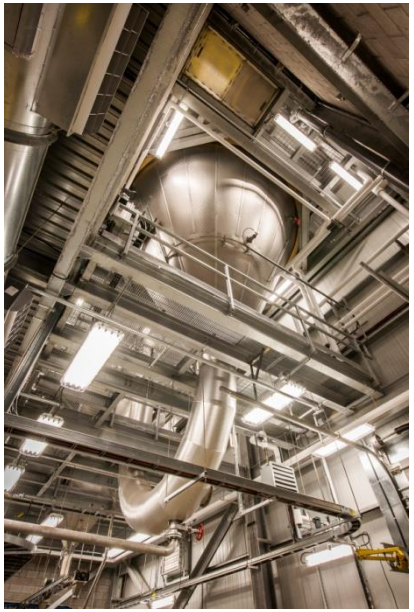
CelluForce™

Presentation by Jean Moreau, President & CEO
Driving Innovation to Market
Cellulose Nanomaterials – A Path to Commercialization
Washington, D.C May 20-21

THE CELLUFORCE JOURNEY

Build It and They Will Come

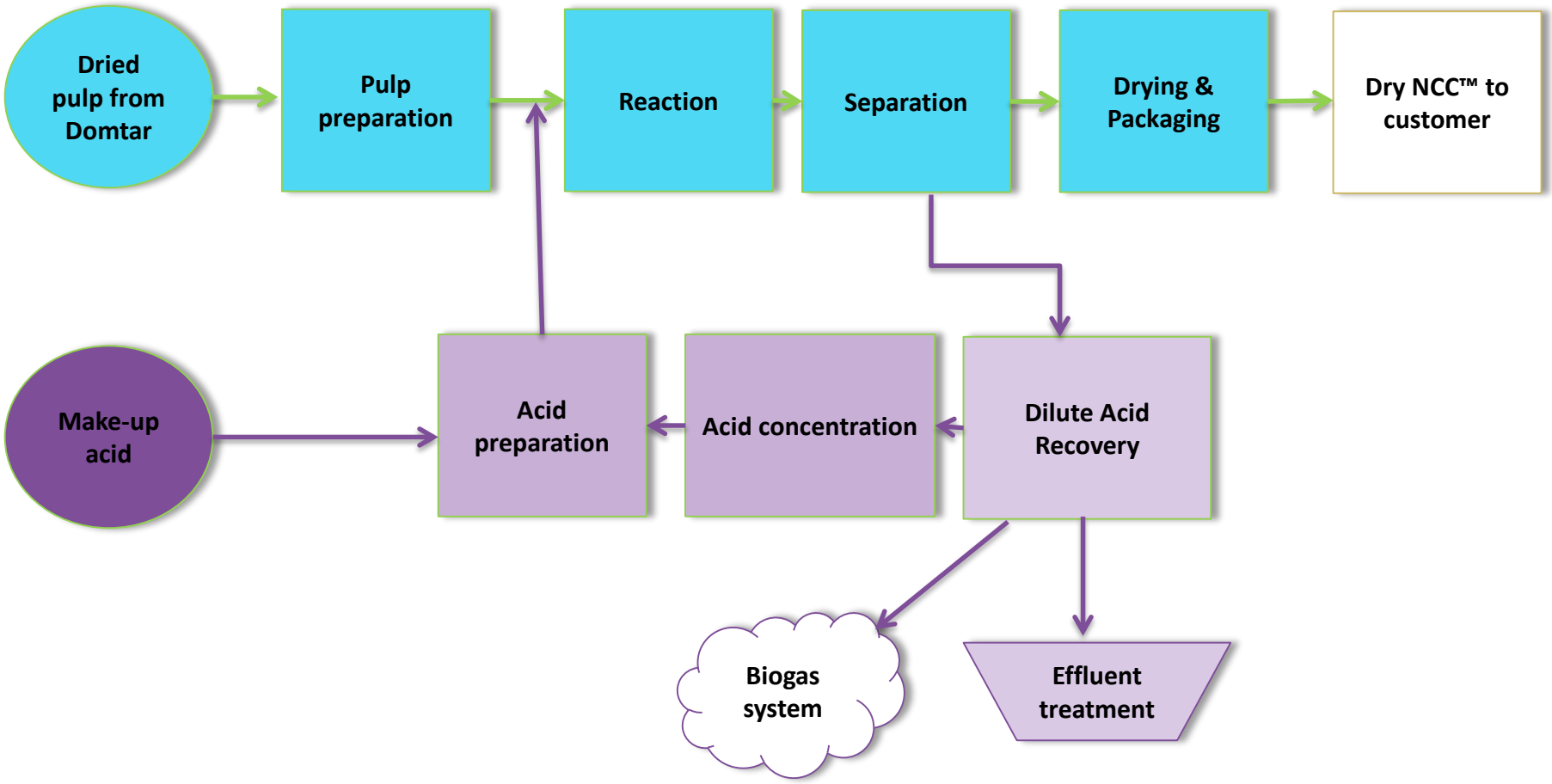
World's Largest CNC Demonstration Plant



Build it and they will come

CelluForce - The Team

CelluForce NCC™Process



Demonstration Plant Inputs and Outputs

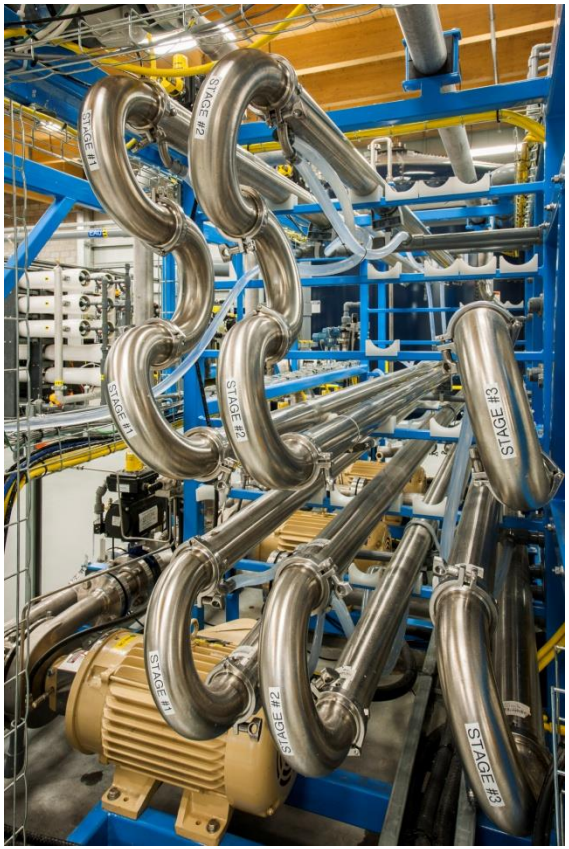
Process Inputs:

- Bleached kraft pulp
- Mill services:
  - Process Water
  - Acid (93% H_2SO_4)
  - Caustic
  - Steam
  - Electricity, air

Process outputs:

- Process effluent to mill treatment system
- Finished product – 200/500 kg bags

Virtual Plant Visit



Who are we
Joint Venture – Incorporated July 2010

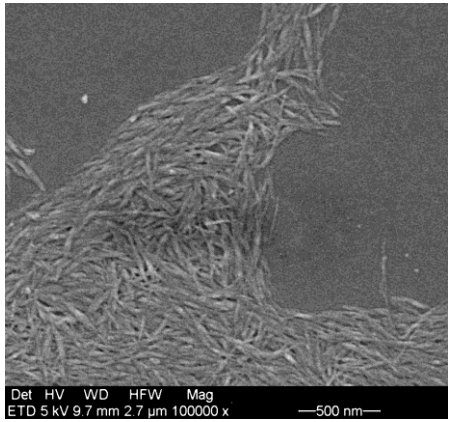
Initial investment $43M
(including $33M of Gov't support)

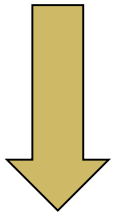
CelluForce™

FPInnovations

Domtar

Cellulose Nanocrystals (CNC)
Our Vision

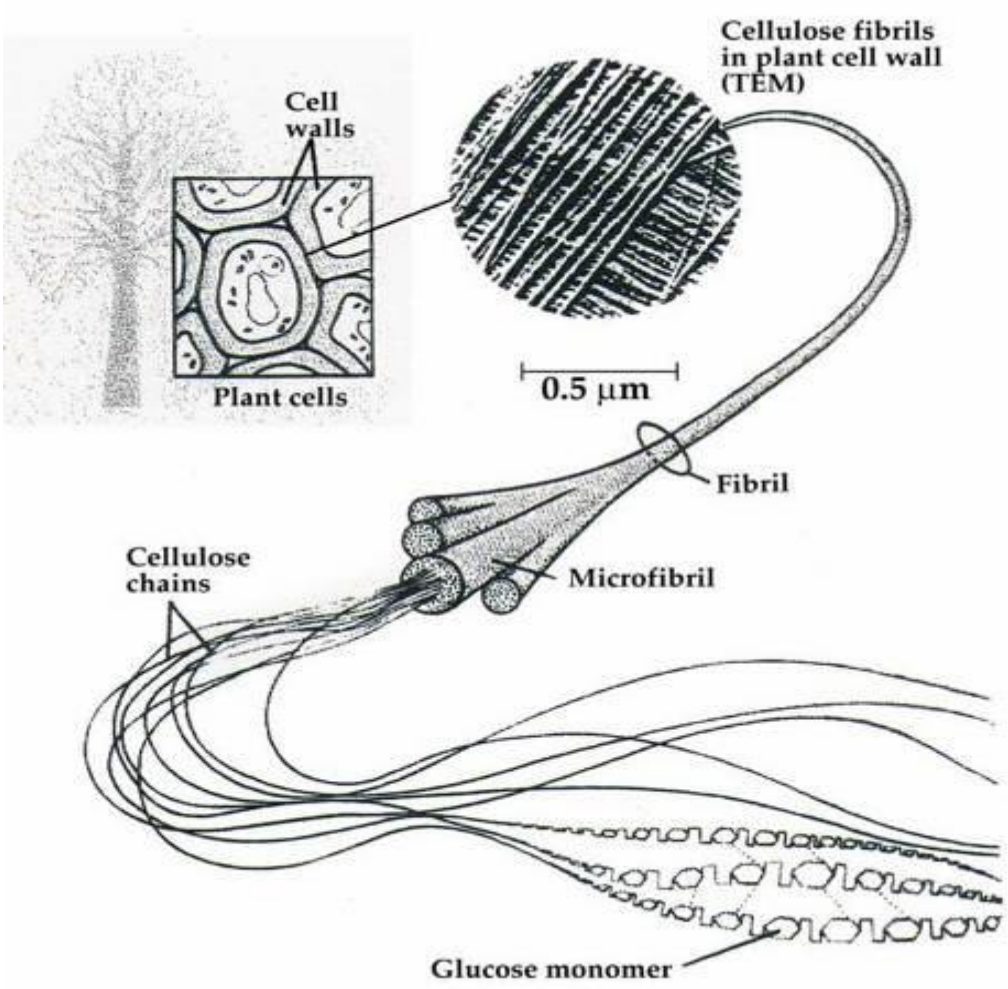




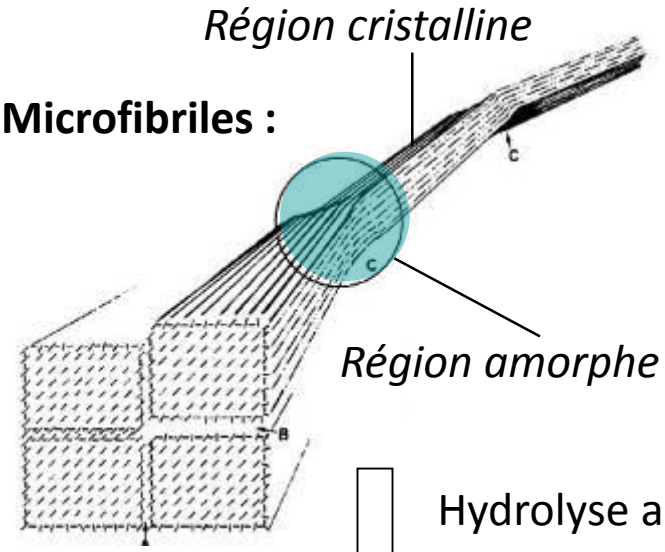
CelluForce™

We harness the power of nature's basic elements to transform your product performance

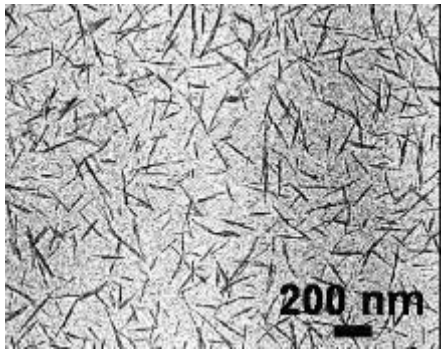
Our Product



Microfibriles :



Hydrolyse acide
H_2SO_4



TEM image of cotton nanocrystals

Our Product

CelluForce Ultra™

CelluForce Allure

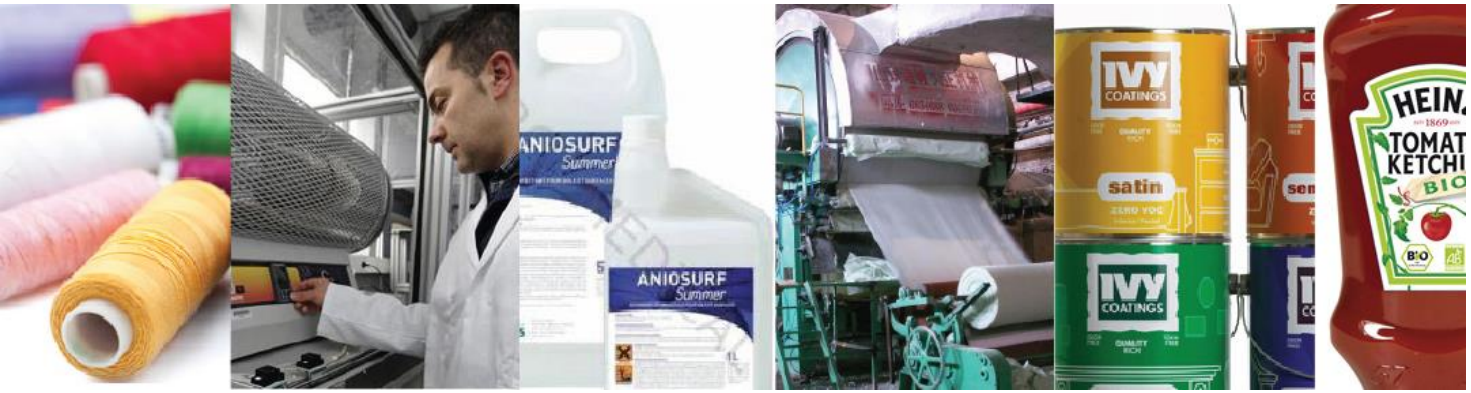
CelluForce Impact

Pure Cellulose nanocrystal CNC

Dimensions:

100 nm long, 5 nm width

General Applications



- Cosmetics
- Paints and coatings
- Construction materials
- Detergents
- Oilfield fluids
- Polymers
- Paper chemicals
- Textiles
- Foodstuffs

Market Opportunities on immediate applications

- Paints and Coatings

- Oil and gas fluid

- Cement

Market Opportunities on immediate applications

- Water Treatment

- Adhesives

- Food

Goals and Accomplishments

INITIAL GOALS (initial investment $43M)

- Introduce nanocrystalline cellulose to the commercial world CNC
- Master the manufacturing process
- Develop the business in a wide range of market sectors
- Prove the market potential
- Build commercial plants

ACCOMPLISHMENTS

- The largest NCC™ demonstration manufacturing facility in the world
- Continuous high quality product processing capability
- Collaboration with over 30 companies, through signed agreements, to develop NCC™ applications
- Portfolio of manufacturing and applications intellectual property
- World recognized CelluForce Trade Mark

Financial Needs

TO COME - WINDOW OF 5-6 YEARS - FINANCIAL NEEDS

- Second round of financing, now to finance next 2 years (2014-15) with the following objectives:
  - Deliver a series of commercial applications with significant potential revenues
  - To further develop potential technical applications
  - To continue improving manufacturing processes
  - Complete engineering estimate to build future commercial plants
- Third round to come in 2016-2017 to bridge end of demonstration phase to commercial phase (2016 to 2019)
- Fourth round to finance commercial plant $ TBD, will be equivalent of a chemical plant

THE FINDINGS

- ✓There is an exciting future for this new biomaterial
- ✓There is a market demand for NCC in various sectors
- ✓We have a continuous manufacturing process that can work :
  - ❖ 24 hours a day,
  - ❖ 7 days a week,
  - ❖365 days a year
- ✓Commercial scale up is possible; non-scalable units and alternative technologies have been identified

THE FINDINGS

- ✓Commercial applications are imminent
- ✓Current collaborations include:
  - ❖Large volume applications
  - ❖Speciality niche applications
  - ❖From cosmetics to oil and gas to specialty chemicals
- ✓Small dosages allow the price point to be maintained in commodity and semi commodity sectors
- ✓Technology development is essential
- ✓Collaboration is key, patience is required
- ✓IP creation is important

Converting the findings into Action

- ✓Clear work plan for commercial plant scale up
- ✓Demonstration knowledge allows flexible manufacturing plants
- ✓Focus on :
  - ❖Tier 1 collaborations
  - ❖V NCC focus
  - ❖Short term applications
- ✓Foster the technology development expert network developed in the last 3 years

Summary

- Outstanding accomplishments to date
- Still 3-4 years before commercial phase
- Build commercial plants
- License technology
- At the edge to create a significant new bio material market > $1B
- Launching phase from 2005 to 2020, 15 years will cost over $100 M before building commercial plant

CelluForce™

THANK YOU

DRIVING INNOVATION (Forbes interview Feb 2014)

- Determination, resilience, perseverance, patience
- Innovation = turning creativity into output
  - Be a captain and a pirate
  - Let them play, create the environment
  - Listening is understated, you can learn to listen
- De-risk your idea
  - Divide your ideas into small projects and shorter milestones
  - How far get we get by Friday!
  - Huddling with a small group

DRIVING INNOVATION (Forbes interview Feb 2014)

- Collaboration is key and is not the same as team work
  - Your boss needs to believe you are going to market
  - PPT will not convey excitement alone, you need to show off
  - Collaborations is more robust and frightening, no rules to the game, no authority above, bring the right expertise into the collaboration
- Get in the field
  - Feel it, touch it
  - Report is not a feel
- Don’t expect everyone to say yes
  - Get attention,
  - Avoid ignorance
  - Piss off is good, you are disturbing, this is INNOVATION
  - Get over it, Innovation is tough

What I Expected

- The reality of a start up
- There would be surprises
- Pressure for results
- Challenges finding the right market
- Achieving enough success to scale to a commercial sized plant

What I Expected Less

- The length of time for the technical demonstration cycle, it is a proof of concept not a sales
- Launching a material as an additive compare to other autonomous innovation
- Murphy's law applies and Murphy was an optimist
- Manufacturing challenges for such a new high-tech material, it is a world first
- Providing responsive technical support in the field, collaboration is a must

What I Know Now

- Infinite perseverance, patience and resilience
- Being selective in pre-filtering clients
- Getting traction quicker with simplified solution environments
- Being realistic about time and cost estimates
- Setting expectations for our owners
- Facing the brutal facts, blow it if need be!