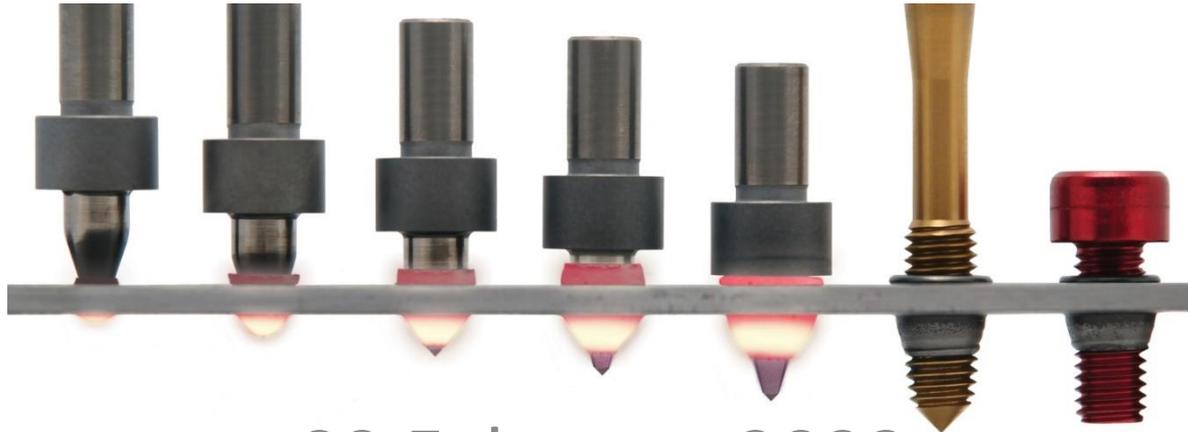




Form your own inserts  
Eliminate weld nuts



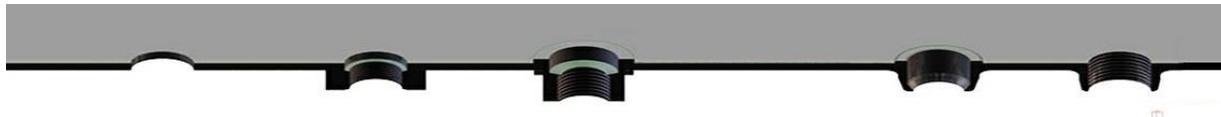
09 February 2023

**The Royal 4.0 Value Proposition**

Improve Shareholder Value by providing innovative solutions to manufacturers.

# Problem

- **Thin wall material that needs to be threaded for joining to another material**
- **Weld nuts and threaded inserts are a common solution:**
  - Removing material from thin wall
  - More production steps
  - Added external material
  - Added costs
  - Quality control issues



# Solution

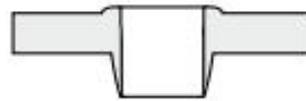
- **Formdrill produces a bushing formed from the parent material:**
  - Maintains material strength
  - Fewer production steps
  - No added external materials
  - Quality maintained
  - Lower costs



Short



Short-Flat



Long



Long-Flat

# Formdrill Background

## ▪ Formdrill

- We manufacture thermal drills, Formdrills
- Established in 1980 in Belgium
- Focused on manufacturing thermal drills and the advancement of the process
- Manufacturing process totally automated- this means better quality at lower prices
- Offices in Germany, France, China, India and the United States
- Distributors in 45 countries.



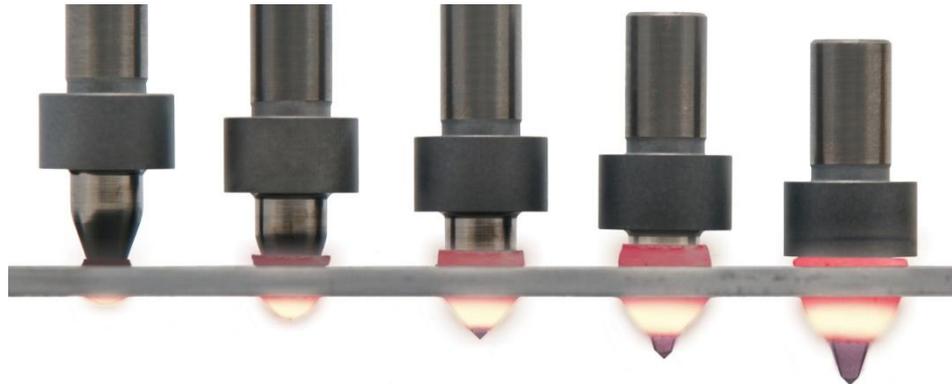
## Formdrills – what they do...

- Form holes in thin materials without cutting
- The material that is normally cut forms a bushing triple the length of the original material thickness
- This formed bushing provides more wall to allow for more threads and eliminate the use of welded nuts or threaded inserts
- This bushing can also be used to support a pivoting shaft or as a brazing Surface
- To eliminate the tapping process self-tappers can be used in assembly



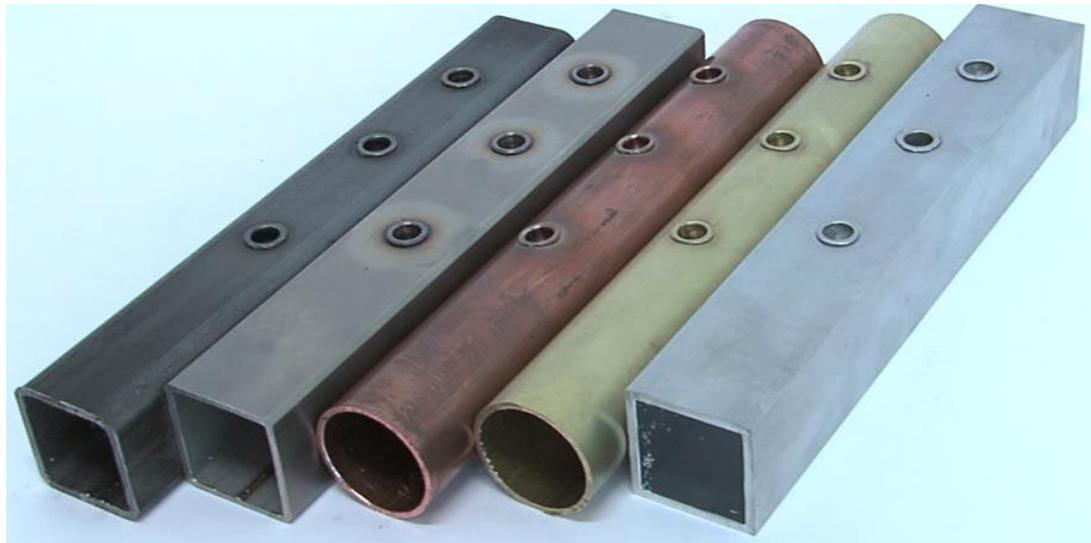
## How does it work?

- The drill is made of tungsten carbide and has a conical shape with several facets
- These facets create friction as they turn (spindle speeds depend on diameter - 1,000 to 4,000 RPM) and the tool is pushed into the material
- The resulting heat from the friction heats up the material and pushes it into a plastic state to displace it and form the bushing



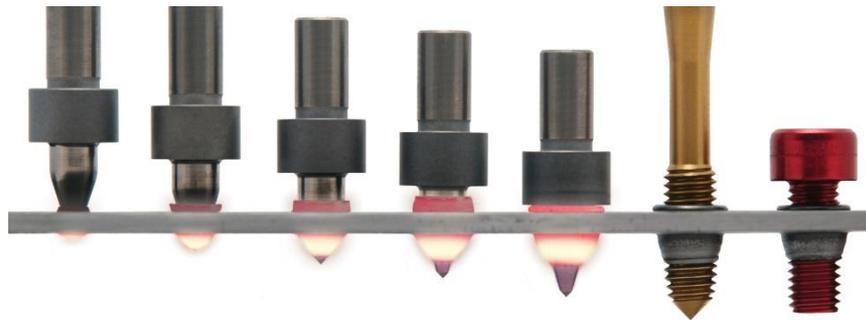
## Works in most malleable materials:

- Mild steel
- Stainless steel
- Aluminum
- Copper & brass
- High strength alloys



## Advantages & benefits

- **Cost reductions in labor & materials**
- **Formdrills & Formtaps can do 8,000 -10,000 holes in mild steel**
- **Production cycles reduced significantly**
- **Formed bushing is produced from the same part**
- **Process does not produce chips**
- **Ideal for automated production lines**



# Formdrill Options

- 2 lengths (Short and Long) to suit the material thickness
- 2 options for the entry to the hole; With a “collar” or a flush surface

Short



Short Flat



Long



Long/Flat



We can easily manufacture whatever is needed for your special application  
Extra Shorts or Longs, several diameters in one tool, etc.



## What do you need from us?

- Tools: Formdrills & Formtaps



## What else?

- Accessories: Toolholders, Lubricants & Dispensers



Formdrill lubricants



Formtap Lubricants



Minimal spray units

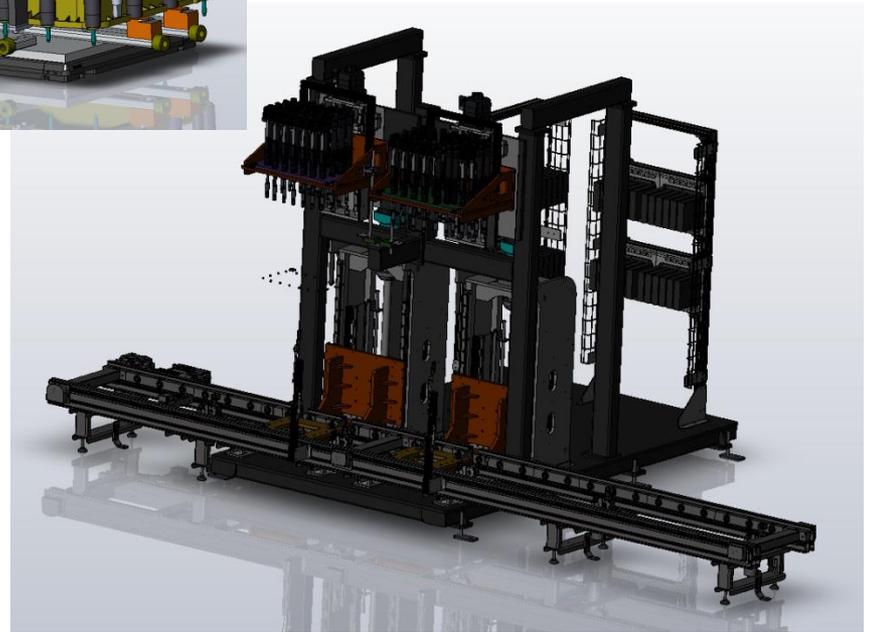
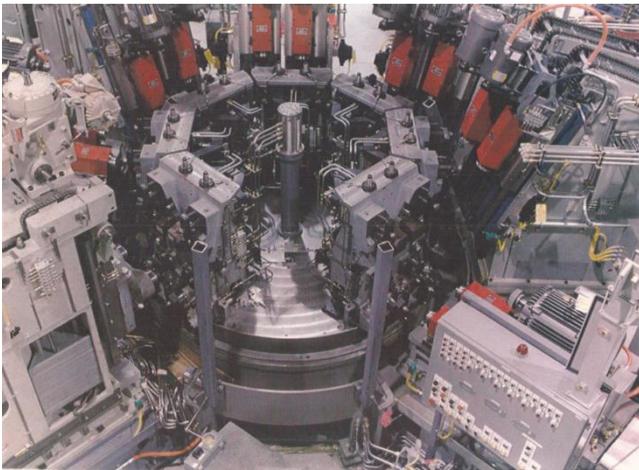
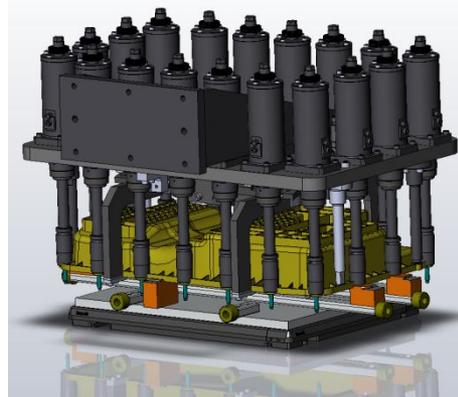
## You can use your own equipment

- Drill presses
- Milling machines
- Specific design machines
- CNC

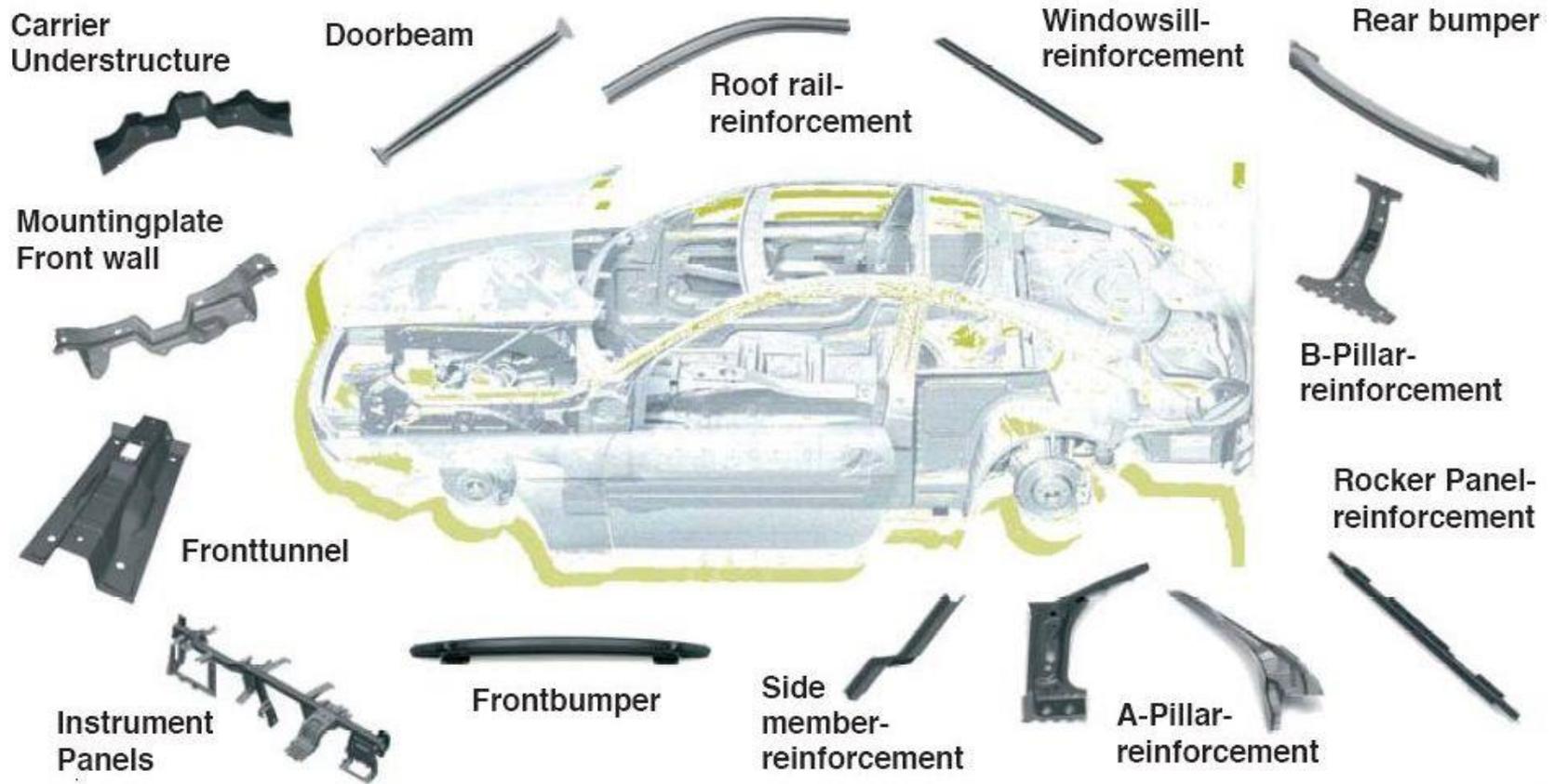


# Or Royal Engineering can design and build special machines for you

Custom machines presenting tools to parts has been Royal Engineering's specialty for over 30 years!



# Applications



# Applications



Foot Pedal

# Applications



Front Axle System

# Applications



Steering Column

# Applications



**Seat Frames**

# Applications



Fuel Rails

# Applications



**Trunk Hinges**

# Applications



Oxygen Sensor

## **Some of our customers**

- **Ford, Ferrari, Mercedes-Benz, Renault, Volvo**
- **Daimler-Chrysler, Honda, Nissan, Toyota**
- **Bosal, Bosh Automotive, Calsonic Kansei, Gestamp, Martinrea, ThyssenKrupp**
- **Kawasaki, Kubota, Polaris, Yamaha**
- **Donaldson, Invacare, Stryker Medical**



Thank you for your time.

**#NoNuts**

Mike Stovall

President

Phone: (586) 216-0825

[m.stovall@royal4-0.com](mailto:m.stovall@royal4-0.com)

[www.royal4-0.com](http://www.royal4-0.com)

CAGE Code: 70X68

