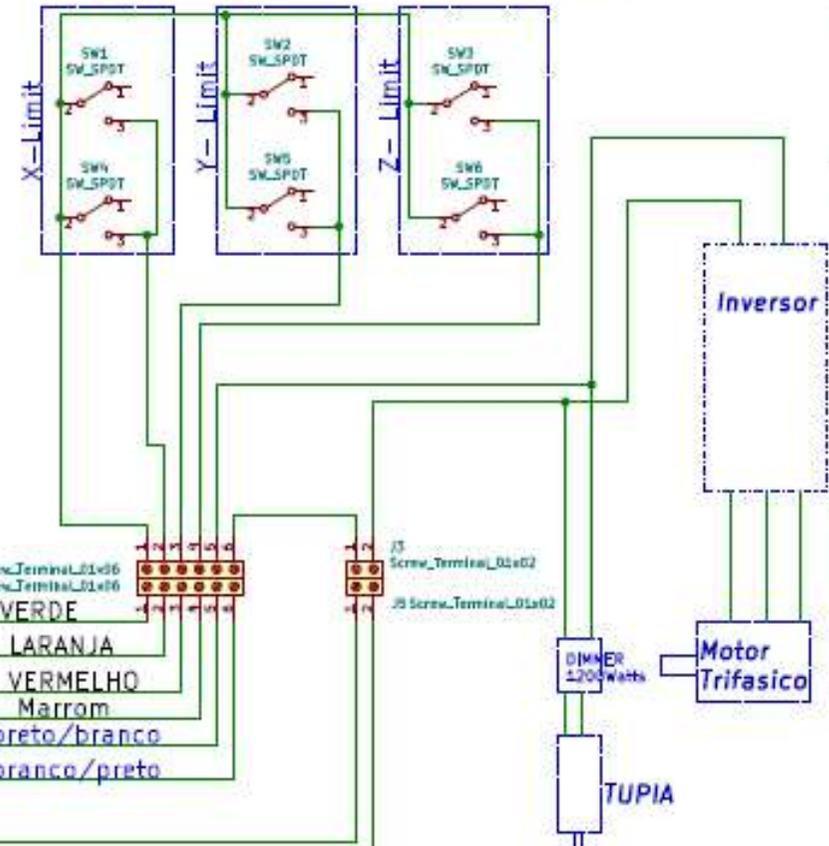
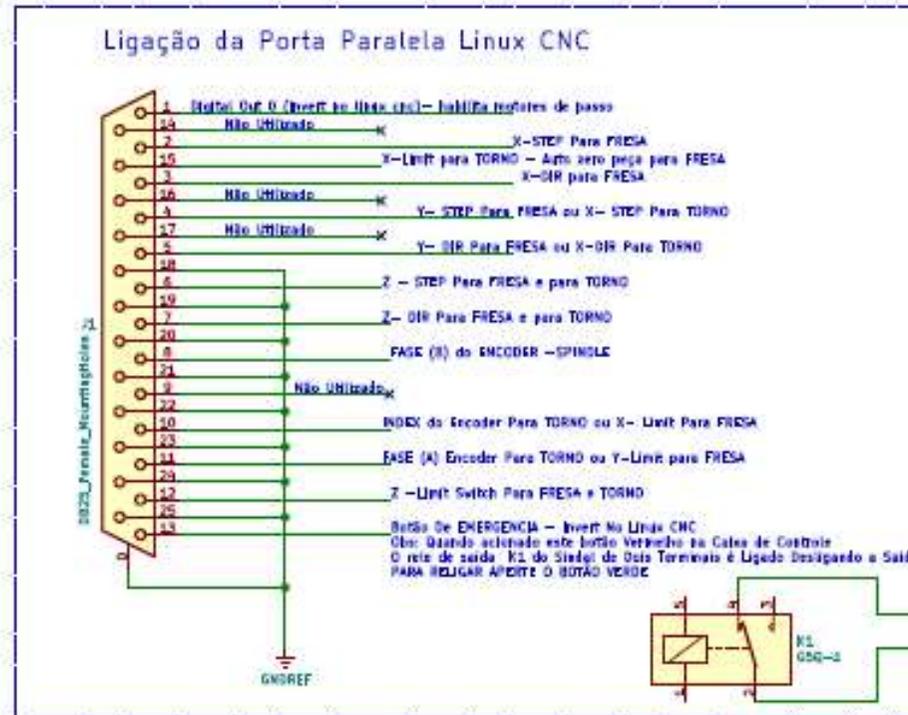
torno: XZ

Configuração da porta paralela

Configuração de cada eixo
teste de cada eixo

Ligações Externas na parte traseira da Caixa de Controle

chaves de fim de Curso- Micro-Switch



Para torno Utilizar Tomada 220VAC
 Para Fresa Utilizar Tomada 127VAC



Esquema Eletrico LinuxCNC
 Autor: Engº Jose Carlos dos Santos
 Disciplina: Projemaq 2020-2
 PNR-USP -EPUSP
 Sheet: /
 File: Projeto lncd20.sch
 Title: Controle Linux cnc LPT1

Motor de passo HT23-401

| MODELO | LIGAÇÃO DO MOTOR 1=SÉRIE 2=PARALELO 3=UNIOLAR | COMPRIMENTO "L" (mm) | MINÍMO TORQUE ESTÁTICO (N.m) | FIOS | STEP (ÂNGULO) | VOLTS | AMPS | OHMS | mH | ROTOR INÉRCIA (g.cm ²) | MOTOR PESO (Kg) |
|--------------|--|----------------------|------------------------------|------|---------------|-------|------|------|-----|------------------------------------|-----------------|
| KTC-HT23-401 | 1 | 76 | 1,86 | 8 | 1,8 | 4,2 | 2,12 | 2,0 | 6,4 | 480 | 1,00 |
| | 2 | | | | | 2,1 | 4,24 | 0,5 | 1,6 | | |
| | 3 | | | | | 3,0 | 3,00 | 1,0 | 1,6 | | |

curva de torque x velocidade



Driver de motor de passo

GECKODRIVE G251

MAIN CONNECTOR:

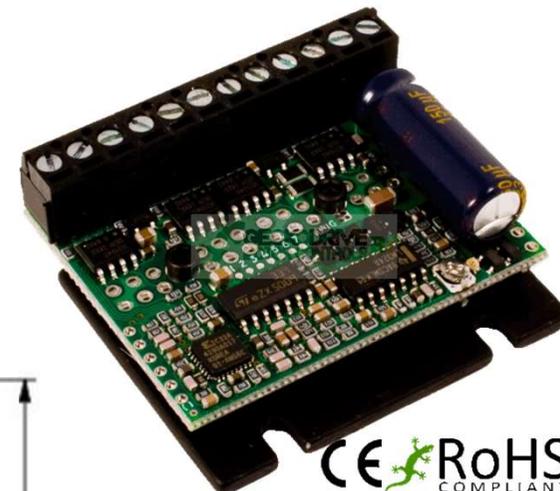
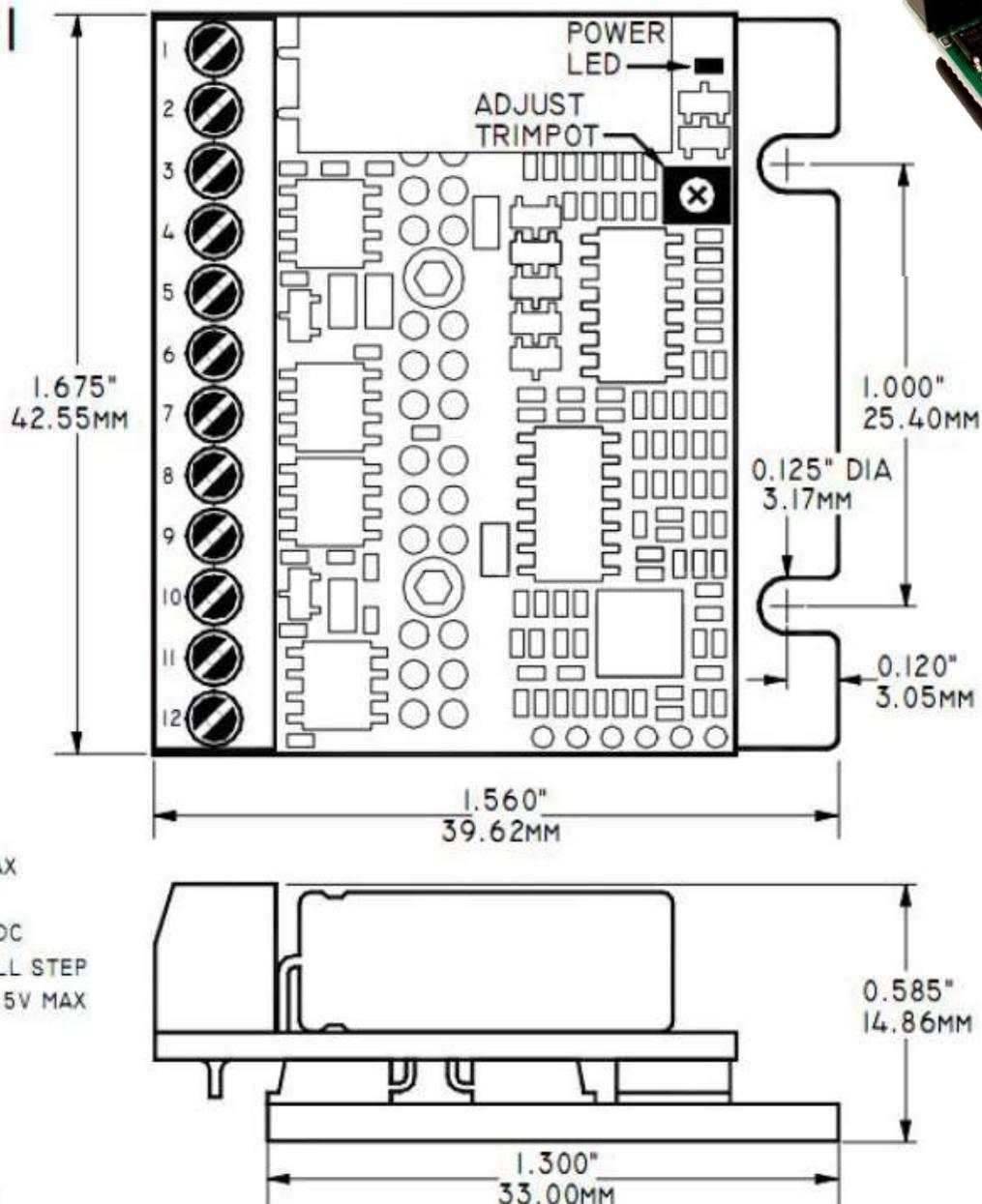
- 1 GND
- 2 +VDC
- 3 I-SET
- 4 I-SET
- 5 PHASE A
- 6 PHASE /A
- 7 PHASE B
- 8 PHASE /B
- 9 DIRECTION
- 10 STEP
- 11 DISABLE
- 12 SIGNAL GND

CURRENT SET RESISTOR:

CONNECT 1/4W RESISTOR FROM "I-SET" (TERM. 3) TO "I-SET" (TERM. 4).
MOTOR PHASE CURRENT = 1 AMP PER 1,000 OHMS.

SPECIFICATIONS:

| | |
|-------------------|------------------------------|
| SUPPLY VOLTAGE | +15VDC MIN, +50VDC MAX |
| PHASE CURRENT | 0A TO 3.5A |
| POWER DISSIPATION | 3.3W AT 3.5A AND 50VDC |
| RESOLUTION | 10 MICROSTEPS PER FULL STEP |
| INPUT LEVEL | 0V TO 3.3V MIN, 0V TO 5V MAX |
| INPUT CURRENT | 1mA |
| WEIGHT | 0.45 OZ (12.5 GRAMS) |
| TEMPERATURE | 0C TO 75C |
| STEP PULSE RATE | 0Hz TO 300kHz |
| STEP PULSE WIDTH | 1 MICROSECOND MIN |
| AUTO STANDBY | 70% OF SET CURRENT |



Indutância do motor : 1 a 50 mH

Conversão deslocamento/passo do motor (driver micropasso):

$$x = n \frac{p}{2000}$$

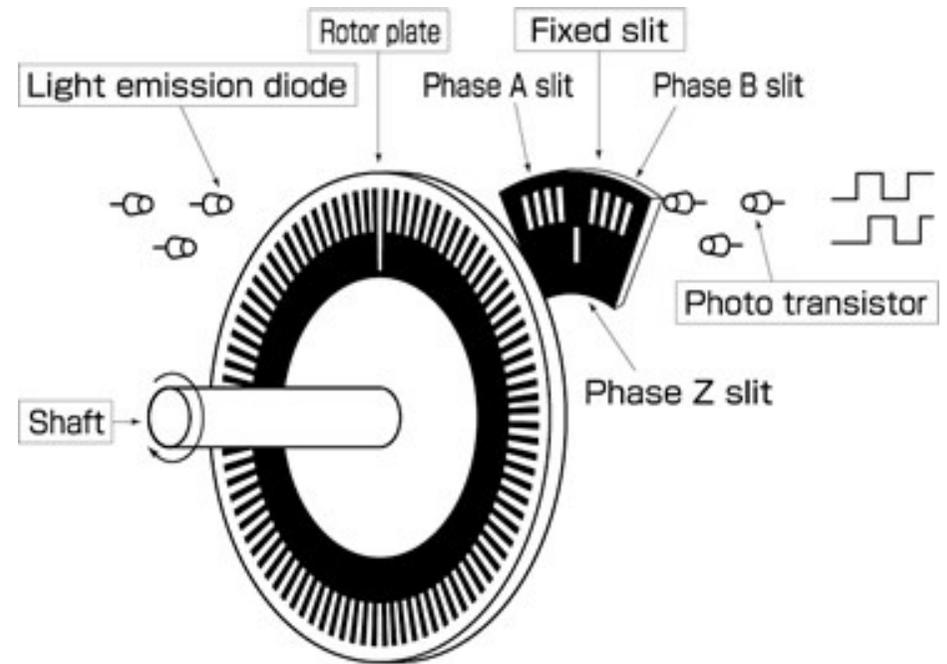
x = deslocamento (mm)

p = passo do fuso (5 mm/volta)

n = número de passos do motor

Encoder óptico

Sensor de posição angular



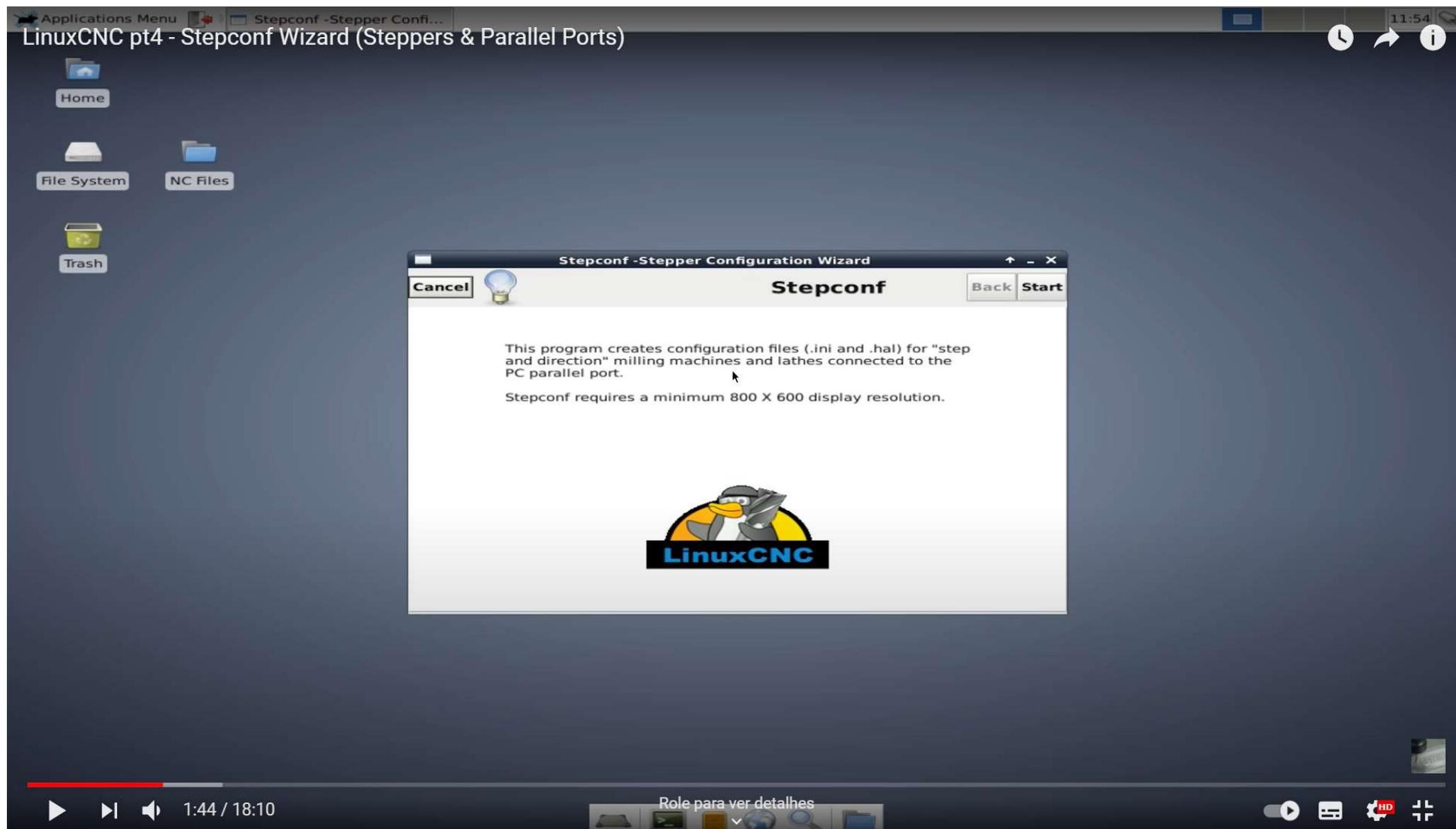
Incremental Encoder Simplified Structure

Encoder: canais A e B com 200 pulsos/volta e pulso indicar de volta completa

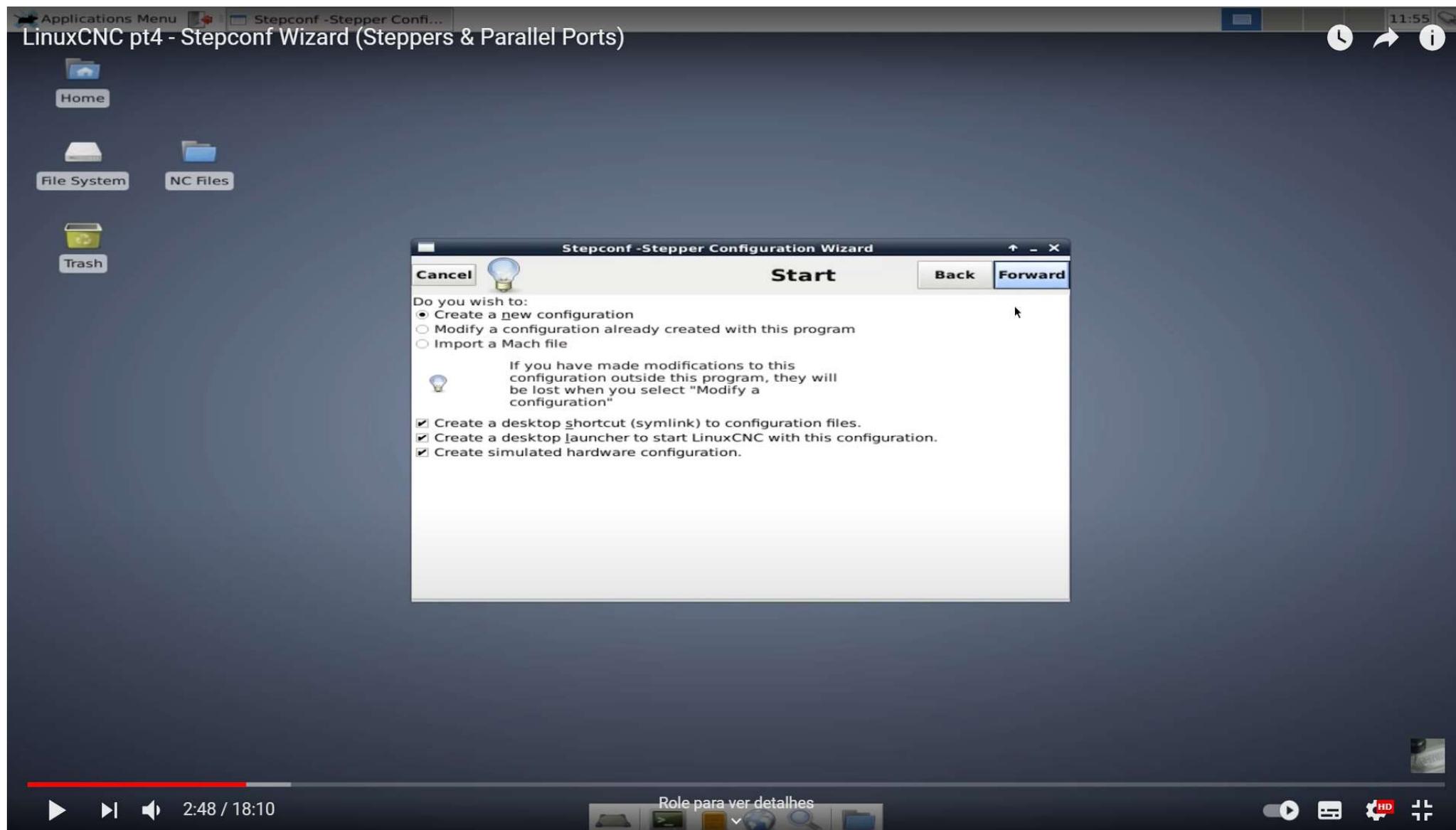
Configuração do Linux CNC



Arquivo de configuração da máquina



Arquivo de configuração da máquina



Especificação do tipo de máquina

The screenshot shows the 'Stepconf - Stepper Configuration Wizard' window. The title bar reads 'Stepconf - Stepper Configuration Wizard'. The window is titled 'Base Information' and contains the following fields and settings:

- Machine Name: russtuff mill
- Configuration directory: ~/linuxcnc/configs/russtuff_mill
- Axis configuration: XYZ
- Reset Default machine units: Inch
- Driver characteristics: (Multiply by 1000 for times specified in μ s or microseconds)
- Driver type: Other
- Driver Timing Settings:
 - Step Time: 5000 ns
 - Step Space: 5000 ns
 - Direction Hold: 20000 ns
 - Direction Setup: 20000 ns
- One Parport (selected) / Two Parports
- Base Period Maximum Jitter: 15000 ns
- Min Base Period: 30000 ns
- Max step rate: 33333 Hz

At the bottom of the window, there is a 'Test Base Period Jitter' button. The video player interface at the bottom shows a progress bar at 4:14 / 18:10 and a tooltip that says 'Role para ver detalhes'.

Especificação do driver do motor de passo

LinuxCNC pt4 - Stepconf Wizard (Steppers & Parallel Ports)

Machine Name:
Configuration directory:
Axis configuration:
Reset Default machine units:

Driver characteristics: (Multiply by
Driver type:
Driver Timing Settings
Step Time: 5000 ns
Step Space: 5000 ns
Direction Hold: 20000 ns
Direction Setup: 20000 ns

One Parport Two Parports

Base Period Maximum Jitter: 15000 ns
Test Base Period jitter
Min Base Period: 30000 ns
Max step rate: 33333 Hz

Gecko 201
Gecko 202
Gecko 203v
Gecko 210
Gecko 212
Gecko 320
Gecko 540
L297
PMDX-150
Sherline
Xylotex 8S-3
Parker-Compumotor oem750
JVL-SMD41 or 42
Hobbycnc Pro Chopper
Keling 4030
Other

3:49 / 18:10

Role para ver detalhes

Configuração da porta paralela

LinuxCNC pt4 - Stepconf Wizard (Steppers & Parallel Ports)

Stepconf - Stepper Configuration Wizard

Parallel Port 1

Cancel Back Forward

| Outputs (PC to Mill): | | Invert | Inputs (Mill to PC): | | Invert |
|-----------------------|------------------|--------------------------|----------------------|--------|--------------------------|
| Pin 1: | ESTOP Out | <input type="checkbox"/> | Pin 10: | Unused | <input type="checkbox"/> |
| Pin 2: | X Step | <input type="checkbox"/> | Pin 11: | Unused | <input type="checkbox"/> |
| Pin 3: | X Direction | <input type="checkbox"/> | Pin 12: | Unused | <input type="checkbox"/> |
| Pin 4: | Y Step | <input type="checkbox"/> | Pin 13: | Unused | <input type="checkbox"/> |
| Pin 5: | Y Direction | <input type="checkbox"/> | Pin 15: | Unused | <input type="checkbox"/> |
| Pin 6: | Z Step | <input type="checkbox"/> | | | |
| Pin 7: | Z Direction | <input type="checkbox"/> | | | |
| Pin 8: | A Step | <input type="checkbox"/> | | | |
| Pin 9: | A Direction | <input type="checkbox"/> | | | |
| Pin 14: | Spindle CW | <input type="checkbox"/> | | | |
| Pin 16: | Spindle PWM | <input type="checkbox"/> | | | |
| Pin 17: | Amplifier Enable | <input type="checkbox"/> | | | |

Parport Base Address:
0

Output pinout presets:
Sherline

Preset

4:53 / 18:10

Role para ver detalhes

Configuração de cada eixo da máquina

LinuxCNC pt4 - Stepconf Wizard (Steppers & Parallel Ports)



Stepconf - Stepper Configuration Wizard

Axis X

Motor steps per revolution: 200

Driver Microstepping: 2

Pulley teeth (Motor:Leadscrew): 1 : 1

Leadscrew Pitch: 5 rev / in

Maximum Velocity: 25 in / s

Maximum Acceleration: 750 in / s²

Home location: 0

Table travel: 0 to 200

Home Switch location: 0

Home Search velocity: 1.5

Home Latch direction: Same

Time to accelerate to max speed: 0.0333 s

Distance to accelerate to max speed: 0.4167 in

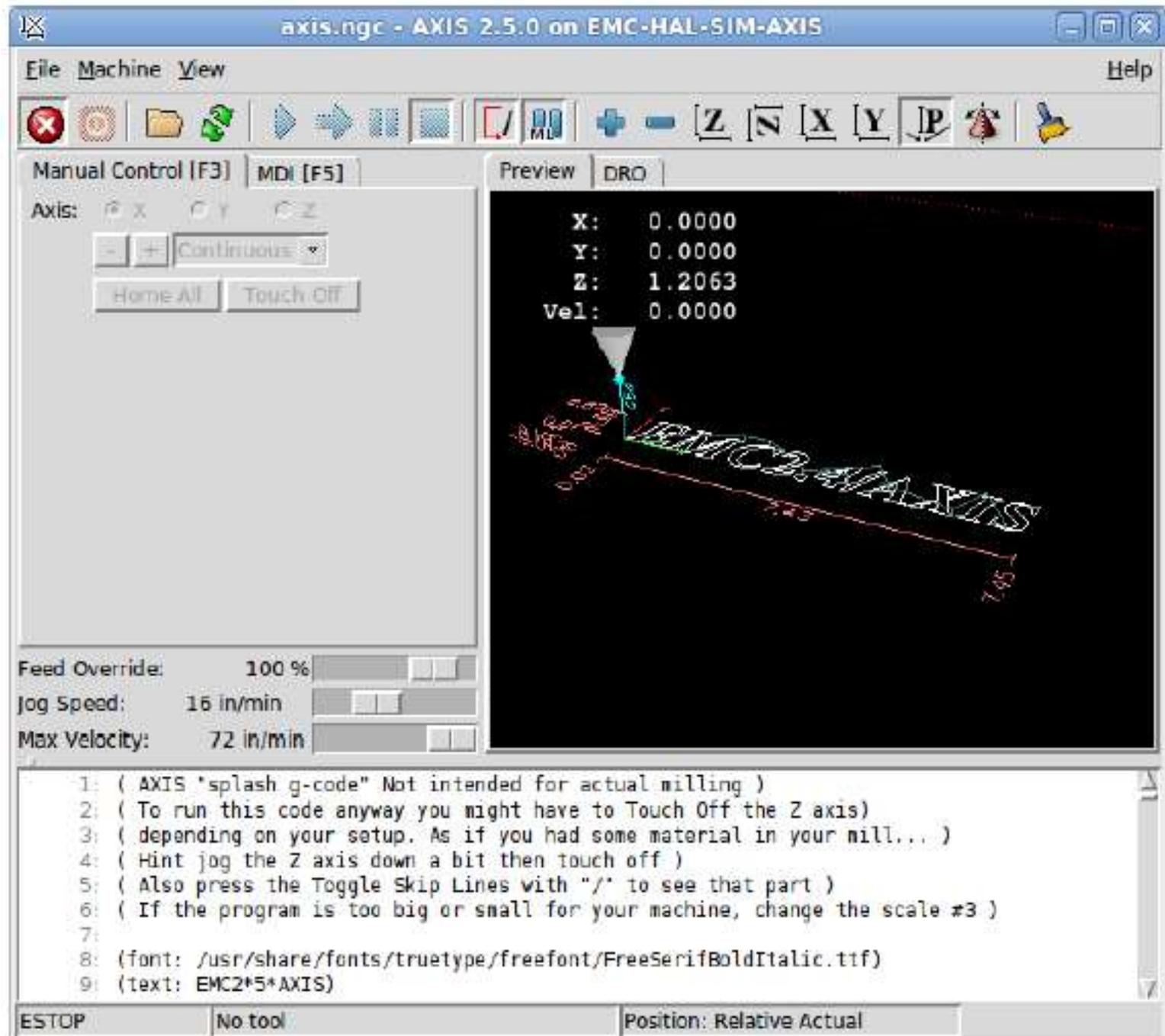
Pulse rate at max speed: 50000.0 Hz

Axis SCALE: 2000.0 Steps / in

8:06 / 18:10

Role para ver detalhes

Interface com o usuário





<https://youtu.be/dXgk4bznkfo>