Extruder Status
(Joint FERMILAB-NICADD project)

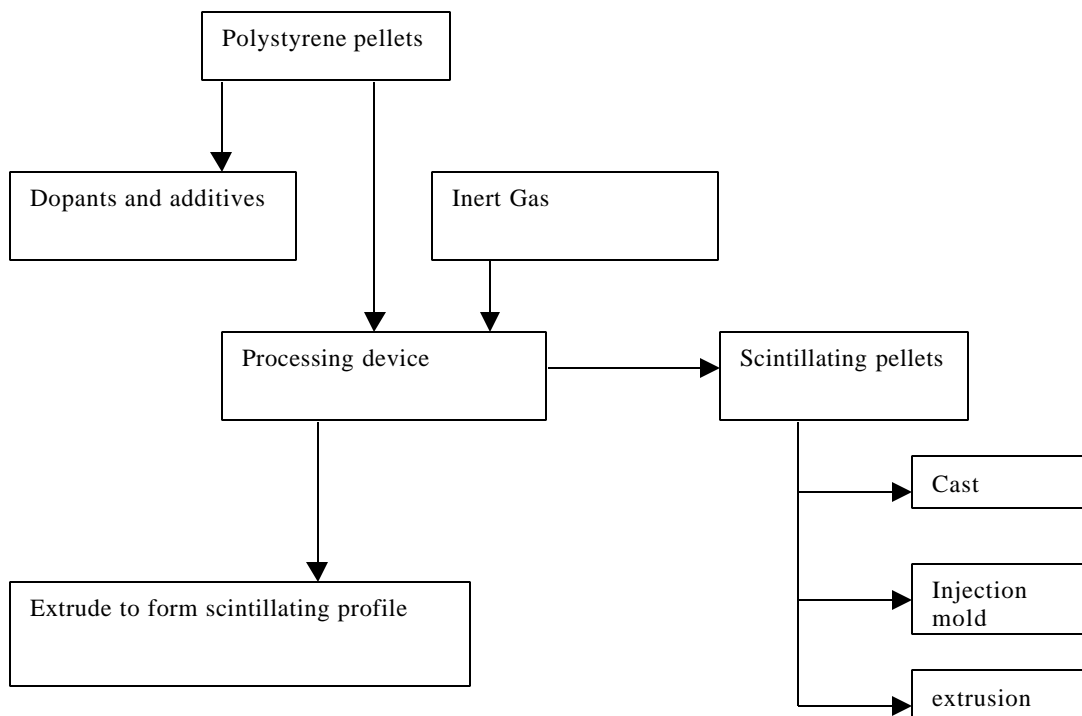## Victor Rykalin
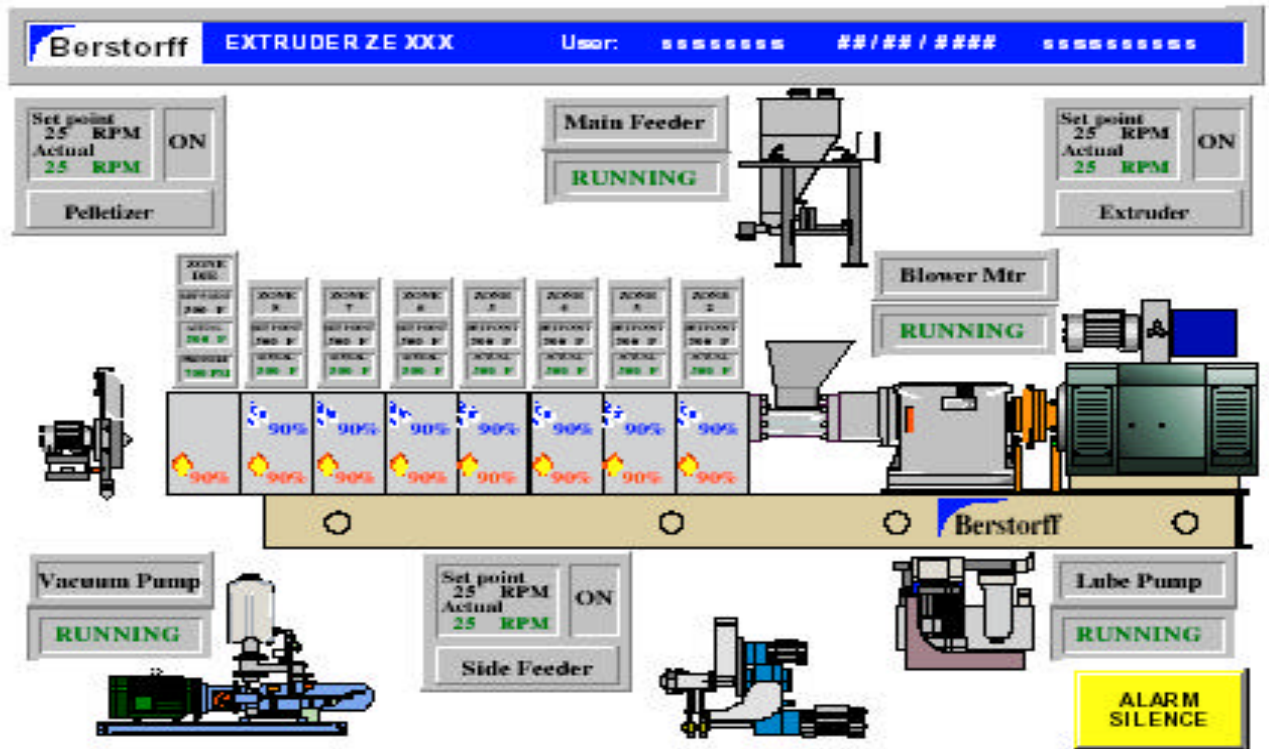
Procurement History

- Berstoff $617 k   Turn-key
- Coperion $1.4 M   Turn-key
- Davis-Standart $631k No installation
- Leistritz $615k   No installation

Final Vendor Berstoff !!!
$579,200 all included. 4-Apr-02

- By September 15/02 we paid $173,760
- By ~December we should pay $ 405,440

- OUTPUT   50-300 Pounds/hour

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Polystyrene pellets
        │
        ├──────────────┐
        ▼              │
Dopants and additives  │      Inert Gas
                       │          │
                       ▼          ▼
                  Processing device ────────► Scintillating pellets
                       │                              │
                       │                              ├──► Cast
                       ▼                              │
        Extrude to form scintillating profile        ├──► Injection mold
                                                      │
                                                      └──► extrusion
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ZE 40A UTS Technical Data

- Screw diameter
- Diameter ratio
- Actual L/D
- Screw speed
- Drive power
- Exp. Output
- Height
- Weight
- Nom. Torque
- Start. Torque
- Theoretical life

- 44 mm
- 34D
- 30:9:1
- 1200 RPM
- 200 HP
- Det. By trials
- ~1100 mm
- ~3500 kg
- 530Nm/screw
- 1.1
- ~40000 hours

Location at FERMILAB lab. 5

- Has to be cleaned before end of October.

- Currently stuffed with CMS residuals.
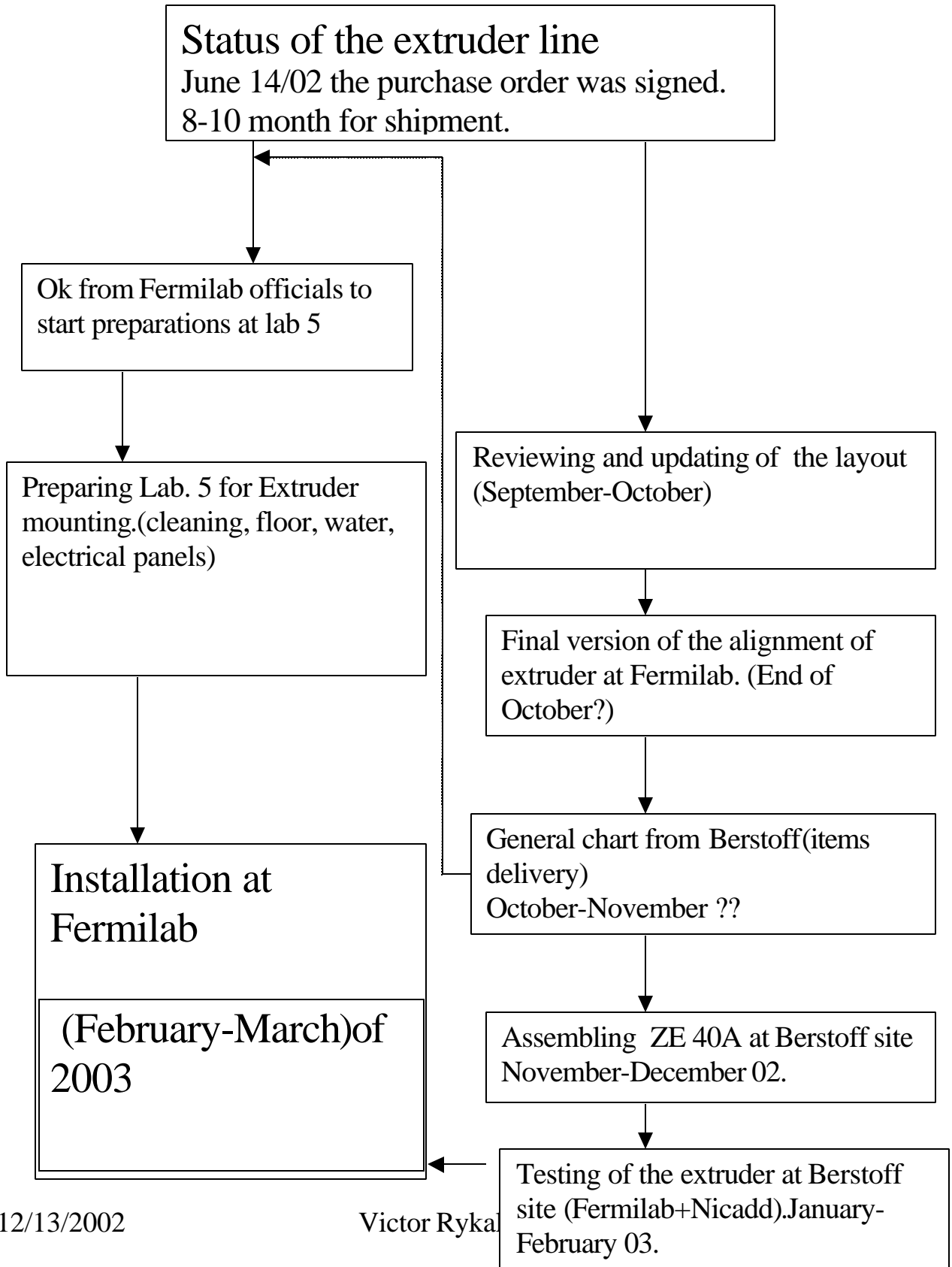
- We are working on these questions currently.

Current situation and plans to get it done !

Status of the extruder line
June 14/02 the purchase order was signed.
8-10 month for shipment.

Ok from Fermilab officials to start preparations at lab 5

Preparing Lab. 5 for Extruder mounting.(cleaning, floor, water, electrical panels)

Reviewing and updating of the layout (September-October)

Final version of the alignment of extruder at Fermilab. (End of October?)

General chart from Berstoff(items delivery)
October-November ??

Installation at Fermilab

(February-March)of 2003

Assembling ZE 40A at Berstoff site November-December 02.

Testing of the extruder at Berstoff site (Fermilab+Nicadd).January-February 03.

NIU-Dep. Of Mechanical Engineering

A roll of the die
NIU grad students, professors design new product for Fermilab

By Talesha Herbert
Staff Reporter

Photo by Christian Arrecis
NIU mechanical engineering professor Meun Kim is designing a die for Fermilab in Batavia using specialized software called HyperXtrude.
 A very challenging die design will soon become a virtual reality for NIU mechanical engineers.
NIU's Center for Accelerator and Detector Development (NICADD) and the department of mechanical engineering are designing a die for Fermilab, a Scintillator Detector Development Laboratory in Batavia. A scintillator is a round, plastic bar with black dye in the center that glows when high-energy particles or photons shine on it. The scintillator is used to shape the die.
I think this is the beginning of a die designed in a totally new way," said Meung Kim, an NIU mechanical engineering professor.
Kim, along with two graduate students and NIU mechanical engineering professor Milivoje Kostic, made up the team that designs dies with advanced computing and simulation techniques.
"The die design requires expertise in computational fluid mechanics, and we have faculty members who are experts in this area," said Simon Song, chair of the mechanical engineering department, in a press release.
"Also, both graduate and undergraduate students will benefit from the collaboration. Graduate students working on this project will receive financial support and get the opportunity to work in a cutting-edge area of research."
The Fermi National Accelerator Laboratory (Fermilab) in Batavia is home to the most powerful particle accelerator in the world.
 "Mainly our work is to design the die to be used in the extrusion machines in the Fermilab," Song said.
The key to the scintillator detector production process is the metal die used to shape it. For the most part, the design and manufacturing of these dies throughout the years has relied on the experience of the die-maker.
Song said the challenging project will save Fermilab thousands of dollars. Each design costs the manufacturers $5,000.
Kim, who has been teaching at NIU for 16 years, is hoping to find a systematic way to design the die in order to "identify all important parameters involved." He also said that a specialized software called HyperXtrude is used to design the die for the scintillator.
"This is a perfect fit for our department," he said.
Kim said his vision is for NIU to emphasize education in the future by teaching students about virtual reality research.
 "Virtual research is like gaming software with physics," Kim said.

NIU-Dep. Of Mechanical Engineering
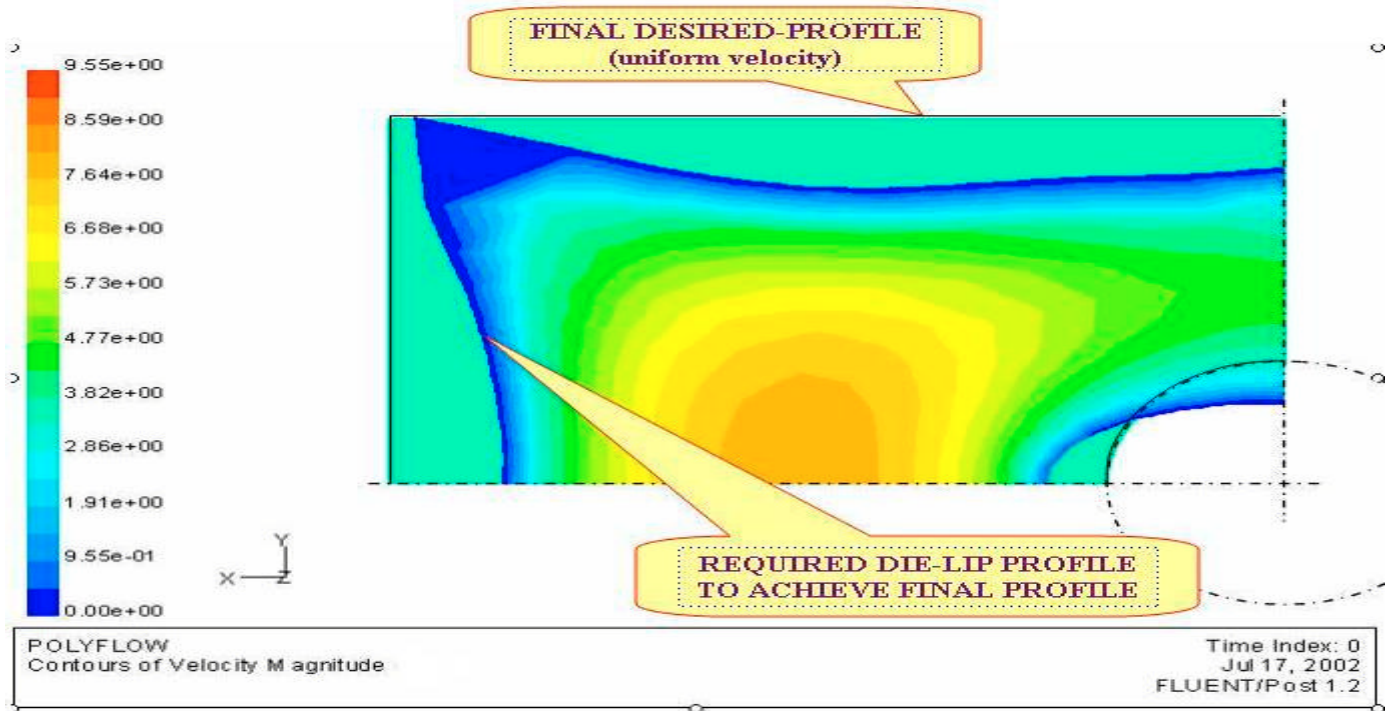
STATUS :

On September 9th, we sent the Purchase Requisition over to Procurement (who places the order with the company) for the Fluent software. We are waiting for a callback from Procurement to see when they actually placed the order with the company.
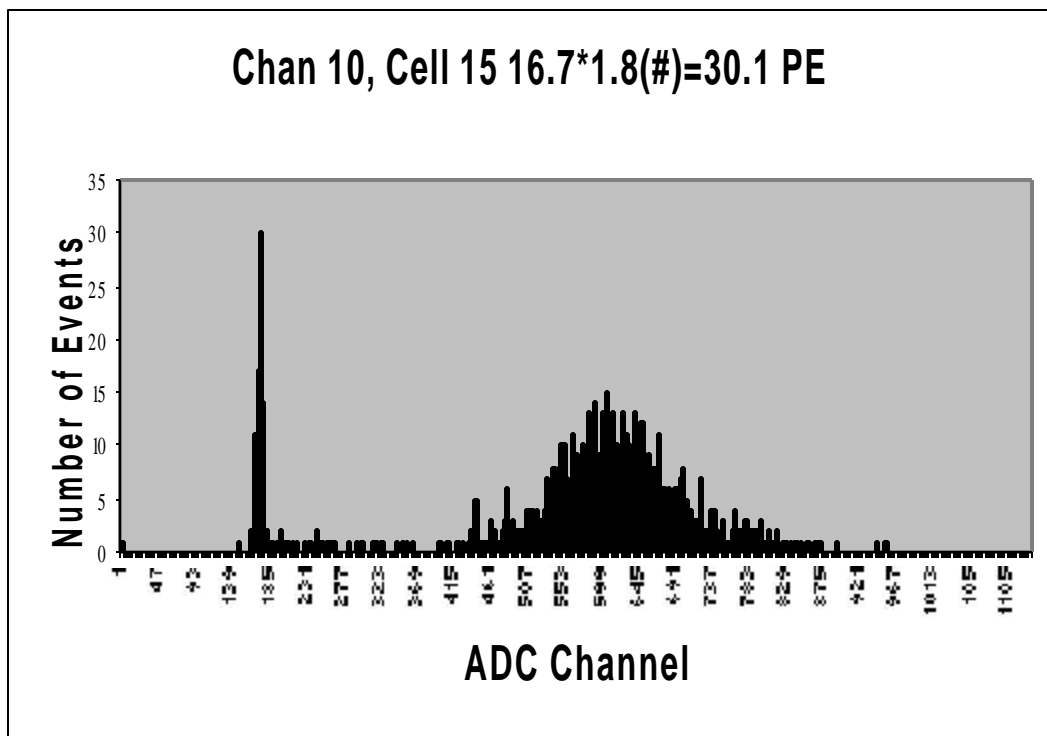
Die.What it looks like ?!
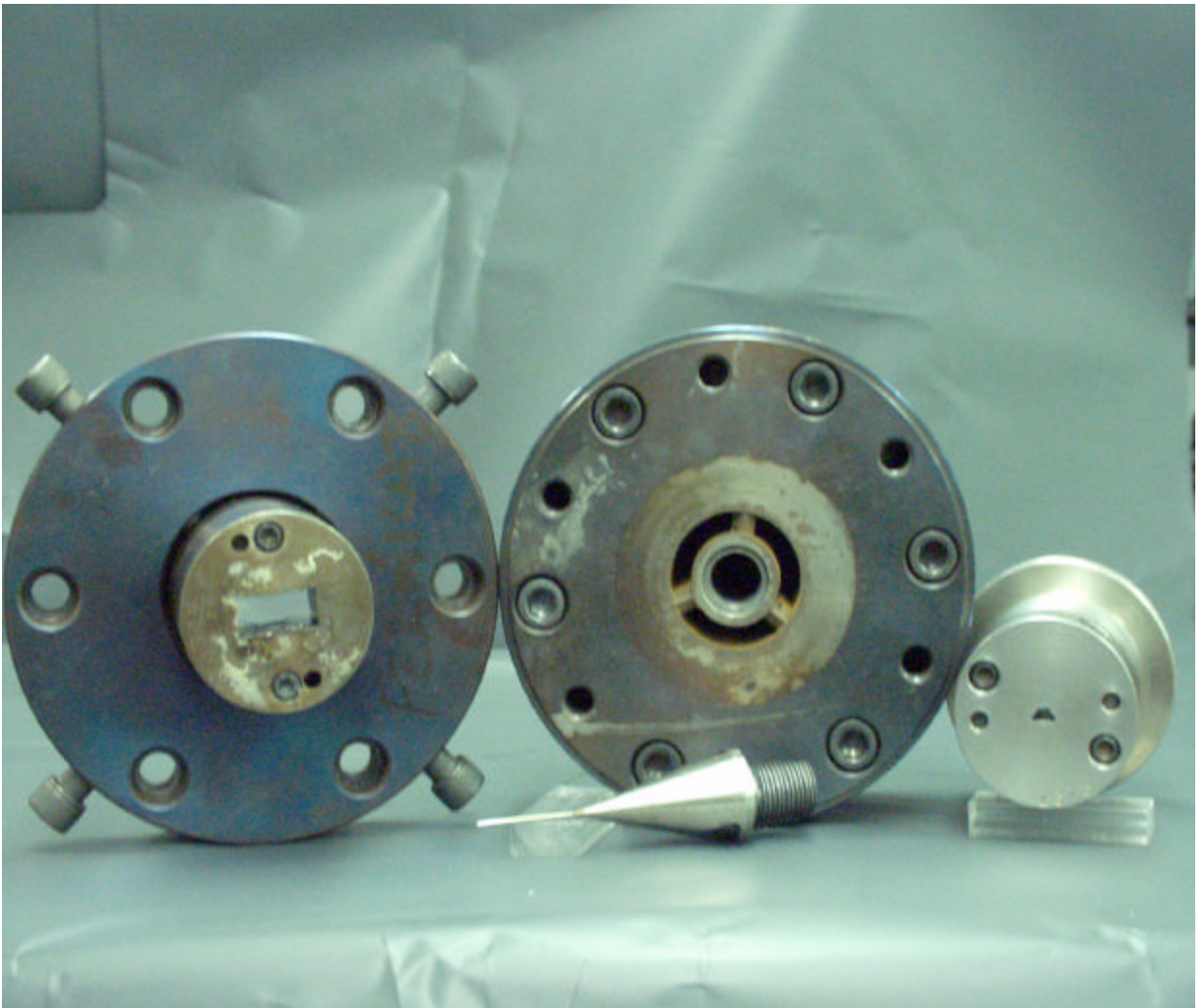
What will be as an output ?!

What will be as a result ?!
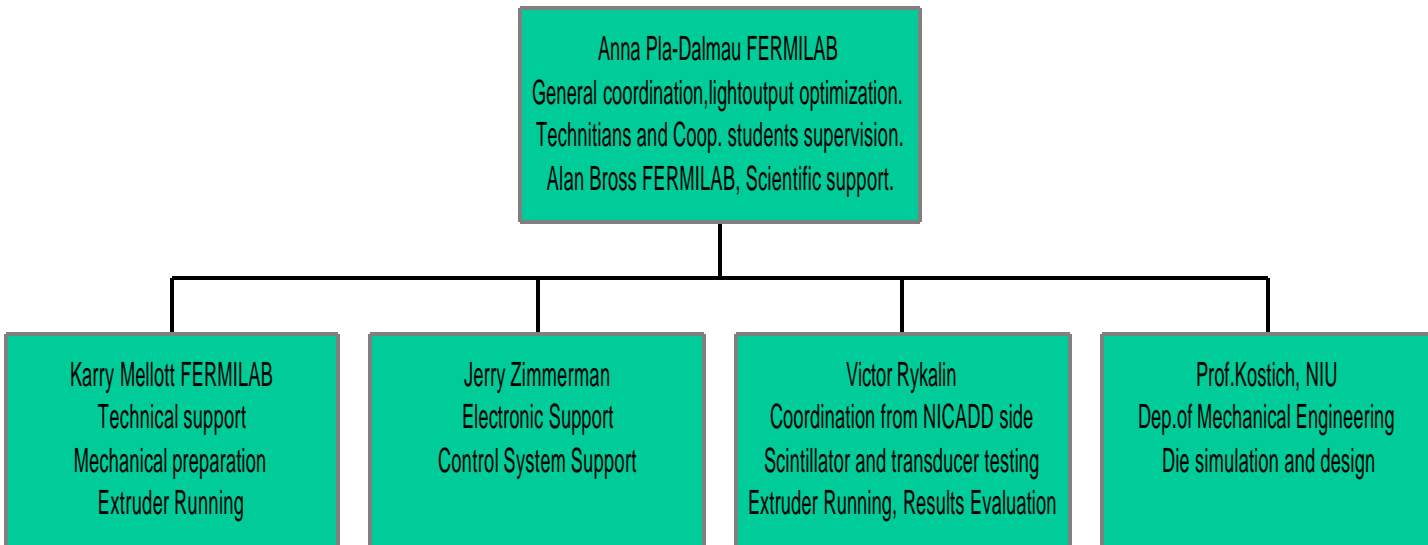
Chan 10, Cell 15 16.7*1.8(#)=30.1 PE

Potential uses for the Extruder

- CKM-Photon veto system (strips)
- CDF-Preradiator (strips)
- KOPIO (BNL)-Photon veto (strips)
- MECO (BNL)-Electron trigger Calorimeter(strips)
- OPERA(CNGS)- Traker(strips/WLS)
- NoE(CNGS)-Fe/scintillator strips
- OMNIS(WIPP, Supernova observatory) Pb/Fe scint. (Strips)
- K2K- scintillator strip hodoscope
- NUMI-Fe/Scintillator strips (80% done)
- LC-Muon Detector System (strips)
- LC-Hadron Digital Calorimeter (cells)

Organization chart

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┌─────────────────────────────────────────────┐
│          Anna Pla-Dalmau FERMILAB            │
│  General coordination,lightoutput optimization. │
│   Technitians and Coop. students supervision.   │
│    Alan Bross FERMILAB, Scientific support.    │
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Karry Mellott FERMILAB Technical support Mechanical preparation Extruder Running	Jerry Zimmerman Electronic Support Control System Support	Victor Rykalin Coordination from NICADD side Scintillator and transducer testing Extruder Running, Results Evaluation	Prof.Kostich, NIU Dep.of Mechanical Engineering Die simulation and design

Summary

- We negotiate last drawing with BERSTOFF
- We got software control system description and sent to the BERSTOFF our comments
- We are taking care about Lab 5.
- We are continue testing with different shapes of scintillators.
- After demonstration of the die simulation program we are waiting for the FLUENT SOFTWARE package(Prof. Kostich will work with this program).

- Plan for the next 6 month Victor Rykalin
- To learn, to learn, to learn(extruder, scintillators…)
- Testing of new transducers (if available)
- Note about Number of P.E. measurements for DHC.
- Report about MRS testing
- Working on the test stand at NIU
- Possible note about light attenuation length in WLS
- Scintillator diagnostics at lab.6 (pellets, extruded examples)
- 128 channel VLPC system R&D ?