



Robust design Predictable innovation

Niels Hansen
Chief Engineer
Device R&D Novo Nordisk



Patient JL
15 December 1922



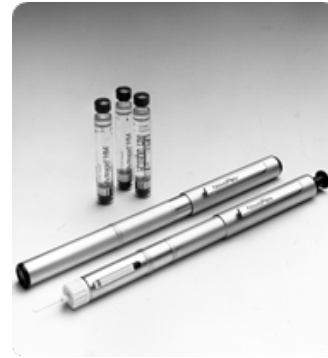
Patient JL
15 February 1923



1923
Vial and syringe



1925
The Novo syringe



1985
NovoPen®



2012
FlexTouch®

Diabetes outlook

2020

Device R&D mission

SUSTAINABLE DEVICE LEADERSHIP

Innovation is **our** obligation

We innovate devices that
add **value** to **patients** and
Novo Nordisk

We **engage** stakeholders in
order to execute **fast** and
reliable innovation



Clayton
US

Denmark
Chartres
France

Montes Claros
Brazil

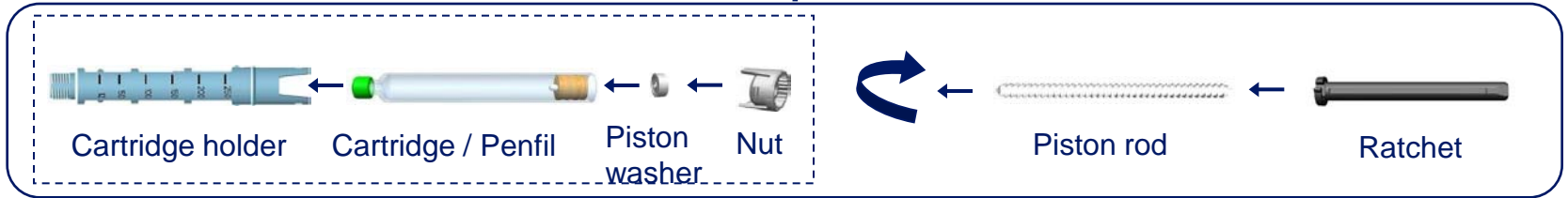
Tianjin
China

Koriyama
Japan

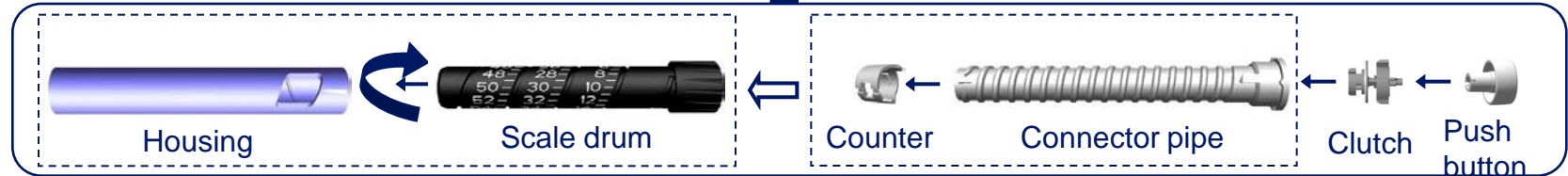
FlexPen[®] Assembly Guide

Overview of components

1

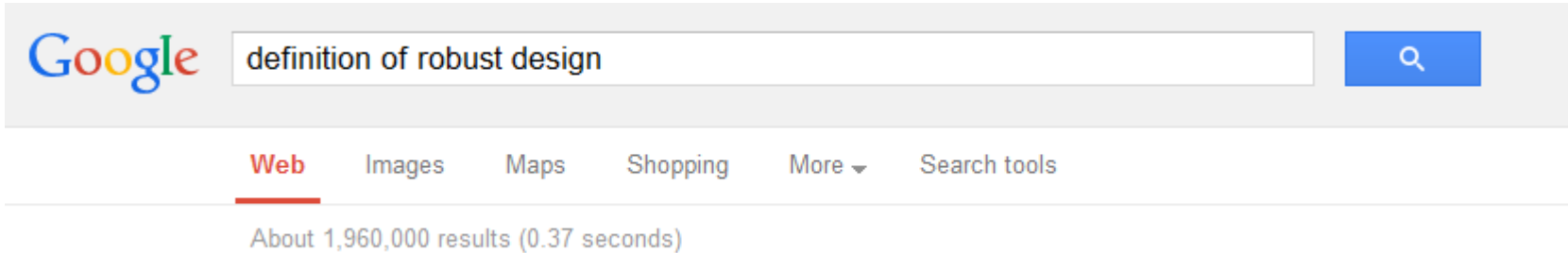


2



$$1 + 2 + \text{Cap} = \text{FlexPen}^{\text{®}}$$

What is robustness ?



At Novo Nordisk we define robust design as:

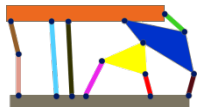
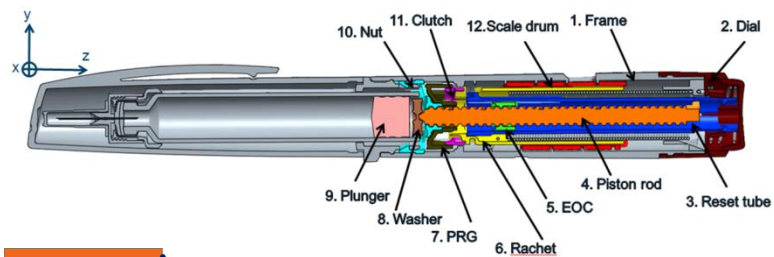
“A robust design is less sensitive to variation. It will therefore sustainably meet requirements”

To Novo Nordisk - Robustness is defined in 6 KPI's

Project: DV _____@M_					
KPI	Actual status Colour vs. ME target	Target @MC	Target @ME	Completion and levels	Comment
Coupling degree Design sensitivity to variance. Kinematic improvement areas in the mechanical design per interface.	State 1: State 2: State 3:	4/0 4/0 4/0	3 3 3		
Materials % of parts for which materials fulfilling functional requirements have been found.	Identified: % Qualified: %	100%	100%		
Structural Distribution of safety factors against the relevant component failure criteria.	≥1.4: % 1.0-1.4: % 1.0≥: %	100% 0% 0%	100% 0% 0%		
Tolerances Distribution of tolerances necessary to obtain clearance and functionality.	Acceptable: % Demanding: % Challenging: %	90% 10% 0%	90% 10% 0%		
Assembly Simplicity and ease of assembly. Cost based yield of product manufacturing %	%	90%	95%		
Manufacturing Difficulty of producing parts. % critical steps in part manufacturing	%	≤ 5%	0%		



The diabetes pandemic



Technical University of Denmark



novo nordisk®