

# Industry Innovations

Concrete Pipe & Box Sections



American **Concrete Pipe** Association



# What is Innovation?



*A notable change in a product or method that creates new value in the form of convenience, quality, safety, cost savings, sustainability, and/or efficiency.*





# Innovation Fuels Progress



# Risks of Innovation

*Some inventions or product alterations may have unforeseen disadvantages*

## Galaxy Note 7



Improved storage capacity,  
larger screen, better battery life

## Freon



“Miracle compound”  
A safe alternative to other harmful  
refrigerant chemicals

## Aircraft Manufacturer



Larger engine, same cockpit  
design for less training, improved  
fuel efficiency



# Importance of Responsible Infrastructure Innovations

*Infrastructure is the foundation  
which makes social and economic  
life possible. It connects people,  
communities, and businesses.*

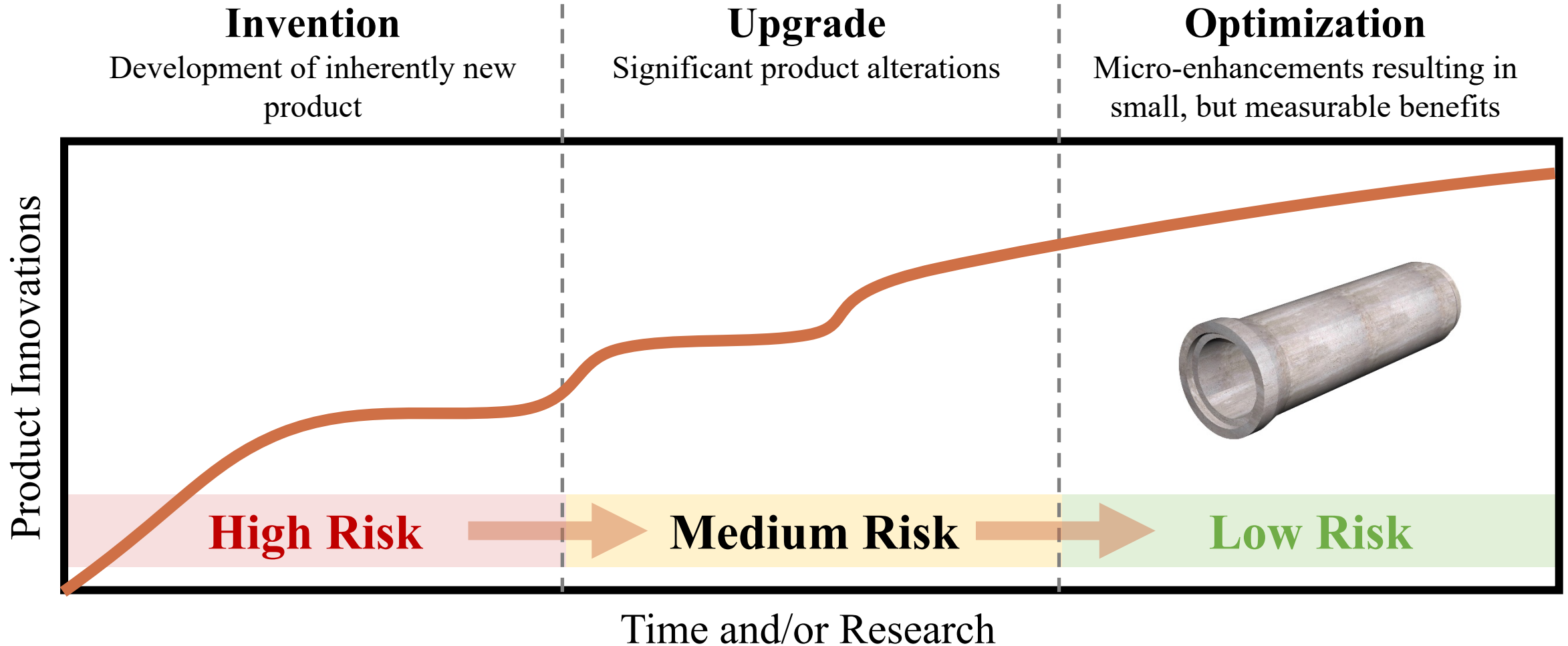


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# Product Innovation Phases



# Concrete Pipe & Box Sections

Heavily researched infrastructure product line with responsible advancements.

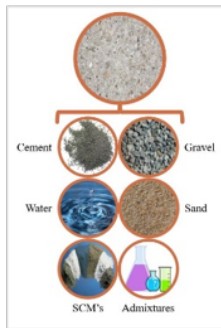
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# Innovations Outline

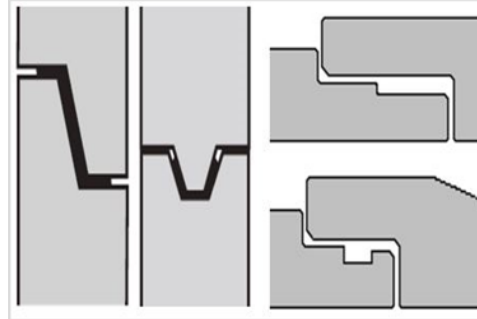
## Concrete Mix Designs



## Reinforcement



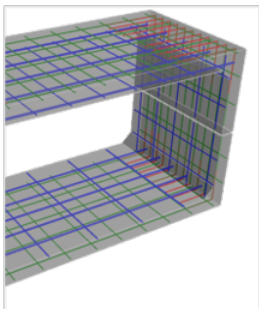
## Joints



## Quality and Production



## Standards and Design Aids



## Installation



## Research

**Research**  
While innovation fuels progress, research fuels innovation

Many Innovative Manufacturers	Many Ongoing Research Projects
Hundreds of individual manufacturers all trying to gain a larger market share through improvements	Seeking to improve the quality and efficiency of the reinforced concrete pipe of the future
Only growth & effective innovations are adopted by other producers and implemented as standard	Examples include fiber reinforced concrete pipe and efforts to mitigate microbial induced corrosion

## Overall Innovations





# Concrete Mix Designs

*Innovations occur regularly*

- Alternative concrete ingredients
  - Supplementary Cementitious Materials (SCM)
  - Admixtures
- Variations in ingredient ratios

## Benefits

Improved production rate, safety, sustainability, aesthetics, product cost and service life



# Concrete Mix Designs

*Different production methods – consistency, repeatability, controlled environment*

Wet Cast



Standard Slump

Dry Cast



Zero Slump

SCC



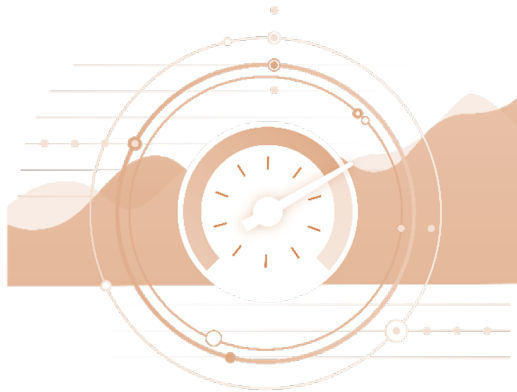
Spread Test



# Reinforcement

*Research & technology improvements have led to incredible advancements*

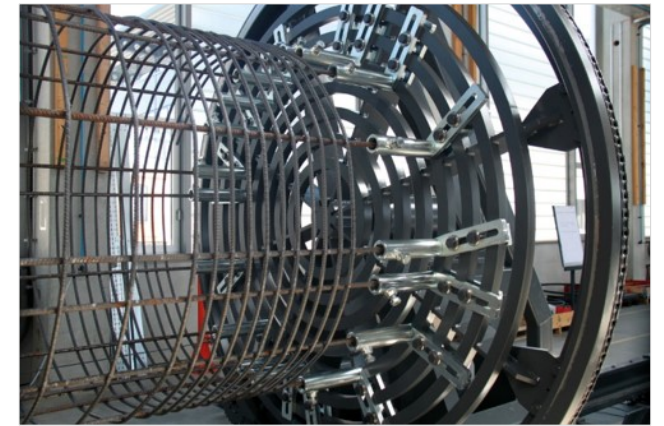
## Reinforcement Optimizations



Increased quality and performance of the reinforcement while also optimizing steel areas

Reduced product weight and cost

## Technology Advancements



Safer, faster, and more precise production

Less material waste, creating a more cost friendly and sustainable end product



# Joints

*Immense evolution & advancements of joint configurations & capabilities*

## Various Joint Advancements



Variety of joint & gasket types such as tongue & groove, flexible sealant, Confined O-ring, Single Offset, and pre-lubricated gaskets provide enhanced performance characteristics for all concrete pipe shapes

Infiltration and exfiltration resistance, ability to accommodate lateral or longitudinal movement, continuity and smooth flow line and ease of installation

# Production & Quality

*Innovative production methods have improved functionality and quality*

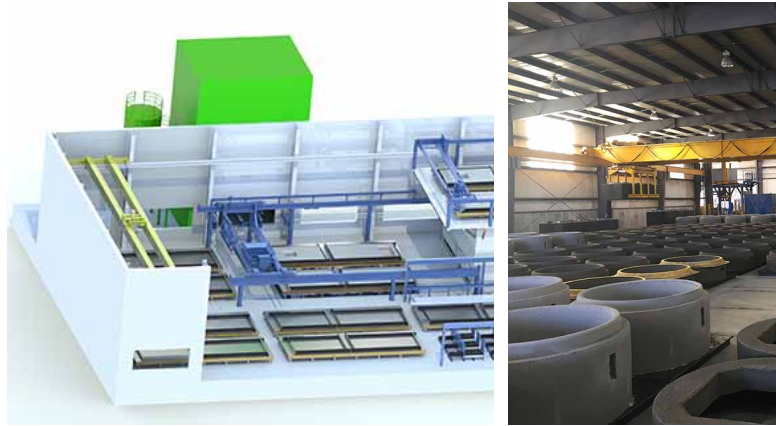
## Product Shape & Size



Boxes sections, arch & elliptical pipe

Helps achieve added functionality

## Plant Automation



Capabilities of individual machine or full plant automation

Increased quality, speed and safety of production

## Quality Control



Quality assurance and control is the main focus of the industry

Improves quality and consistency of products

# Standards & Design Aids

*Research & technology improvements have led to incredible advancements*

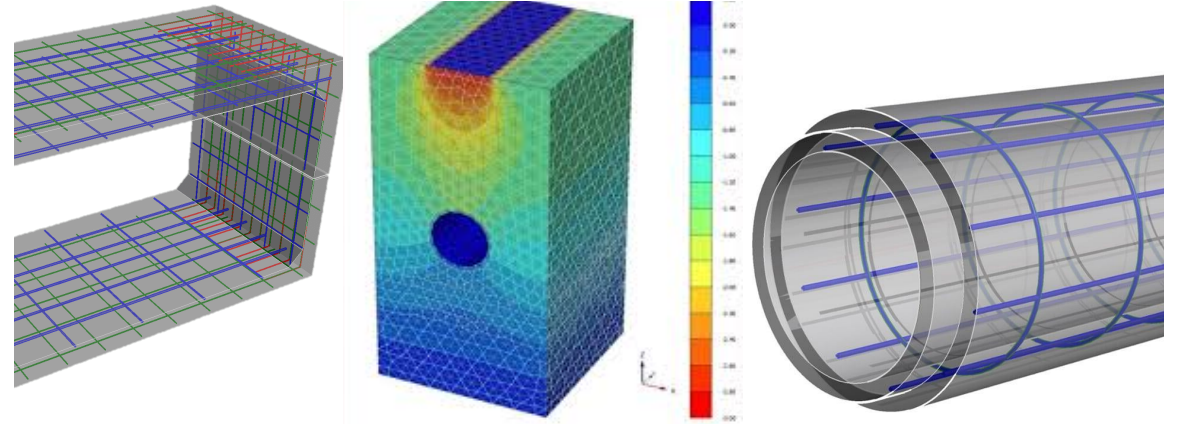
## Development of Standards



Hundreds of standards established through organizations such as ASTM, CSA, ASCE, and AASHTO

Ensures product quality and consistency across the board

## Design Tools & Programs



Developed to assist manufacturers and specifiers

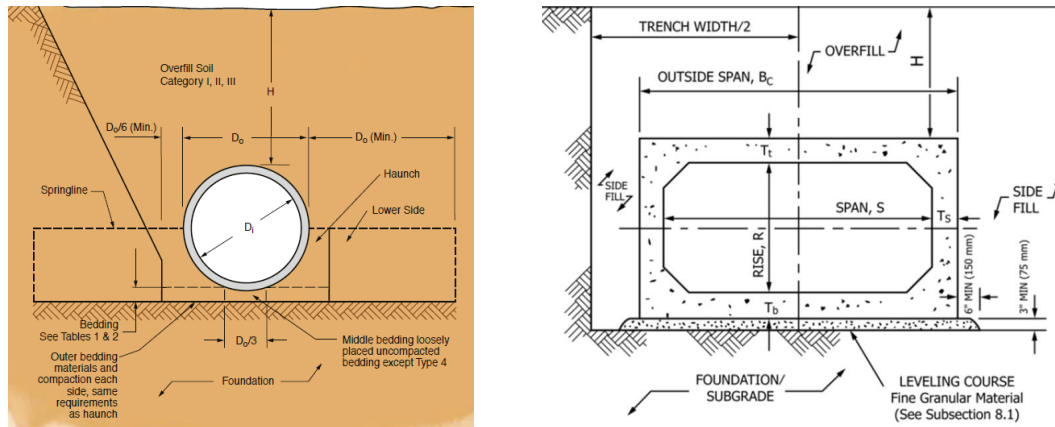
Comprehensive designs for even the most complex projects with consistency, ease and time efficiency



# Installation

*Many advancements in the installation of concrete pipe and structures*

## Research & Standards Development



Development of installation requirements and procedures

Consistent and proven product installation nationally

## Innovative Installation Techniques



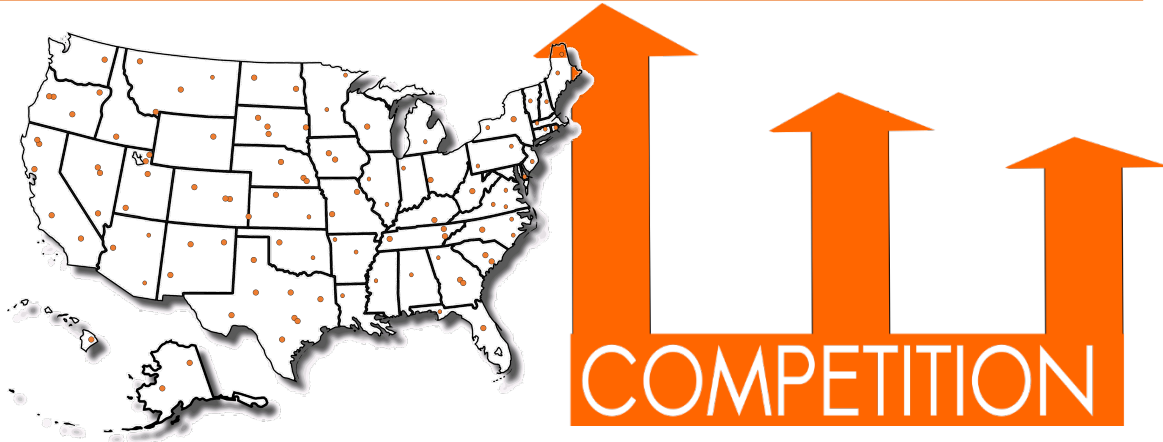
Innovative installation techniques such as trenchless and flooded backfill installations

Safer, quicker and more disruption-free concrete pipe installations even for complex projects

# Research

*While innovation fuels progress, research fuels innovation*

## Many Innovative Manufacturers



Hundreds of individual manufacturers all trying to gain a larger market share through improvements

Only proven & effective innovations are adopted by other producers and implemented as standard

## Many Ongoing Research Projects



Seeking to improve the quality and efficiency of the reinforced concrete pipe of the future

Examples include fiber-reinforced concrete pipe and efforts to mitigate microbial induced corrosion



# Recent Industry Innovations



2005

2005

External joint hydrostatic test

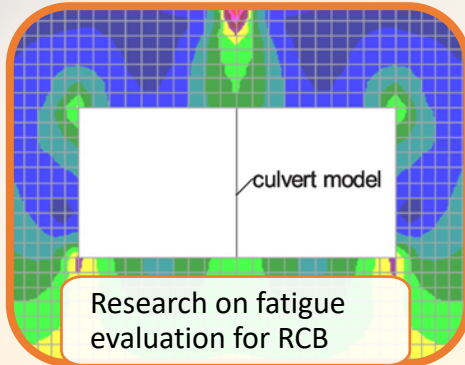


2005

ACPA Chairman Safety Awards

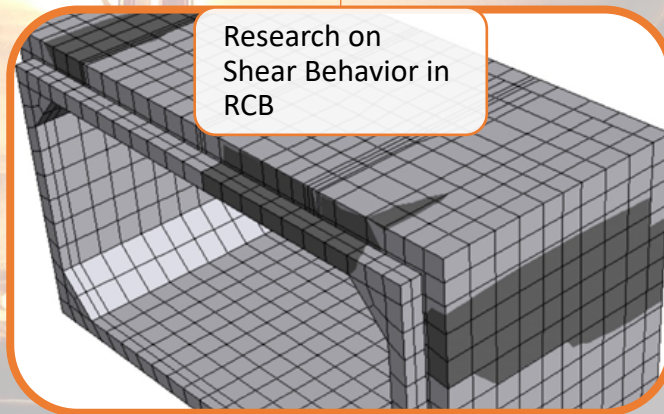


2006



2007

Research on fatigue evaluation for RCB

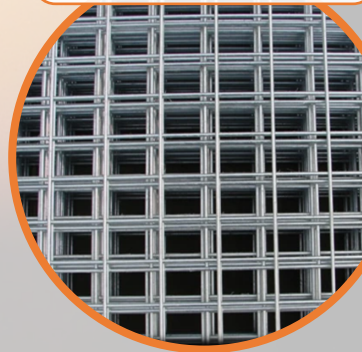


2008



2008

Production of welders to produce circular sheets

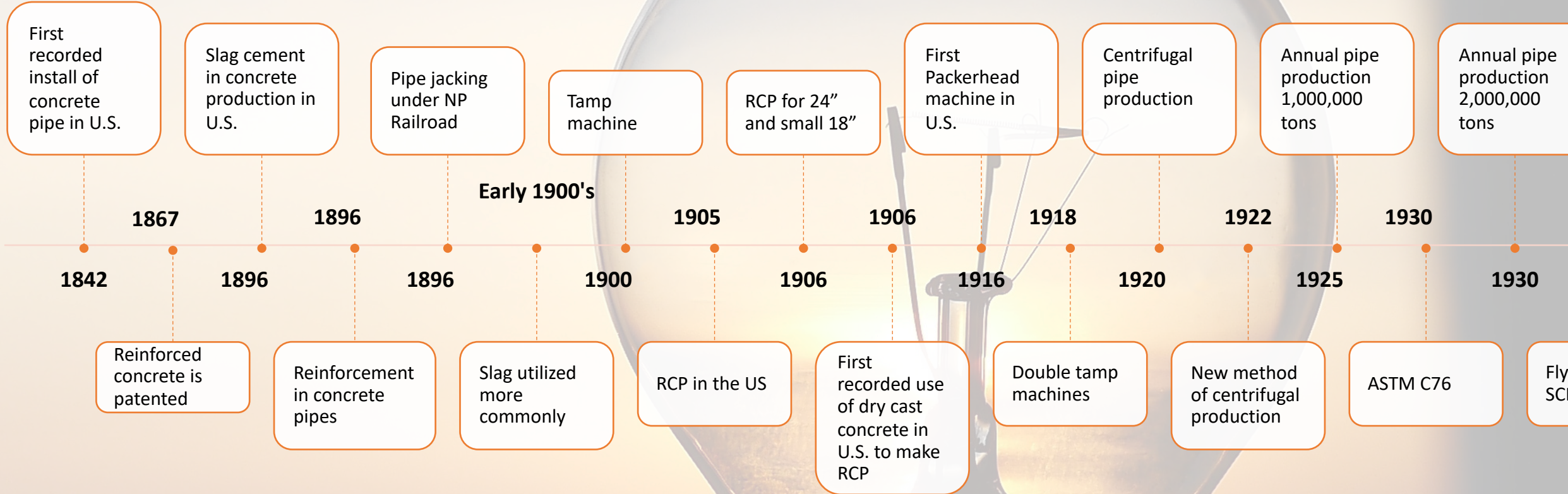


2010





# Consistent Advancements



# Questions

A large, glowing lightbulb is the central focus of the image. Inside the bulb, a sunset scene is visible, with a bright sun low on the horizon over a body of water. The lightbulb is set against a background of a soft, hazy sunset sky. The word "Questions" is written in a large, bold, orange serif font across the middle of the lightbulb. A thick orange horizontal line runs across the width of the image, passing through the middle of the lightbulb and the text.