

# KUKA

## Dataflow bending programs

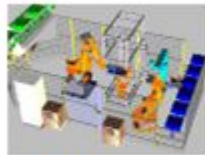
Thomas Schrooten

KUKA Automatisering + Robots N.V.

2010-01-11 (replaces none)



Turn-key cells



Engineering



Engineering Services



Robots

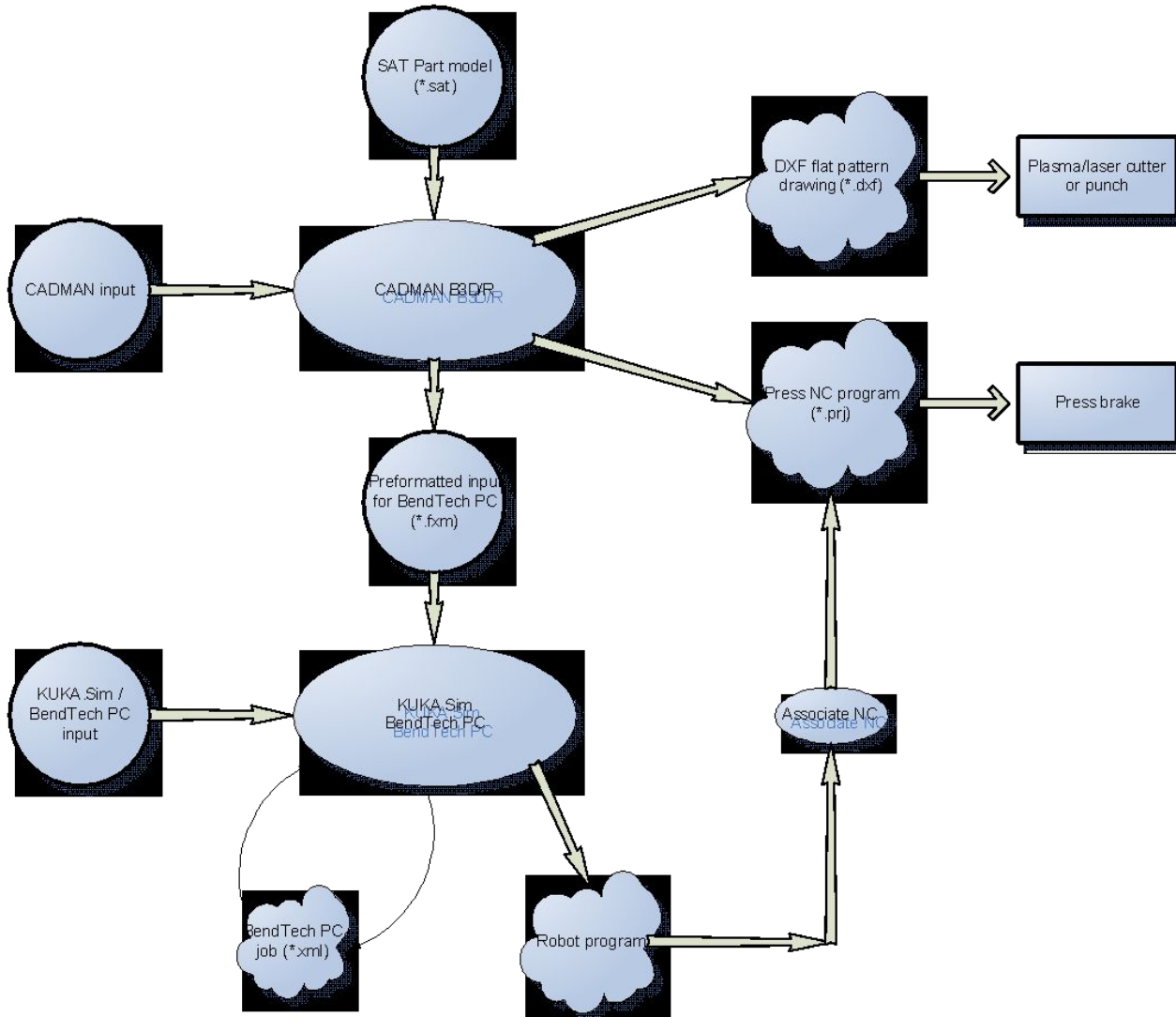


Customer Services



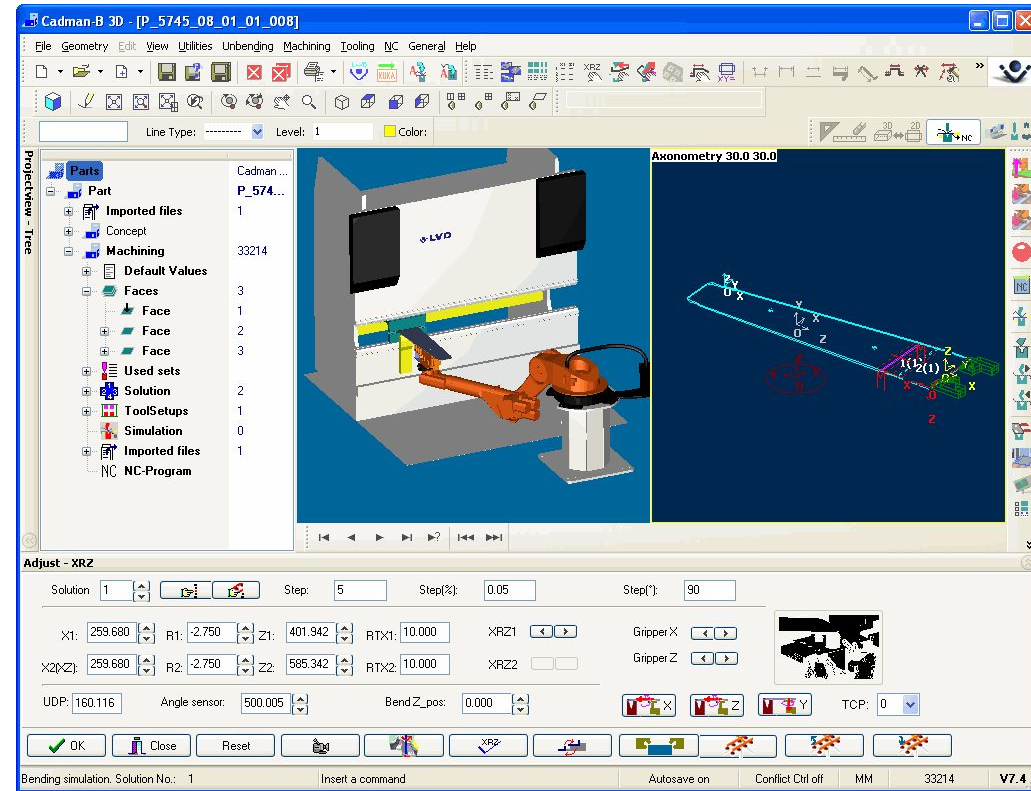
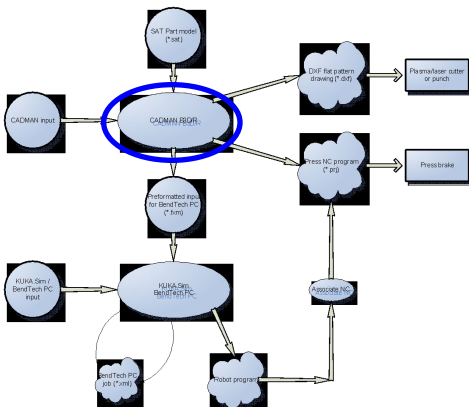
Training

## Dataflow overview



## Programming in CADMAN B3D / R

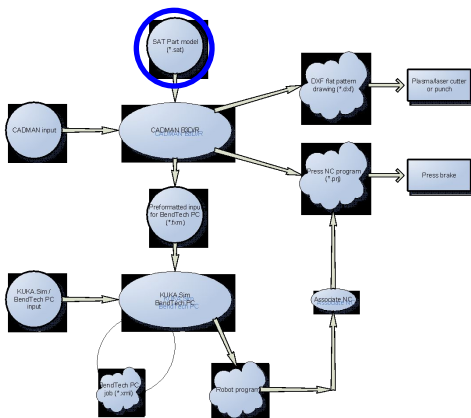
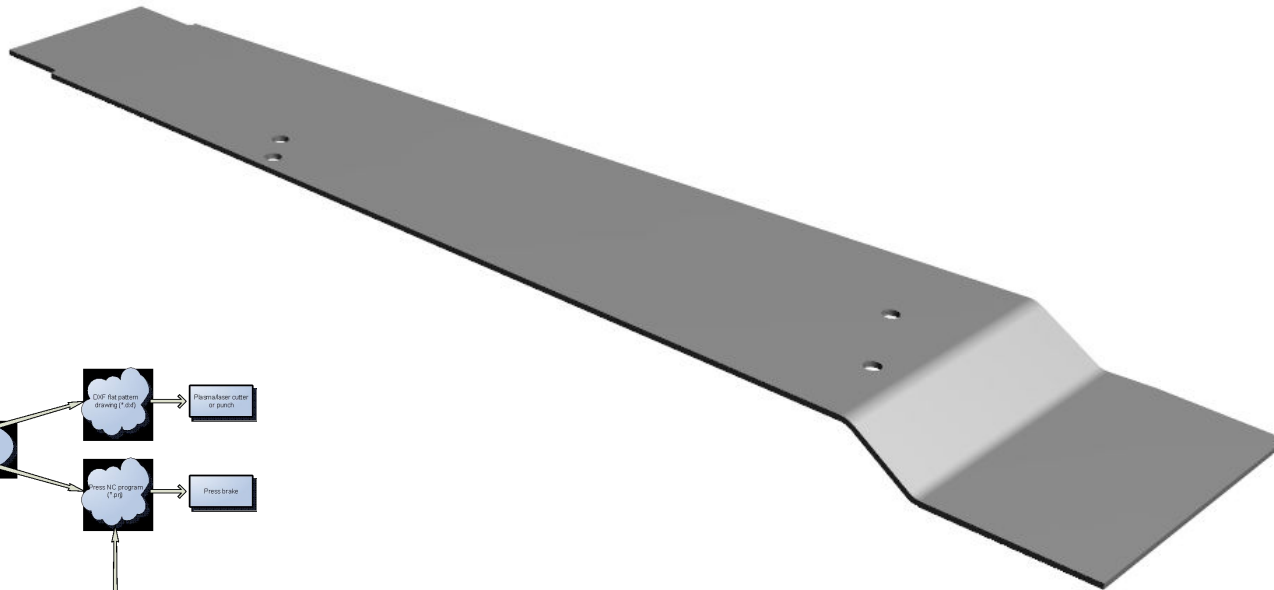
- Inputs
  - SAT part model
  - Material database
  - Press brake tools
  - Cell information
  - Robot grippers / Regrip station
  
- Outputs
  - Flat pattern drawing
  - Press brake NC program
  - Preformatted file for BendTech PC



## Programming in CADMAN B3D / R : inputs

SAT part model: \*.sat

- 3D model of part in bent shape
- File format: SAT 6.0 or less



## Programming in CADMAN B3D / R : inputs

### Material database

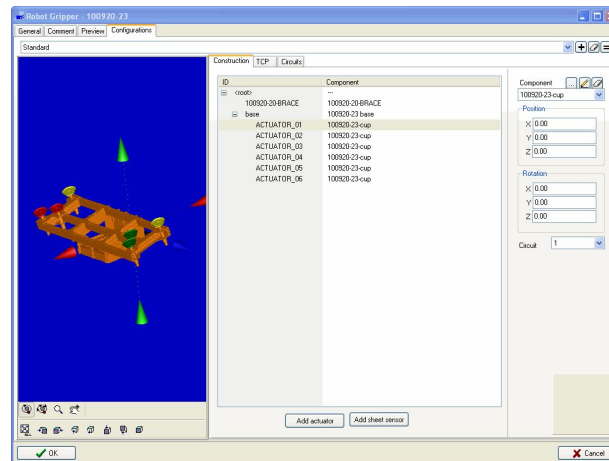
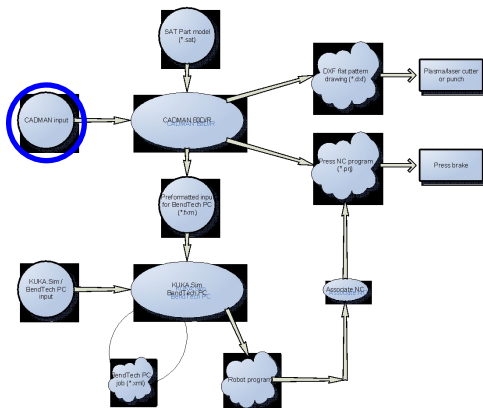
- For non standard materials, samples for every occurring thickness of the material must be shipped to LVD for testing. This material will then be added to the CADMAN database

### Press brake tools / cell information

- These will be preconfigured in CADMAN-R

### Robot grippers / Regrip station

- KUKA designs the robot grippers / regrip station and also configures them for use in CADMAN-R

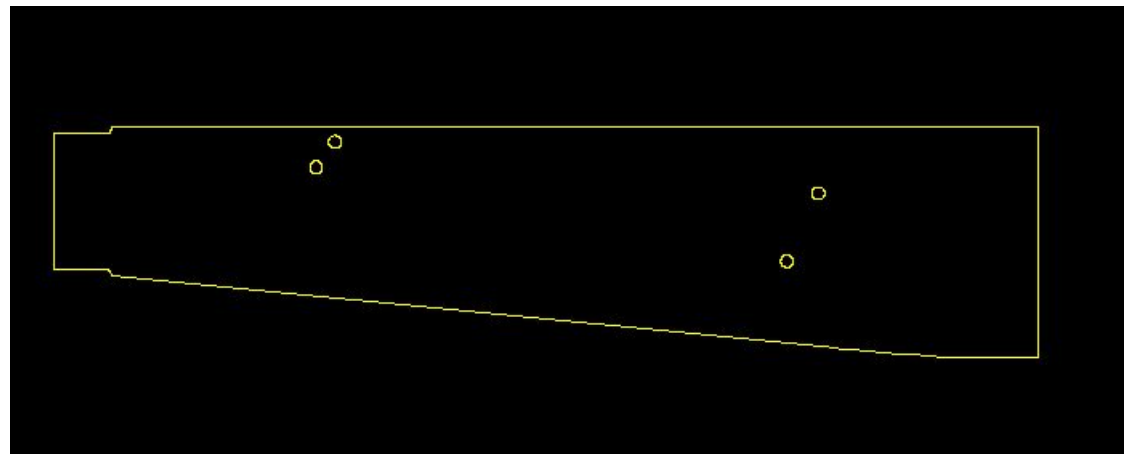
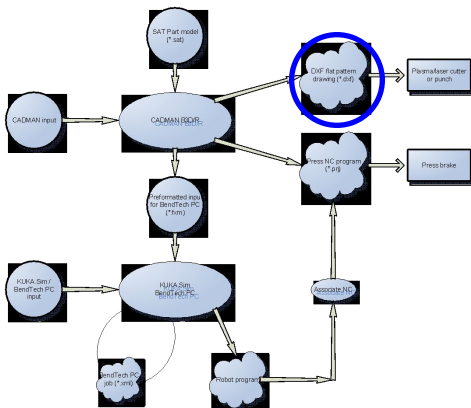


## Programming in CADMAN B3D / R : outputs

Flat pattern drawing: \*.dxf

Taking into account the material behaviour (material database) and the used press brake tools (die and punch), the bend allowance is calculated and a flat pattern drawing is generated.

This flat pattern (\*.dxf file format) must be sent to the plasma or laser cutter or the punch. The dimensions of the bent end product will only be correct if this drawing is used for cutting the flat plate material.

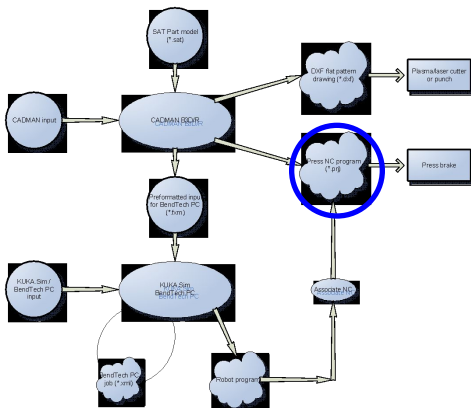


## Programming in CADMAN B3D / R : outputs

Press NC program: \*.prj

The press NC program will be exported in the \*.prj format. This has the following advantages:

- Software version independant
- Press brake tools information is included
- Robot program can be associated with press brake program

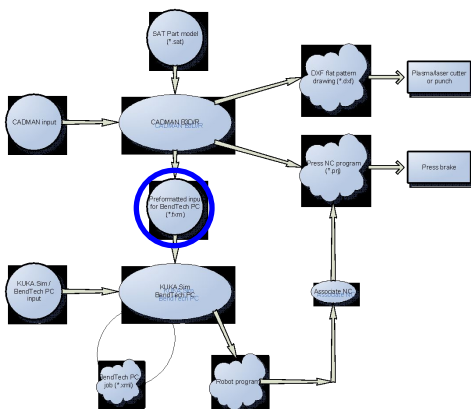


	19281_89_345 6.00		297.3 297.3	R10W_G1546659	
	351		359	V50_78_130_G1545311	
	147.0		EASY FORM		-1.6
	128.85		0.00		V1 0.18
	341		---		CV1 0.00
	143		0.0		CX 0.00
	10		0.57		NO 1
	10.00		0.0		X1 259.68
	FOOT		OFF		R1 127.2
					Z1 401.9
					Z2 585.3
					XZ 0.00

## Programming in CADMAN B3D / R : outputs

Preformatted file for BendTech PC: \*.fxm

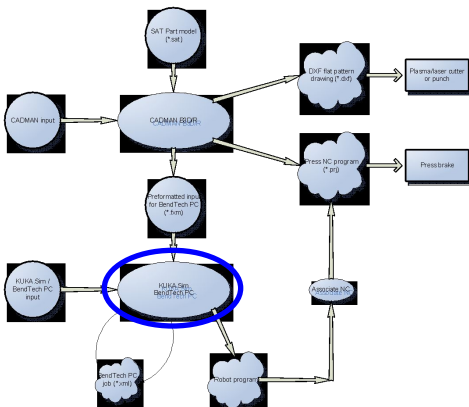
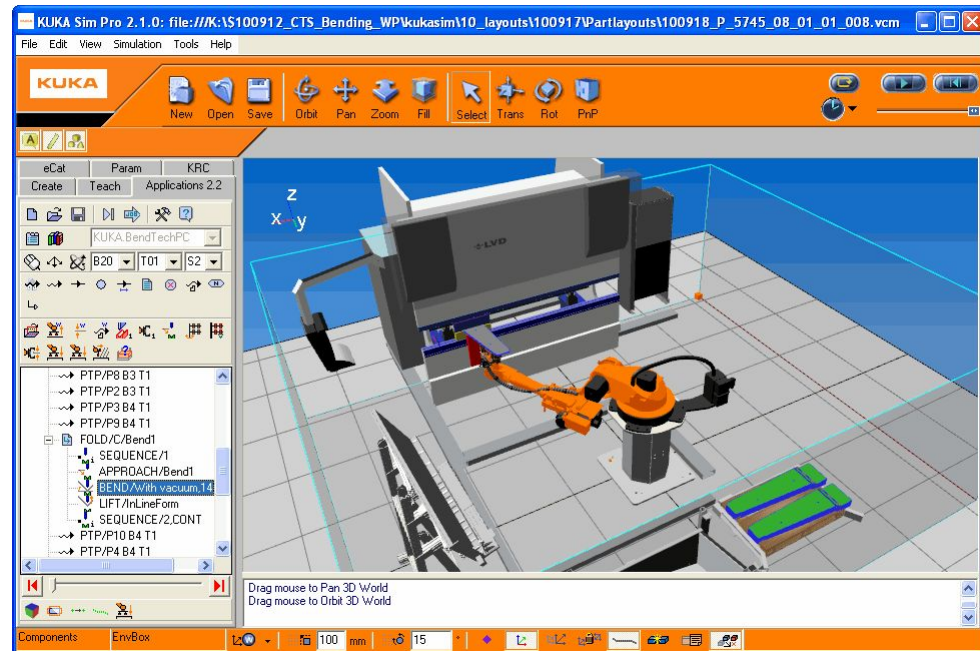
- This file contains bending information that is relevant for the robot program
  - » Part geometry
  - » Bending sequences
  - » Press brake settings
  - » Grasp position for robot gripper
  - » ...
- This file's only purpose is to link the programming press brake made in CADMAN to the robot programming in KUKA.Sim/BendTech PC





## Programming in KUKA.Sim / BendTech PC

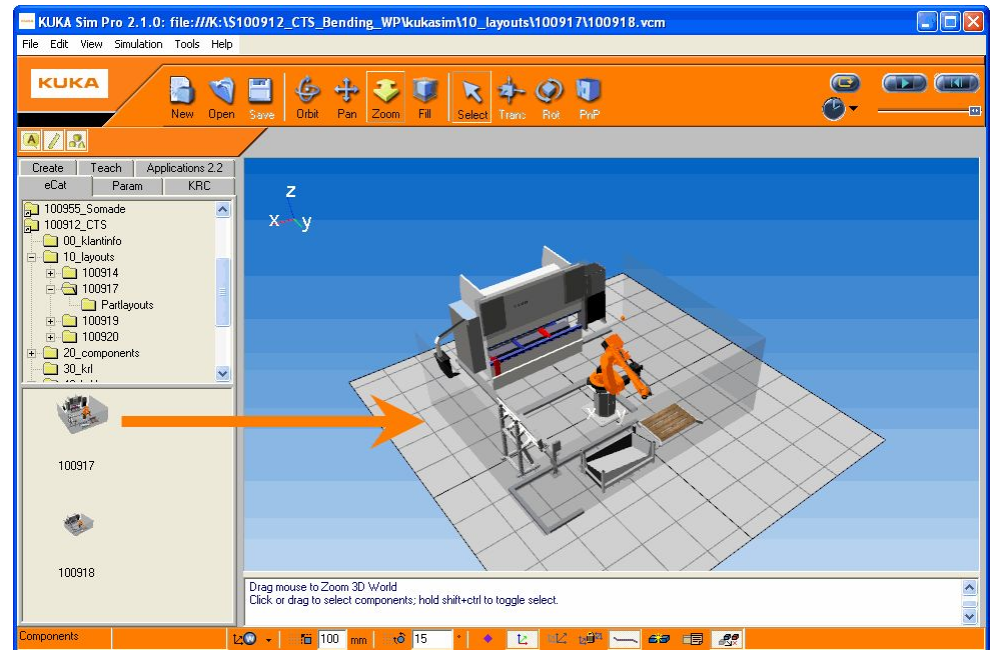
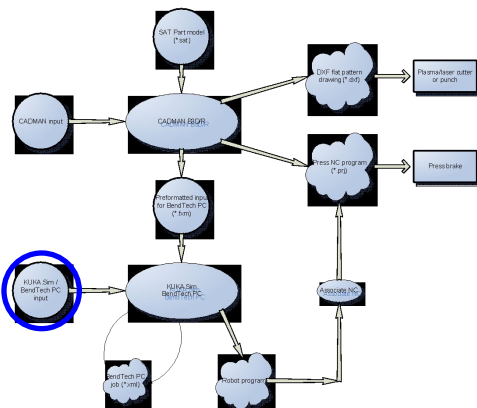
- Inputs
  - \*.Fxm file from CADMAN
  - Complete cell layout (KUKA.Sim)
  
- Outputs
  - Robot program (\*.src, \*.dat)
  - BendTech PC offline job for reloading simulation (\*.xml)



## Programming in KUKA.Sim / BendTech PC: inputs

The complete cell layout in KUKA.Sim is modelled by KUKA. This layouts contains all functional components and possible obstacles:

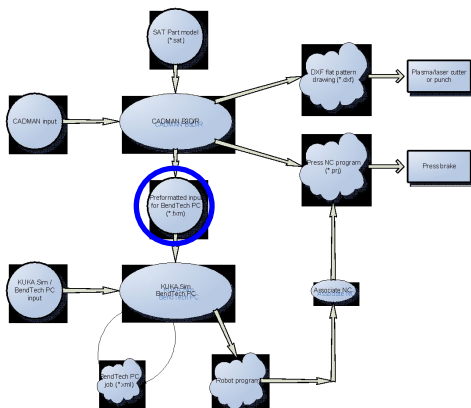
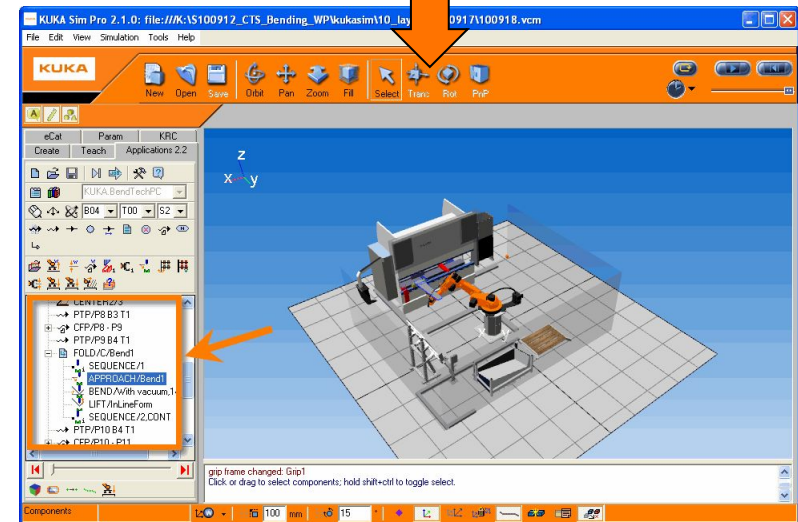
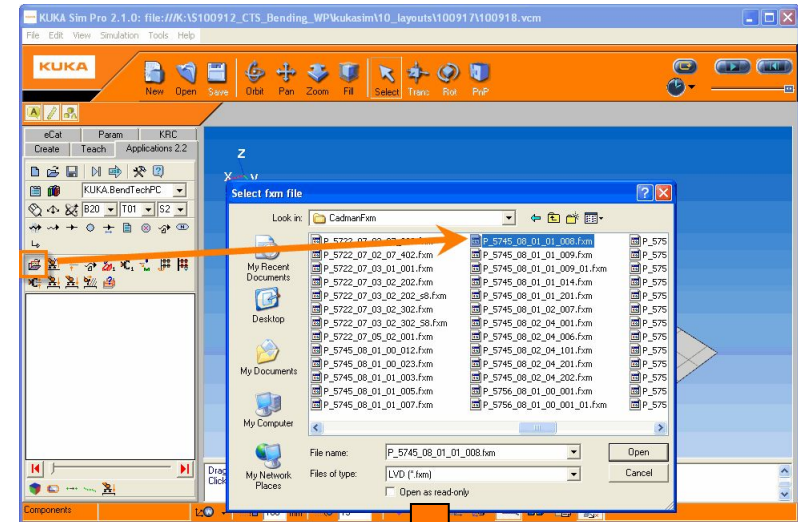
- Robot
- Press brake
- Input units
- Output units
- Regrip station
- Thickness measurement
- Fences, operator pedestals and other obstacles



## Programming in KUKA.Sim / BendTech PC: inputs

### Fxm file from CADMAN

- Part geometry
- Press brake program
- Grasp frames
- Used gripper geometry
- Functional program elements





## Associate NC

The robot program can be associated with the press brake NC (\*.prj)

Advantage: After the online programming all code for one part is compressed in one \*.prj file. When loading this file on the press brake, the press uses the press brake NC and automatically sends the robot program to the robot

