

الله أكبر

# پروئز پای دونده

نهبه کنده: پکنارسولزاده اسناد مربوطه: دکتر جمے

# فهرست مطالب

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# مقدمہ

- چتتم مصنوعے تنہر سوخنہ ( ۲۹۰۰ - ۲۱۰۰ قبل از مہلاد )
- انگشت بزرگ پای مصنوعے ( ۹۵۰ - ۱۰۱۰ قبل از مہلاد )
- پای مصنوعے رومے ( ۳۰۰ قبل از مہلاد )



Artificial Eye in Burnt City and Theoretical Understanding of How Vision Works: Abdorreza Naser MOGHADASI

A wooden toe: Swiss egyptologists study 3000 year old prosthesis Dr. Andrea Loprieno-Gnirs, Prof. Dr. Susanne Bickel University of Basel, Department of Ancient Civilizations

Prosthetics in Antiquity - An Early Medieval wearer of a foot prosthesis (6th century AD) from Hemmaberg/ Austria

# قطع عضو و اعضای مصنوعی در رسانه



"THIS MAN IS MINE"

The staff was cut and handed to the learner, who, planting it firmly on the ground before him, leaned on it, and exclaimed, 'Let it go!' in tones which instantly suggested 'the anchor' to his friends. The order was obeyed, and the ex-pirate stood swaying to and fro, and smiling with almost childlike delight. Presently he became solemn, lifted one leg, and set it down again with marvellous rapidity. Then he lifted the other leg with the same result. Then he lifted the staff, but had to replace it smartly to prevent falling forward. 'I fear I can only do duty as a motionless tripod,' he said rather anxiously. (Ballantyne 1883: 238)

Pirates and Prosthetics: Manly Messages for Managing Limb Loss in Victorian and Edwardian Adventure Narratives: Ryan Sweet



**Non-disabled men  
have things to learn  
from disabled men**

Tom Shakespeare, 1999

# اهمیت اعضای مصنوعی



- بهبود فعالیت روزانه
- کیفیت زندگی
- اشتغال و کمبود نیروی کار
- کمتر شدن نیاز به پرستار و هزینه‌های پرستاری



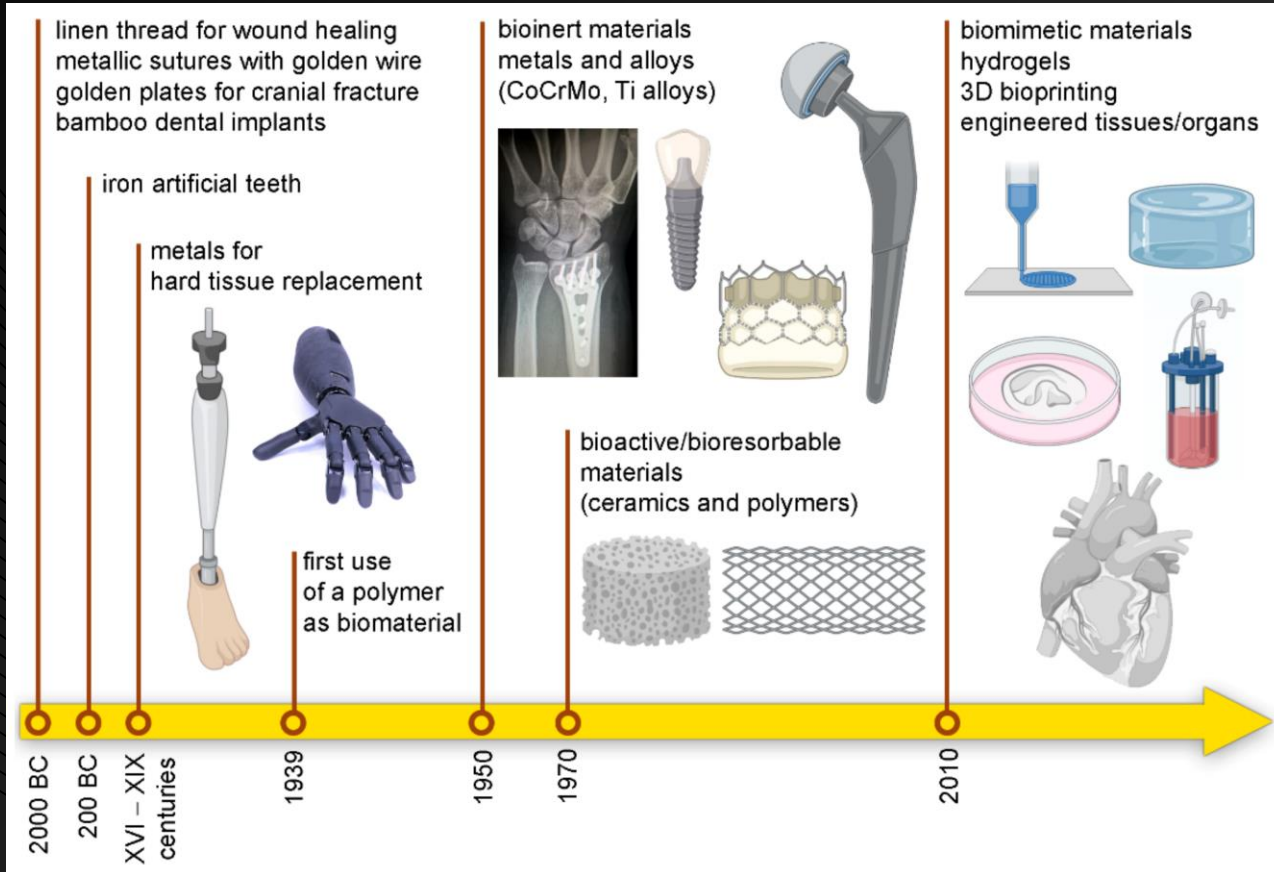
نمونه‌ای از پروتز اندام تحتانی

# انواع پروتزها

- پروتز اندام تحتانی
- پروتز اندام فوقانی
- پروتزهای زیبایی
- پروتزهای مایوکنتریک
- پروتزهای ورزشی



# مواد مورد استفاده در پروتزها



• رزین اکریلیک

• فایبر کربن

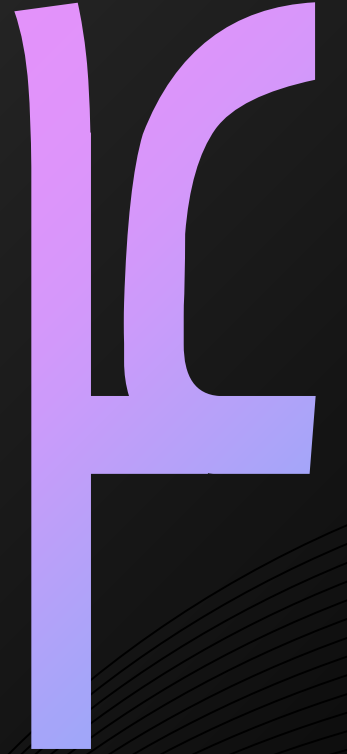
• ترموپلاستیک‌ها

• سپلیکن

• آلومینیم

• تیتانیوم

# بازار کار و آینده



• مینکران پارسبان درمان

[www.bonetech.ir](http://www.bonetech.ir)

• شرکت آترا ارتھوپد ارومیه

[www.atraorthoped.com](http://www.atraorthoped.com)

• شرکت اطلس بن طب

[www.atlasboneteb.com](http://www.atlasboneteb.com)

• شرکت تجهیزات پزشکی و صنعت

<https://teb-sanat.com>

• شرکت آدور

<https://www.ador.ir/>

• شرکت نوید آرنو

[navidortho.com](http://navidortho.com)

• شرکت تجهیزات پزشکی سینا مکس آراد

[www.sinamax.co](http://www.sinamax.co)

• شرکت موقوفه دانش سلامت کوثر

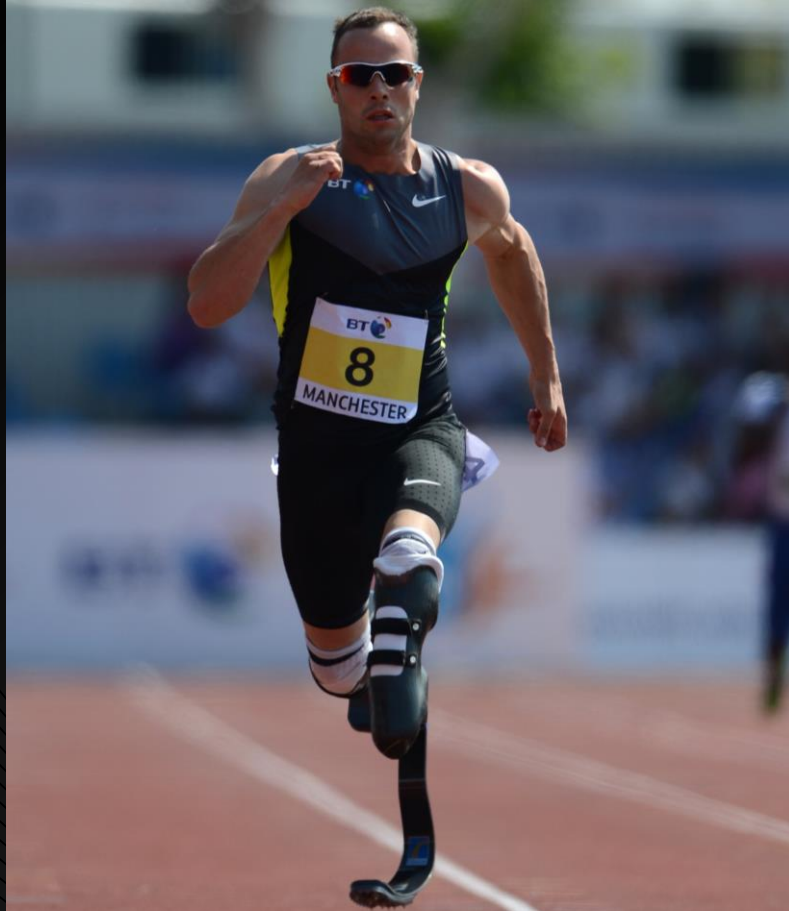
[www.kowsarmedical.com](http://www.kowsarmedical.com)

• شرکت پکتا تجهیزات نوین بوعلی

[www.ytnba.co](http://www.ytnba.co)

• شرکت تجهیزات پزشکی همیار طب کسری

[www.tanyar.org](http://www.tanyar.org)



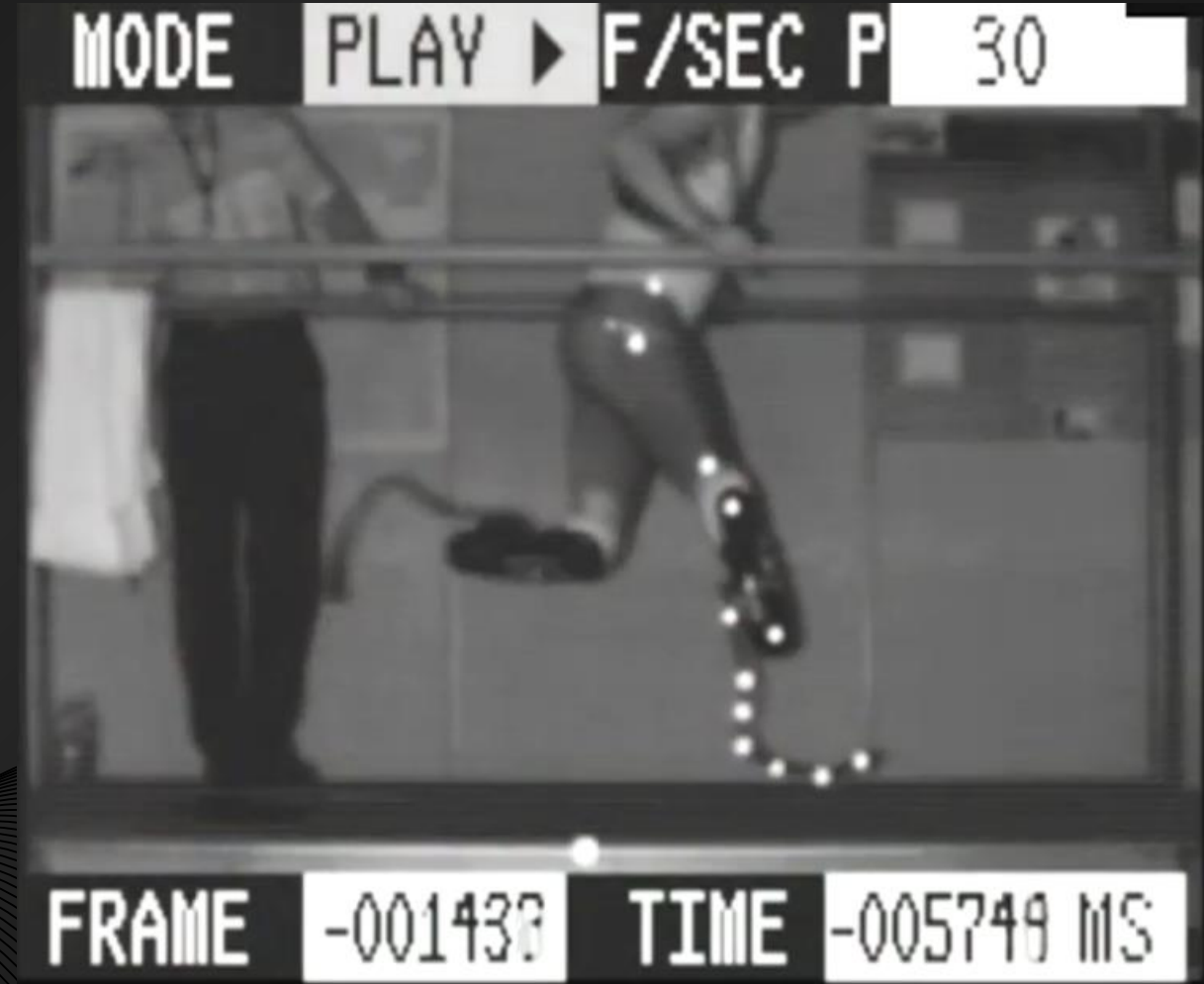
# پای مصنوعی دهنده



اسکار پیستوریوس ۲۲ نوامبر ۱۹۸۶ در پرتوریا به دنیا آمد. هر دو پای او از زانو به پایین نازک‌نی (استخوان نازک میان مفصل زانو و پاشنه پا) نداشتند. فقط یازده ماهه بود که هنگامه و شیلا پدر و مادرش تصمیم هر اس آورو شجاعت بار خود را عملی کردند؛ در یک عمل جراحی پاهای اسکار از زانو به پایین قطع شد و او راه رفتن را با پای مصنوعی آموخت.

مدال طلای دو ۲۰۰ متر و مدال برنز دو ۱۰۰ متر پارالمپیک آتن در گروه معلولین از یک پا را به دست آورده است و بارها رکوردهای جهانی دوهای ۱۰۰ متر، ۲۰۰ متر و ۴۰۰ متر پارالمپیک را شکسته است.

پیستوریوس که با یک پای مصنوعی ساخته شده از فیبر کربن قابل ارتجاع و تیغه مانند (معروف به چیتا) می‌دود، با کسب مدال نقره دو ۴۰۰ متر قهرمانی دو و میدانی آفریقای جنوبی در سال ۲۰۰۷ راه خود را به مسابقات انسان‌های سالم باز کرد. او که شرکت در المپیک پکن را هدف خود قرار داده بود، در ژوئیه ۲۰۰۷ به مسابقات جایزه بزرگ دو و میدانی شفیلد دعوت شد.



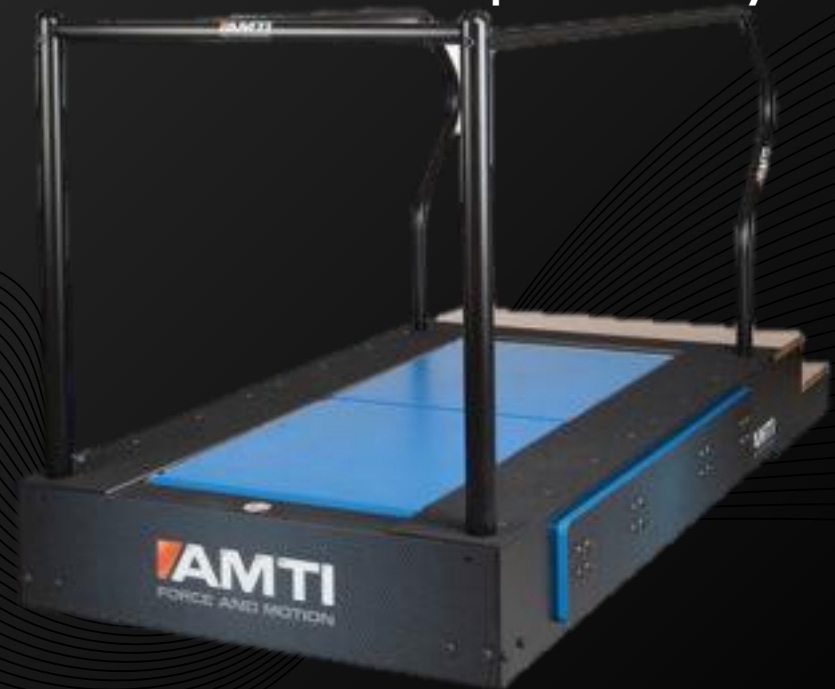
The fastest runner on artificial legs: different limbs, similar function? Peter G. Weyand,<sup>1,2</sup> Matthew W. Bundle,<sup>3</sup> Craig P. McGowan,<sup>4</sup> Alena Grabowski,<sup>5</sup> Mary Beth Brown,<sup>6</sup> Rodger Kram,<sup>7</sup> and Hugh Herr<sup>5</sup>

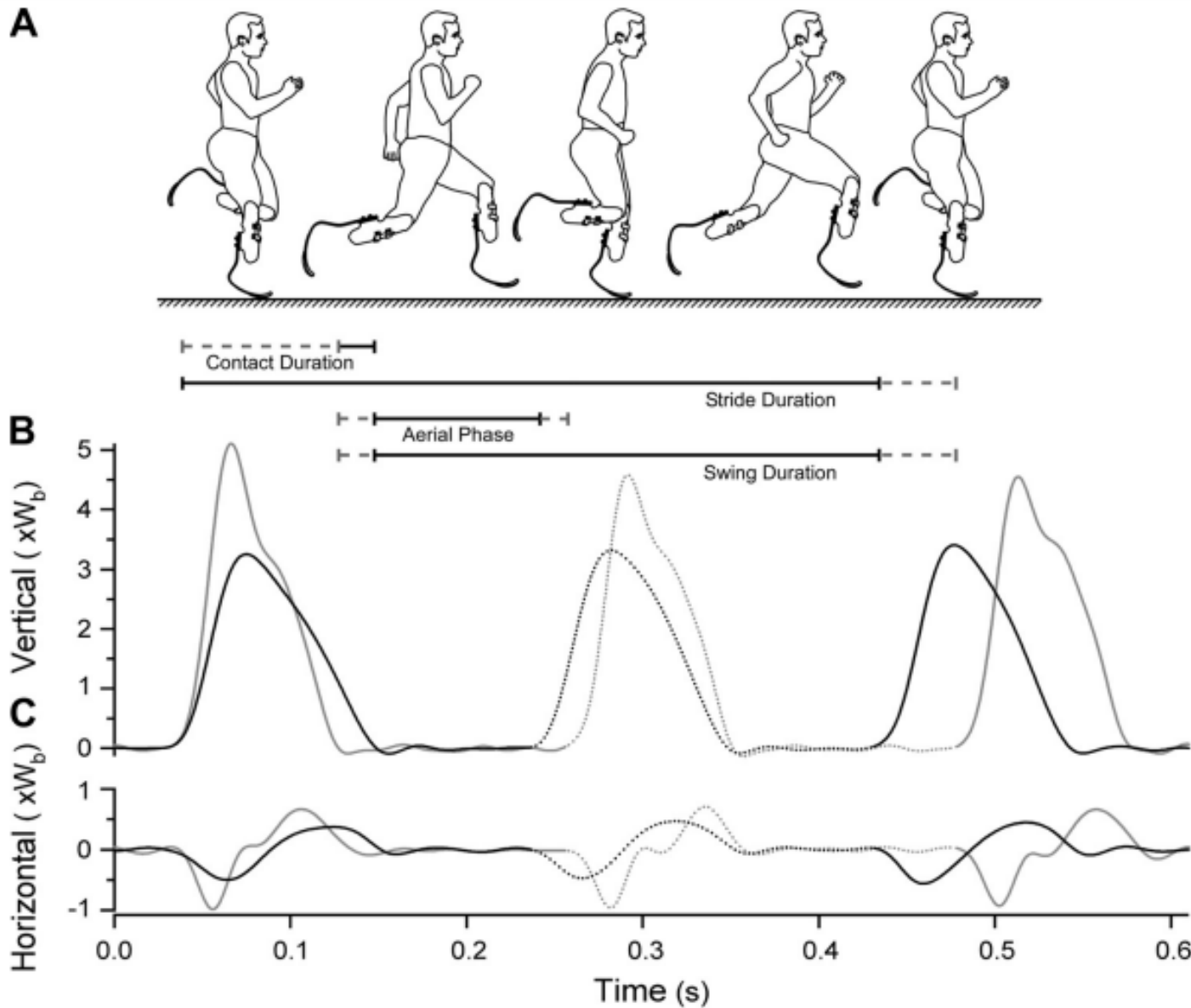
regarding the metabolic cost of running, we used the range of biological variability for runners with intact limbs from the most comprehensive study in the literature for competitive male runners at the elite and subelite levels (22). Additionally, we acquired metabolic data on subjects who were competitive 400-m runners with best performances similar to our amputee subject. Our first hypothesis was that the metabolic cost of running for our amputee subject would be greater than two SD below the means reported for each of these three intact-limb comparison groups (i.e., elite runners, subelite runners, and 400-m specialists with similar best performances).

The fastest runner on artificial legs: different limbs, similar function? Peter G. Weyand,<sup>1,2</sup> Matthew W. Bundle,<sup>3</sup> Craig P. McGowan,<sup>4</sup> Alena Grabowski,<sup>5</sup> Mary Beth Brown,<sup>6</sup> Rodger Kram,<sup>7</sup> and Hugh Herr<sup>5</sup>

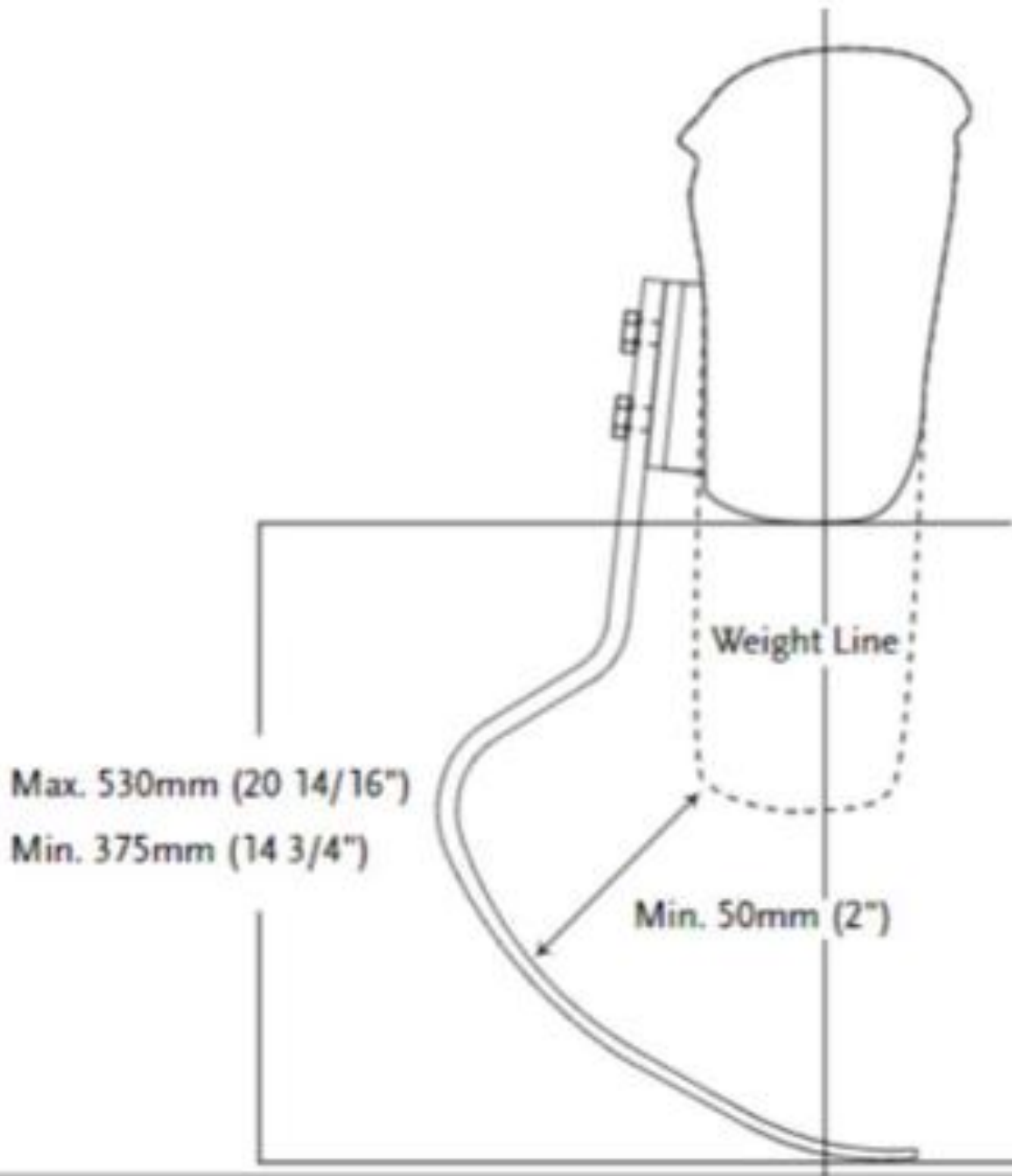
- test our second hypothesis, regarding sprinting endurance, we established intact-limb norms using the sizeable database present in the literature for competitive runners (7, 36). These studies indicate that the all-out speeds of intact-limb runners during any trial lasting
- from a few seconds to a few minutes can be accurately predicted from two variables: the top sprint speed and the minimum speed eliciting maximal aerobic power. If both of these speeds are known, the speed for any all-out trial from 3 to 300 s is provided by:

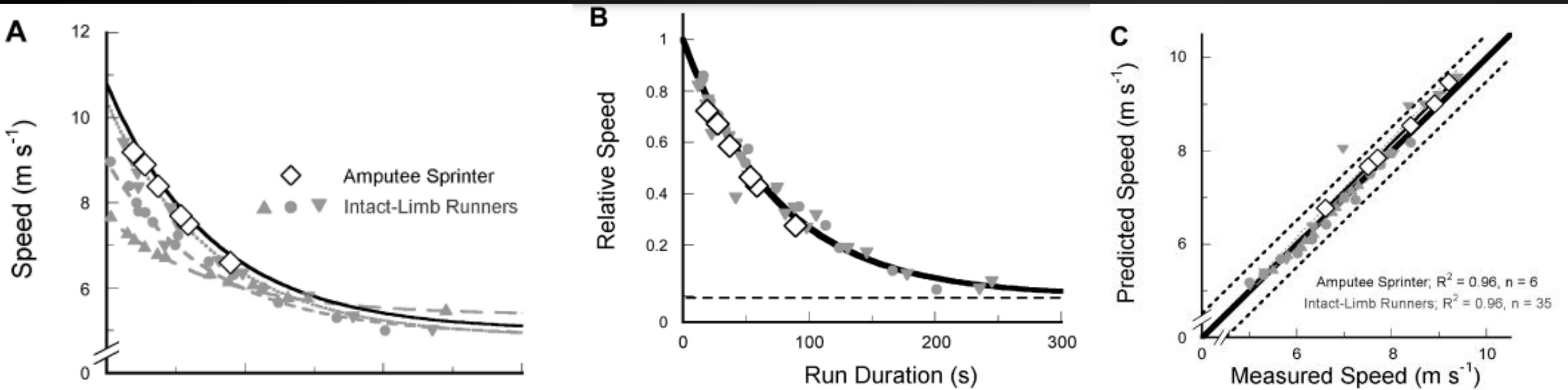
$$\text{Spd}(t) = \text{Spd}_{\text{aer}} + (\text{Spd}_{\text{ts}} - \text{Spd}_{\text{aer}}) \cdot e^{-kt}$$





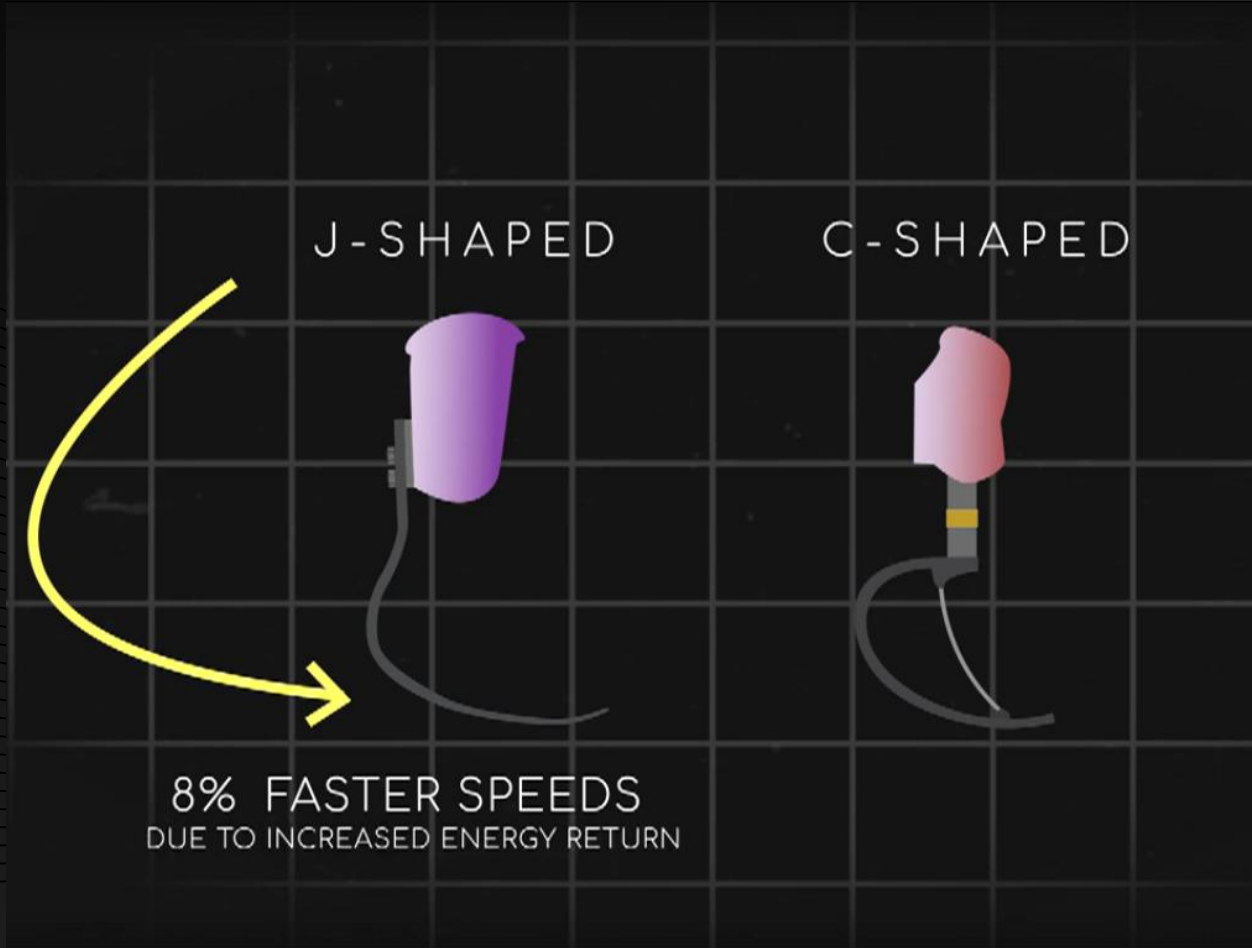
**A:** tracings from video images of our amputee subject during the contact, aerial, and swing phases of a stride while sprinting on a treadmill at 10.5 m/s. Also shown are the vertical (**B**) and horizontal ground reaction forces, normalized to body weight (**C**) vs. time for our amputee and an intact-limb subject at a treadmill speed of 10.5 m/s. Black (amputee sprinter) and gray lines (intact-limb sprinter) illustrate the ground reaction force traces of the right (solid) and left limbs (dotted) of the 2 subjects. Differences in the duration of the aerial, swing, and total stride times (shorter) for our amputee vs. intact-limb subject correspond to the dashed line extensions of the respective lines in **A** (bottom); differences in the duration of the contact time (longer) for our amputee vs. intact-limb subject correspond to the solid line extensions.



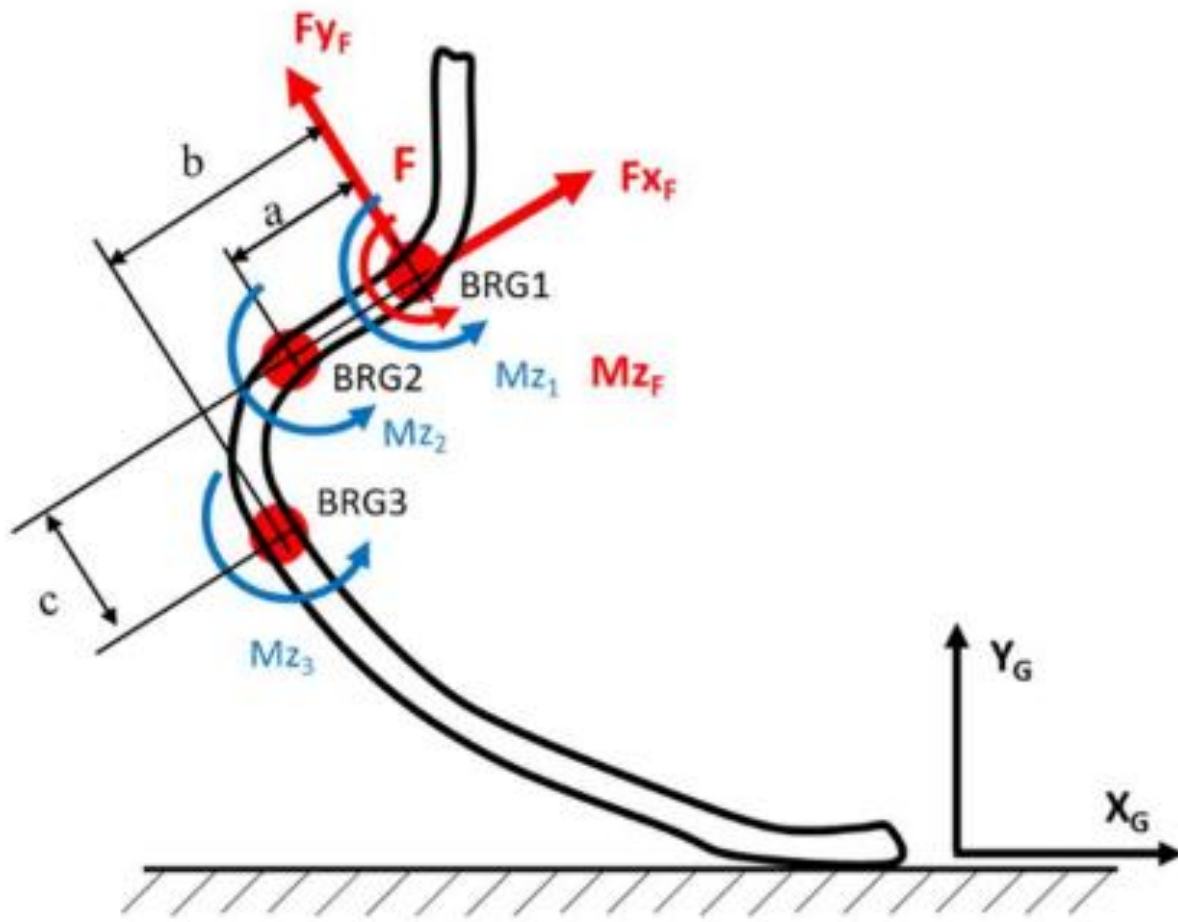


The mechanical dissimilarities observed highlight the functional trade-offs that are perhaps inevitable for artificial vs. biological limbs. The aerial and swing time reductions observed for our amputee subject support the classic, but largely untested, arguments of functional morphologists. For more than a half century, these scientists have postulated that light, slender limbs have evolved in cursorial animals to enhance speed by reducing the time required to reposition the limbs (13, 15, 16). However, the meager ground reaction forces observed during amputee running here and elsewhere (4, 11) identify what may be a critical limitation for speed (35). Legs must perform different functions during the stance and swing of the stride, as well as during the start, acceleration, and relatively constant-speed phases of sprint running. Collectively, our results underscore the difficulty of providing these multiple mechanical functions with a single, relatively simple prosthetic design and the formidable challenges involved in engineering limbs that fully mimic those produced by nature.

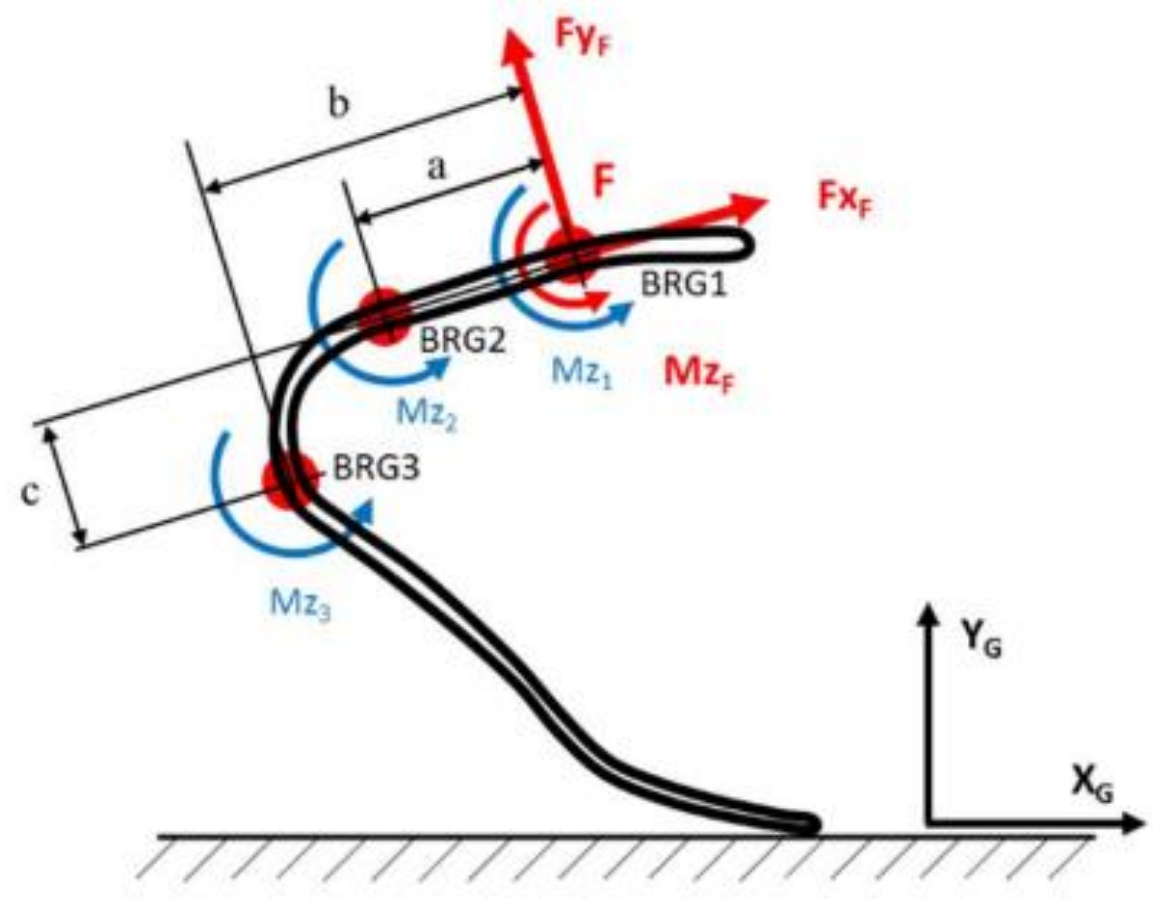
# اصول طراده پای مصنوعی دوندہ:



- شکل نبنہ مهم است.
- طراده سوکت.
- طراده نبنہ و اجزای اضافی



(a)



(b)

Sensing concept adopted for the instrumented running prosthetic foot. Three bending bridges sensing the bending moment  $Mz_1$ ,  $Mz_2$ , and  $Mz_3$  at known locations allow reconstructing the three load components  $F_{x_F}$ ,  $F_{y_F}$ , and  $Mz_F$  at the Foot reference system origin  $F$ . (a) Example of a Jshaped instrumented running prosthetic feet (RPF). (b) Example of a C-shaped instrumente

Formulas adopted for the calculation of bending moment acting at each bridge location are reported in:

$$Mz_1 = Mz_C + Fy_C \cdot x_1 - Fx_C \cdot y_1$$

$$Mz_2 = Mz_C + Fy_C \cdot x_2 - Fx_C \cdot y_2$$

$$Mz_3 = Mz_C + Fy_C \cdot x_3 - Fx_C \cdot y_3$$

The calibration procedure allowed evaluating the response of the three bending strain gauge bridge channels to known bending moments and calculating the linear calibration constant K of each bridge, as expressed by the following Equation:

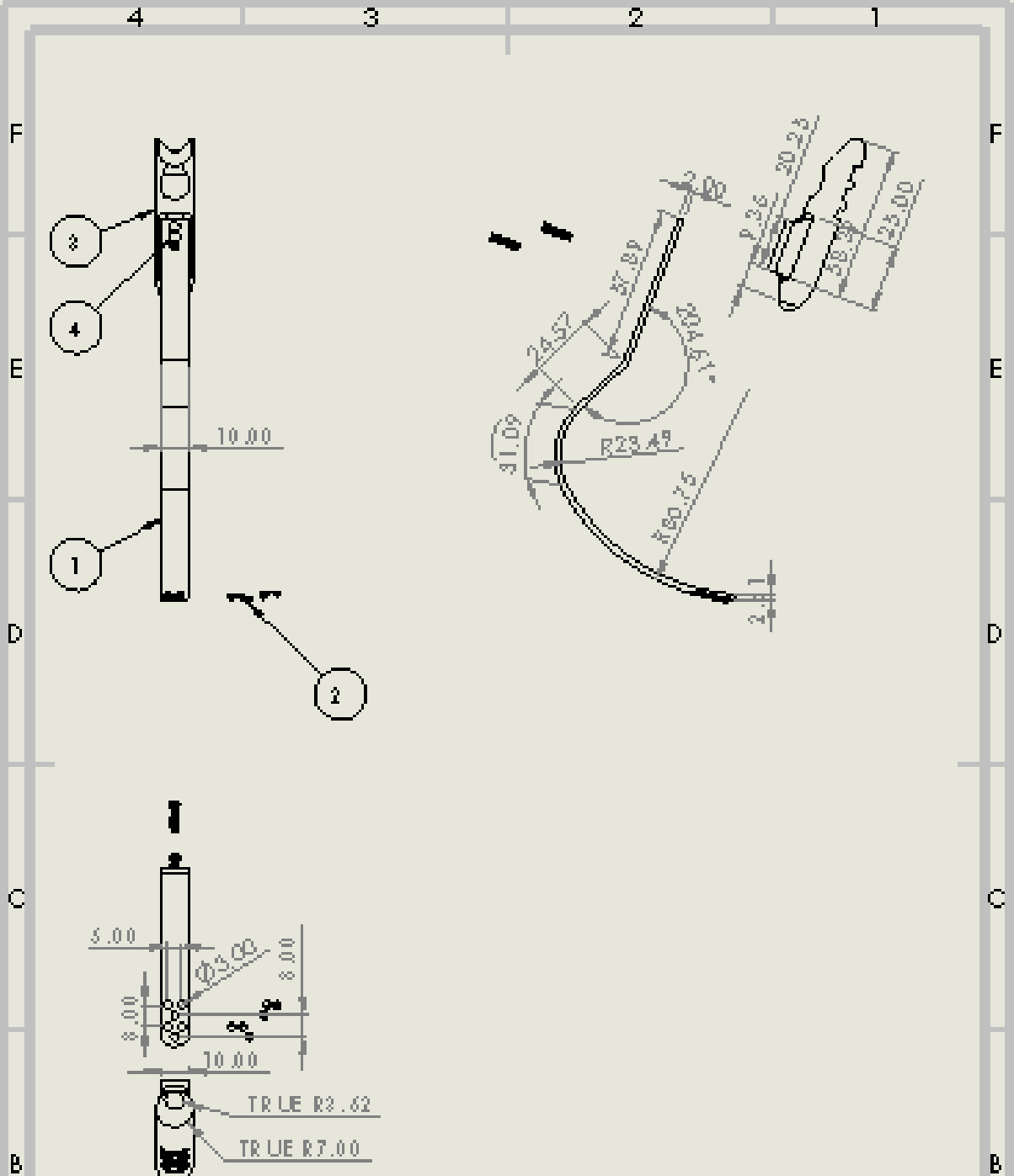
$$Mz_1[Nm] = K_1 \left[ \frac{Nm}{mV} \right] * brg_1 \left[ \frac{mV}{V} \right]$$

$$Mz_2[Nm] = K_2 \left[ \frac{Nm}{mV} \right] * brg_2 \left[ \frac{mV}{V} \right]$$

$$Mz_3[Nm] = K_3 \left[ \frac{Nm}{mV} \right] * brg_3 \left[ \frac{mV}{V} \right]$$

where  $Mz_1$ ,  $Mz_2$ , and  $Mz_3$  are the bending moment applied at the three bridges,  $brg_1$ ,  $brg_2$ , and  $brg_3$  are the three-signal output from the bridge channels, and  $K_1$ ,  $K_2$ , and  $K_3$  are the three calibration constants of the bridges.





**Edit Load** [X]

Name: Person\_Whole\_Weight  
Type: Surface traction  
Step: Dynamic\_Explicit (Dynamic, Explicit)  
Region: (Picked)

---

Distribution: Uniform  $f(x)$   
Traction: Shear

Direction

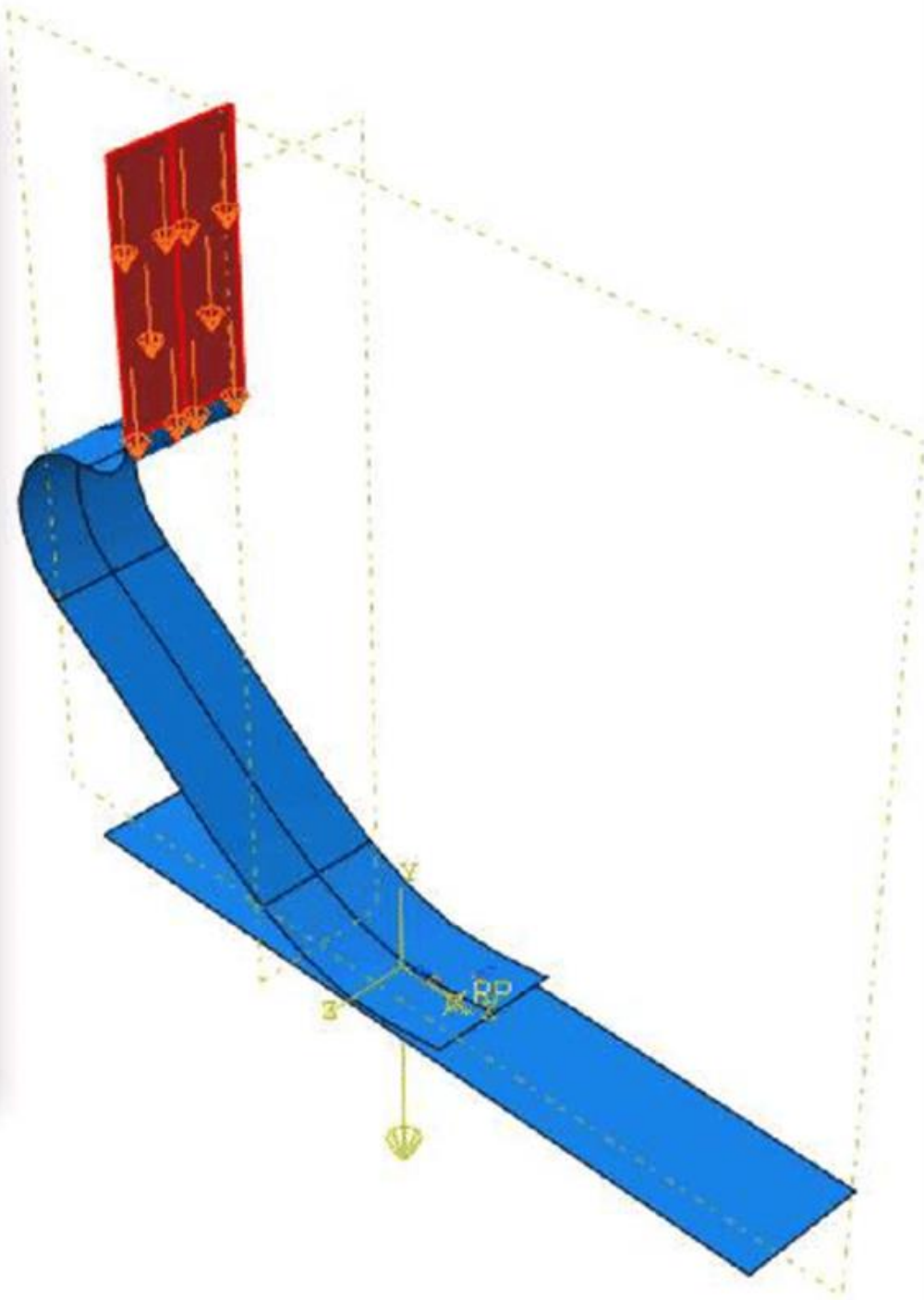
Vector before projection:  $(0, -1, 0)$   
CSYS: Global

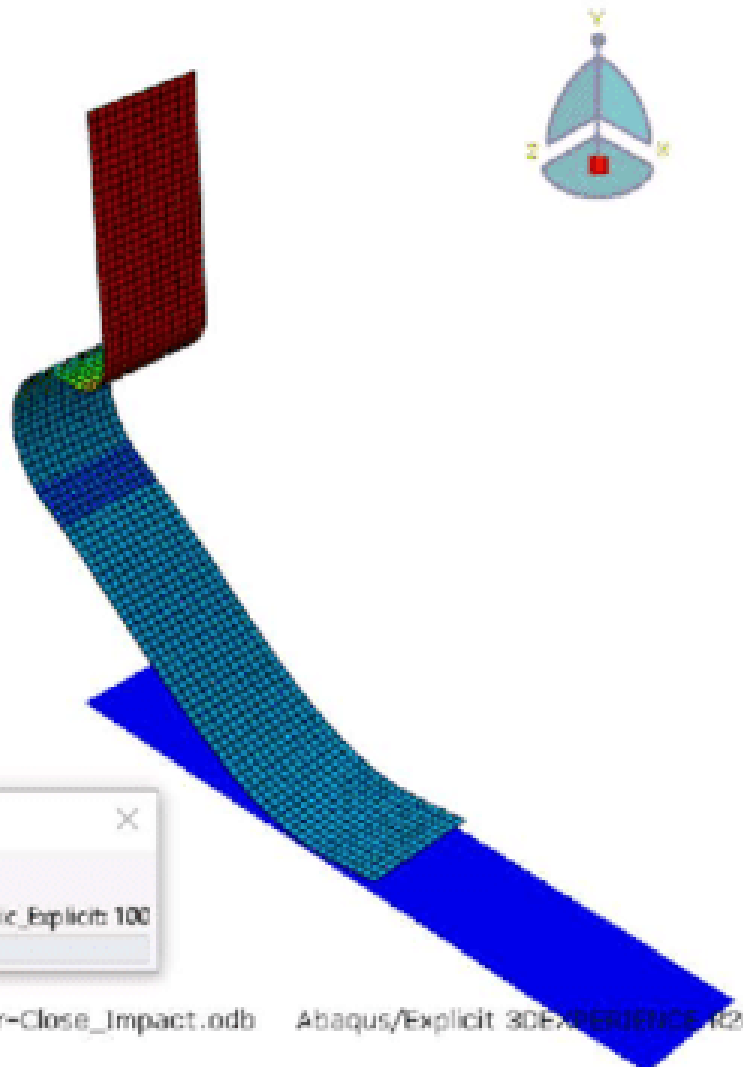
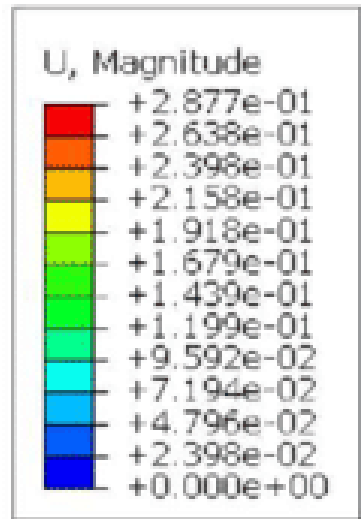
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Magnitude: 0.035  
Amplitude: (Instantaneous)  $A$

Traction is defined per unit deformed area  
Shear traction will always follow the rotation

OK Cancel





Frame Selector

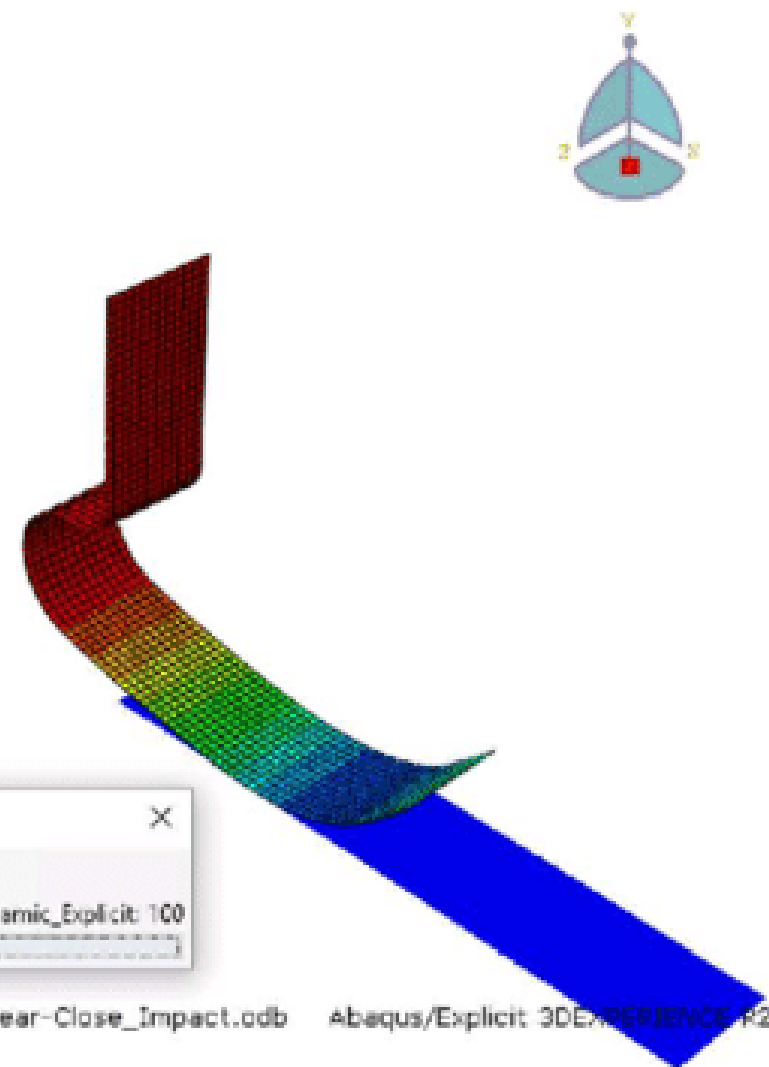
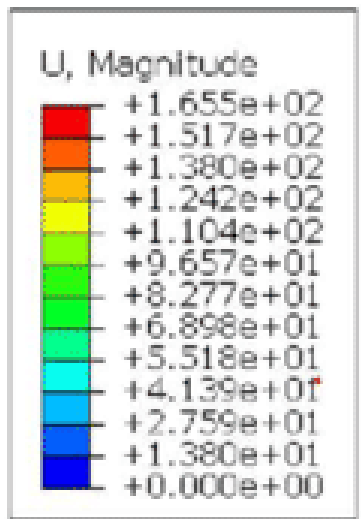
Dynamic\_Explicit

Dynamic\_Explicit: 0 Dynamic\_Explicit: 100

1

ODB: J-Model-2-Linear-Close\_Impact.odb Abaqus/Explicit 3D EXPERIENCE R2019

Step: Dynamic\_Explicit, Person falling on one foot contact to hard floor from sup  
 Increment 378; Step Time = 5.0047E-04  
 XPrimary Var: U, Magnitude  
 Deformed Var: U Deformation Scale Factor: +1.000e+00



Frame Selector

Dynamic\_Explicit

Dynamic\_Explicit: 0 Dynamic\_Explicit: 100

50

ODB: J-Model-2-Linear-Close\_Impact.odb Abaqus/Explicit 3D EXPERIENCE R2019

Step: Dynamic\_Explicit, Person falling on one foot contact to hard floor from sup  
 Increment 19453; Step Time = 2.5001E-02  
 XPrimary Var: U, Magnitude  
 Deformed Var: U Deformation Scale Factor: +1.000e+00



# مصادر