



Getting a Handle on Improved Telemanipulator Operation

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HOTLAB 2018

Proven Technology. Customized Solutions.

HISTORY OF CRL TELEMANIPULATORS



1950-1959

1960-1969

1970-1979

1980-1989

1990-1999

2000-2009

2010-2016

1950 Model **1**
1952 Model **4**
1952 Model **6B**
1953 Model **7**
1953 Model **8**

1960 Model **A**
1960 Model **B**
1960 Model **D**
1961 Model **E**
1962 Model **F**
1964 Model **G**
1966 Model **J**
1966 Model **H**
1968 Model **L**
1969 Model **E-HD**

1970 Model **8-HD**
1971 Model **M**
1973 **System 50**

1980 Model **G-HD**
1980 Model **R**
1980 Model **RE**
1981 Model **M-2**
1985 **SAMSIN**

1990 Model **G-HDE**
1990 Model **L-HD**
1992 Model **G-LD**
1992 Model **RE-FB**
1993 Model **L-HDE**

2013
Model **G-LDR**

2016
VERSA®

1950

1960

1970

1980

1990

2000

2010

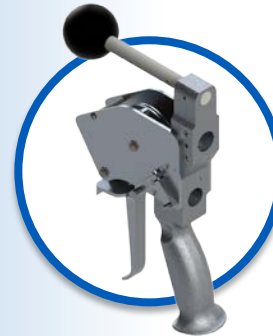
2016

One Common Component



Opposed Grip
Handle

This handle has been used on manipulator models over the past **70 years**, with few changes made to the overall design and construction



Also available:

Pistol Grip Handle
for heavy duty applications

ERGONOMICS

er·go·nom·ic | ərgə'nämik |

Adjective. Relating to or designed for efficiency and comfort in the working environment.

Ergonomics experts from SRI•Ergonomics provided CRL with technical assistance on ergonomics issues surrounding telemanipulator handles.

Three different efforts were conducted in order to evaluate any ergonomics issues surrounding the design and use of telemanipulator handles:

- **Ergonomics Design Principles**
- **Anthropometric Data**
- **Biomechanics Assessment**

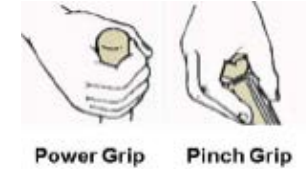
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Ergonomics Principles

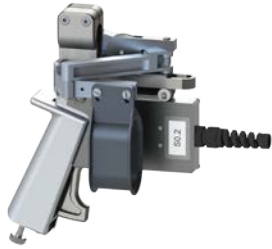
were applied and tested on CRL telemanipulator handles

8 Ergonomic Principles Tested

1. **Grip Type** (power – strength ability) (pinch – precision)
2. **Handle Diameter**
3. **Handle Shape** for optimal gripping and torque-generation
4. **Handle Length**
5. **Handle Surface** can make difference on required grip forces
6. **Handle Material**
7. **Sharp Edges**
8. **Function** ambidexterity for all users



Evolution of the Handle



Current Production Handle

- Developed in the late 1950's
- Basic design has remained unchanged and in production for over 60 years



VR2 - VR3

First attempts at improvement

- Tapered handle with wide Duck Bill for hand comfort
- Grip Ball for second hand stability
- Based entirely on 1950's design with minor changes
- Good ideas, but never made it to Production



VR4 - VR7

Major improvements implemented

- Reduced assembly time and reduced assembly tools
- Common parts throughout
- No-Solder Electrical maintenance
- Additional grip points for increased control
- Backward compatibility with 1950's model



VR8

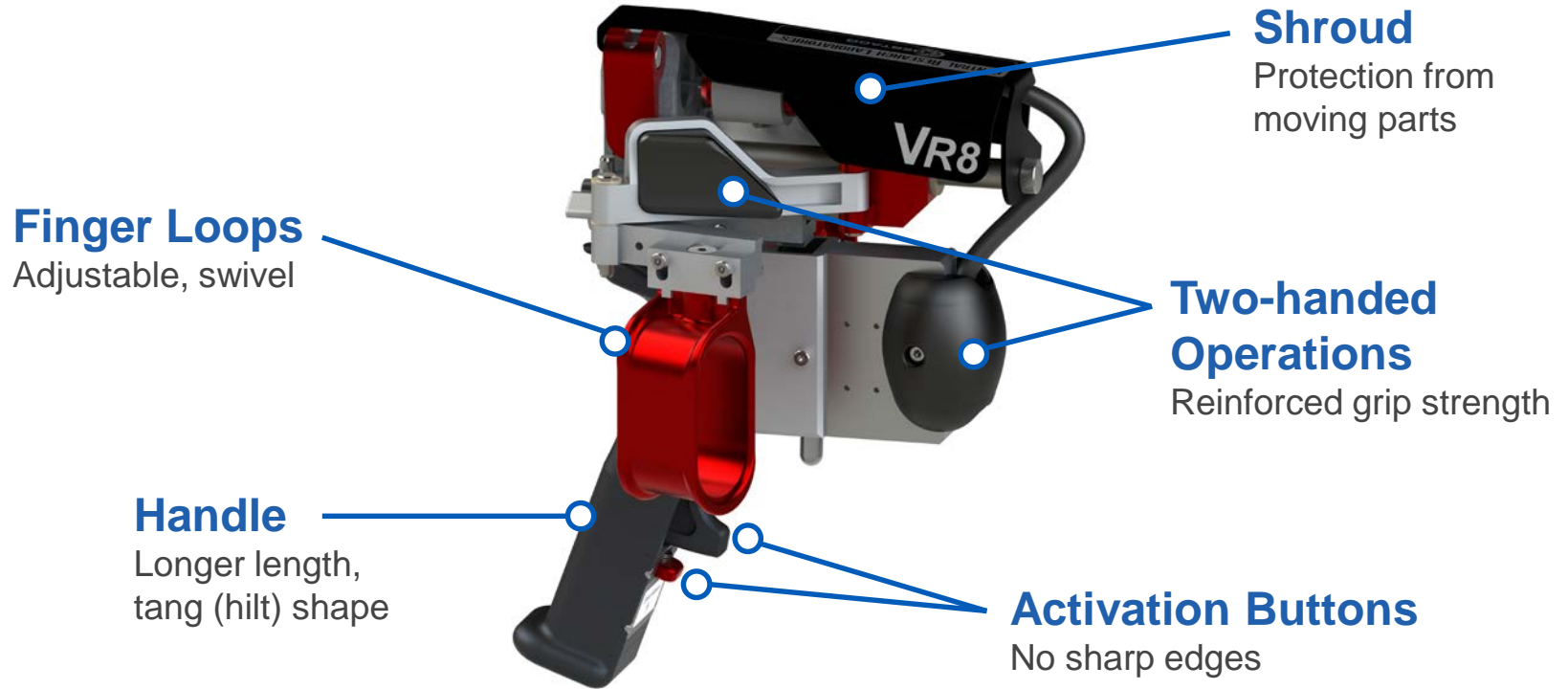
- Ergonomic Study issues addressed and incorporated
- Removable, Maintainable, Adjustable Design

This new system met all of the parameters for ergonomic operation in different wrist positions:

- ✓ Neutral
- ✓ Palmer Flexion
- ✓ Dorsiflexion
- ✓ Radial Deviation
- ✓ Ulnar Deviation

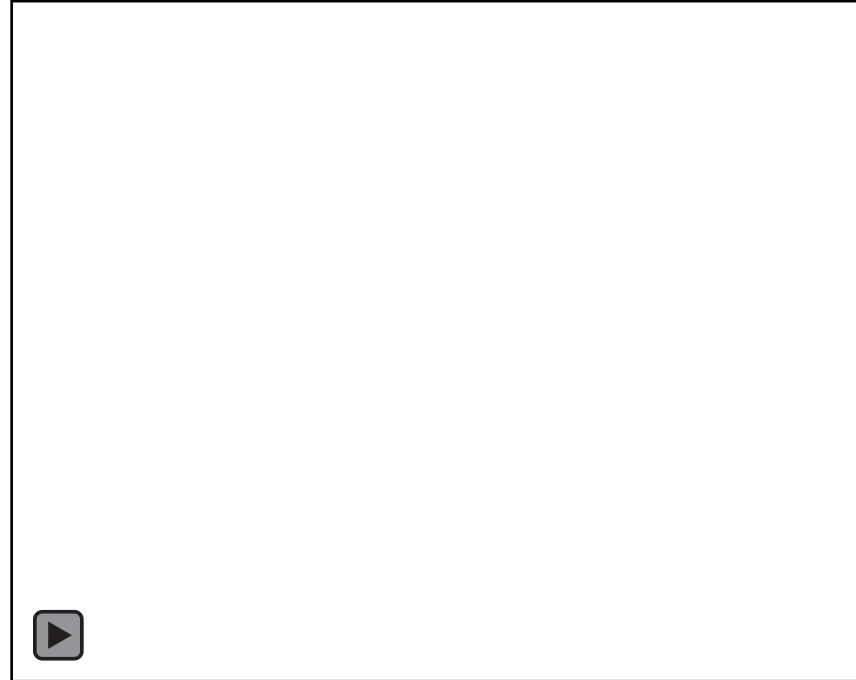
As well as the versatility that makes it usable by operators with:
Varying hand sizes | Dominant-hand orientations | Hand-strength levels

VERSA Handle System



Quickly Detachable Controls

- Requires No Tools to Remove
- Allows for Each Operator to Have a Perfectly Fitted Handle
- Allows for Change Between Handle Types
- Maintenance can be Easily Completed Off the Manipulator



MULTIPLE PATENTS PENDING

The result of this commitment is the

VERSA HANDLE SYSTEM

which stands ready to be a next-generation solution to all telemanipulator user and operations concerns.



VR8 Opposed Grip

THANK YOU!
QUESTIONS?

CRL *Central Research
Laboratories*
a DESTACO company